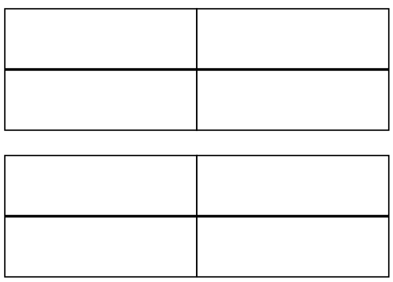
Fraction Action

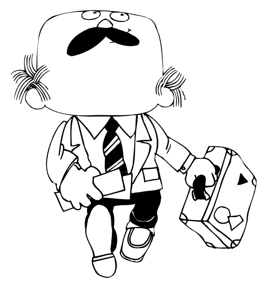
Draw a diagram to show that the fraction $\frac{3}{4}$ is the same as the fraction $\frac{9}{12}$.



(1.03)

Probability Pizzazz

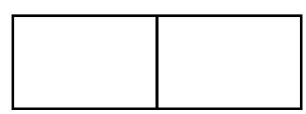
Matt packed four pairs of slacks (blue, black, tan, and grey) and three shirts (white, yellow, and green) for a trip. List all the different outfits that he could wear.



(4.01)

Geometry Gems

The garden below has fencing around the perimeter and as a partition down the center. The length of the garden is 30 feet, and the entire length of fencing used is 37 yards. How long is the partition (in feet)?



(Review)

Solve This!

Sandy delivers a total of 126 papers every week. If she delivers twice as many papers on each day of the weekend as she does on each day of the week, how many papers does she deliver on Sunday?

(1.07)

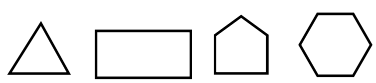
Mathematically Speaking

John and Betty both estimate the solution to 429 + 389. Explain why John's answer of 800 differs from Betty's answer of 820.

(Review)

Keeping Skills Sharp

1. $m + 54 = 82$
2. $\frac{7}{12} + \frac{5}{12} =$
3. 0.5 + 0.3 =
4. $16 \times 4 =$
5. 2 feet = _____ inches
6. Find the perimeter of a rectangle with the given length and width.
   L = 12 cm W = 10 cm
7. Find median for the following set of temperatures.
   {26˚, 26˚, 27˚, 29˚, 32˚, 25˚, 35˚}
8. (76 + 24) ÷ 10 =
9. If the letters of the word "ISOSCELES" were put on cards and placed in a bag, what is the probability that a vowel would be picked?
10. Draw the next two figures.

 _____ _____

Write answers here:

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________
2 ______________________
3 ______________________
4 ______________________
5 ______________________
6 ______________________
7 ______________________
8 ______________________
9 ______________________
10 ______________________

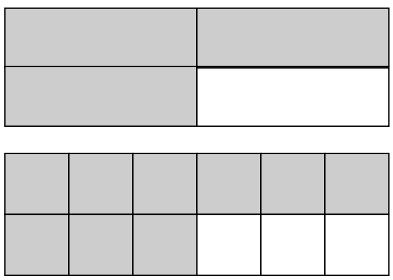
Answer Key

Grade 6 WEEK 1

Solve This!

28 papers are delivered on Sunday.

Fraction Action



Probability Pizzazz

12 possible oufits

Slacks	Shirt
Blue	White
Blue	Yellow
Blue	Green
Black	White
Black	Yellow
Black	Green
Tan	White
Tan	Yellow
Tan	Green
Grey	White
Grey	Yellow
Grey	Green

Geometry Gems

17 feet

Mathematically Speaking

John estimated by giving the answer to the nearest hundred. Betty gave the answer to the nearest ten.

Keeping Skills Sharp

1. 28
2. 1
3. 0.8
4. 64
5. 24 inches
6. 44 cm
7. median = 27
8. 10
9. $\frac{4}{9}$
10. any septagon
    any octagon

Mental Math

This section provides an opportunity for sharpening students' mental computation.

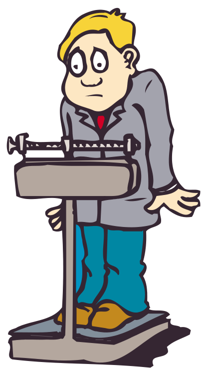
1. 836 to the nearest ten?
2. What number is 3 tenths less than 1?
3. How much is 6 dimes, 3 nickels, and 1 quarter?
4. How many inches are in 4 feet?
5. How many cups are in a quart?
6. Nine less than what number is 6?
7. The sum of what number and 14 is equal to 21?
8. The product of 4 and 12 is divided by some number to get an answer of 3. What is the number?
9. If $\frac{2}{5}$ of a pizza costs $4.00, how much will the whole pizza cost?
10. Eighteen is equal to twice what number?

Mental Math

1. 840
2. 0,7
3. $1
4. 48 inches
5. 4
6. 15
7. 7
8. 16
9. $10.00
10. 9

Fraction Action

A man weighs $\frac{5}{6}$ of his weight plus 30 pounds. What is his weight?



(1.07)

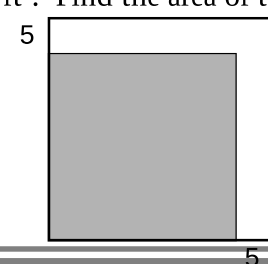
Probability Pizzazz

The sixth grade class officers: president, vice-president, secretary, and treasurer will be seated in a row of four chairs at the class meeting. In how many different ways may the four officers be seated?

(4.01)

Geometry Gems

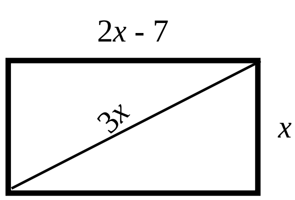
If two sides of a square field were increased by five feet, as seen in the diagram, the area of the field would increase by 245 ft^2. Find the area of the original square.



(review)

Solve This!

Write an expression to represent the perimeter of the following rectangle.



(5.01)

Mathematically Speaking

What is the easiest way to multiply a number by 100?

(1.04)

Keeping Skills Sharp

Write answers here:

1. $192 + k + 12 = 213$
2. $\frac{7}{12} + \frac{7}{12} =$
3. $1.5 + 0.3 =$
4. $25 \times g = 75$
5. 2 quarts = ___ pints
6. Find the area of a rectangle with the following dimensions.
   $L = 12$ cm $W = 10$ cm
7. Find the range for the following scores:

   26, 26, 27, 29, 32, 25, 35
8. $46 + 8 \div 4 + 6 =$
9. If a fair spinner is divided into 4 equal parts, 2 colored blue, one green and one red, what is the probability that you would spin a blue?
10. For the spinner in #9 above, what is the probability that you would spin a green or a red?

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________ 6 ____________________

2 ____________________ 7 ____________________

3 ____________________ 8 ____________________

4 ____________________ 9 ____________________

5 ____________________ 10 ____________________

Answer Key

Grade 6
WEEK 2

Fraction Action

Solution: 30 lbs is the other sixth which means every other sixth must be 30 lbs as well.

6×30 pounds = 180 pounds

Geometry Gems

Answer: 484 ft^2. The corner piece is 5×5 or 25 ft^2. The rest of the new space is then 220 ft^2. Each small added rectangle must be 22×5. The square is 22×22.

Solve This!

$6x$ - 14

Probability Pizzazz

24 possibilities

Mathematically Speaking

The easiest way to multiply a number by 100 is to add two zeros to the right end of it, or if it is a decimal number, shift the decimal two places to the right.

Keeping Skills Sharp

1. 9
2. $\frac{14}{12} = 1\frac{2}{12} = 1\frac{1}{6}$
3. 1.8
4. 3
5. 4
6. 120 cm^2
7. Range = 10
8. 54
9. $\frac{1}{2}$
10. $\frac{2}{4}$ or $\frac{1}{2}$

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. 11×700
2. 900×40
3. $64{,}000 \div 0.8$
4. $\frac{4}{5} + \frac{3}{10}$
5. If $\frac{5}{10}$ of a number is 80, what is the number?
6. Estimate 56×3.
7. Which fraction is smaller? $\frac{1}{10}, \frac{1}{5}, \frac{1}{8}$
8. What is the product of the factors of 6?
9. $10\frac{1}{3} - 8\frac{1}{6}$
10. $\frac{9}{10} \times 5$

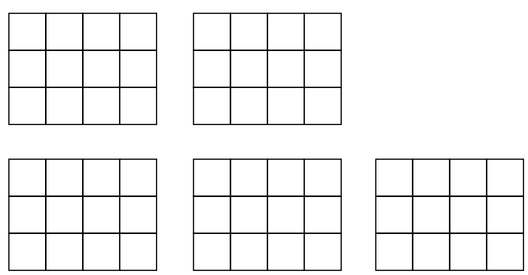
Mental Math

1. 7,700
2. 36,000
3. 80,000
4. $\frac{11}{10}$ or $1\frac{1}{10}$
5. 160
6. ≈ 180
7. $\frac{1}{10}$
8. $1 \times 2 \times 3 \times 6 = 36$
9. $2\frac{1}{6}$
10. $\frac{9}{2}$ or $4\frac{1}{2}$

Fraction Action

Shade in the shapes below to find the sum:

$1\frac{1}{4} + 2\frac{2}{3}$



(1.04)

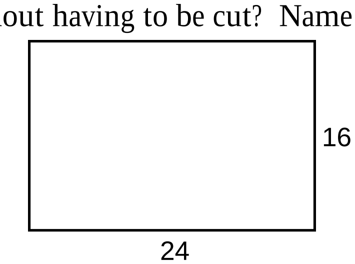
Probability Pizzazz

John is doing an activity that involves tossing three fair coins. What is the probability that he will obtain two Heads and one Tail on his next toss?

(4.02)

Geometry Gems

How many 3 cm by 4 cm tiles are needed to cover this figure? Is there any other size tile that will fit this figure without having to be cut? Name them. Explain.



(1.05)

Solve This!

Susan is working out a problem in which she is supposed to put numbers in each shape. If there is a 5 in the square, and the answer is 32, what number was in the triangle?

$\boxed{5} + \triangle^{3}$

(1.05)

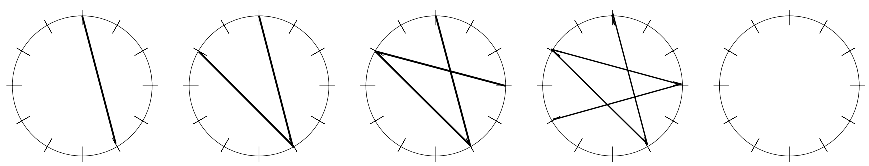
Mathematically Speaking

Two methods can be used to determine where to place a decimal point when multiplying decimals. Tell what they are.

(1.04)

Keeping Skills Sharp

1. $3 + w + 97 = 115$
2. $2\frac{1}{3} \quad + \quad 12\frac{5}{6} \quad =$
3. $2.5 + 0.031 =$
4. Order from least to greatest: $\frac{5}{6}, \frac{7}{10}, \frac{3}{4}$
5. 36 inches = ___ yards
6. An isosceles triangle with a base of 5 cm has a perimeter of 30 cm. How long are each of the other two sides?
7. Find the median: 18, 7, 26, 10, 15.
8. $(10 + 2) \div (6 - 3) =$
9. If you roll a fair six-sided number cube, what is the probability that you will roll a number less than a 3?
10. Draw the next figure in the pattern.



Write answers here:

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________

2 ______________________

3 ______________________

4 ______________________

5 ______________________

6 ______________________

7 ______________________

8 ______________________

9 ______________________

10 ______________________

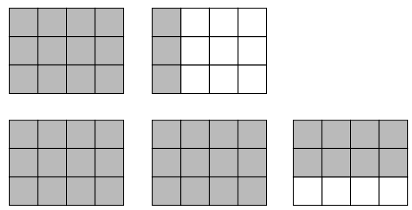
Answer Key

Grade 6
WEEK 3

Solve This!

The answer is 3. $5 + \underline{3}^3 = 32$

Fraction Action



The answer is $3\frac{11}{12}$.

Geometry Gems

It will take 32 tiles (3 cm by 4 cm) to cover the figure. There are 34 other sizes that will fit. The length of the tile should be a factor of one side, and the width should be a factor of the other side.

Probability Pizzazz

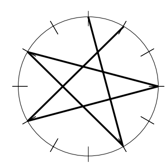
$\frac{3}{8}$

Mathematically Speaking

1. Estimate your answer.
2. The number of decimal places to right of the decimal in the answer should be the sum of the number of decimal places to the right of the factors.

Keeping Skills Sharp

1. 15
2. $15\frac{1}{6}$
3. 2.531
4. $\frac{7}{10}$, $\frac{3}{4}$, $\frac{5}{6}$
5. 1
6. 12.5
7. median = 15
8. 4
9. $\frac{2}{6}$ or $\frac{1}{3}$
10



Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. $2 \times 7 \times 5$
2. $15 \times 2 \times 5 \times 2$
3. Find the product of 3 and 840.
4. $2400 \div 60$
5. $90 – 40 + 80 – 40$
6. Write 75% as a decimal.
7. What is the least common multiple of 6 and 8?
8. Which of these is larger? $\frac{65}{100}$, $\frac{4}{5}$, 0.81
9. $\frac{5}{8} = \frac{?}{32}$
10. $10 - 5\frac{1}{5}$

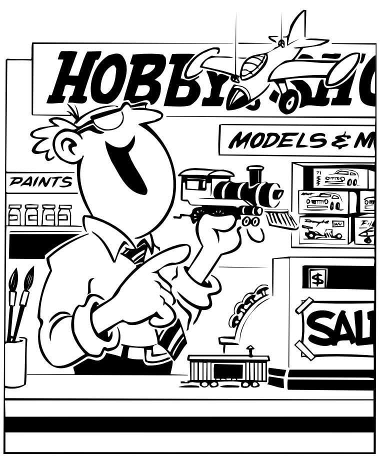
Mental Math

1. 70
2. 300
3. 2520
4. 40
5. 90
6. 0.75
7. 24
8. 0.81
9. 20
10. $4\frac{4}{5}$

Fraction Action

Bill, Rasheed, and Juan own a hobby shop.

Juan owns $\frac{5}{8}$ of the shop. Rasheed owns twice as much as Bill. What fraction of the shop does Bill own?



(1.04)

Probability Pizzazz

Andy and Fran are playing a game that involves tossing two fair number cubes, numbered one to six, and recording the sum of the two numbers.

How many different sums are possible?

What is the greatest possible sum?

(4.01)

Geometry Gems

Each side of a regular octagon measures $x + 3$ cm. Write a simplified expression to represent the perimeter of this figure.

(5.01)

Solve This!

Number Sense

Rearrange the following to make a true equation.

1 2 3 4 × =

(1.07)

Mathematically Speaking

Explain why you can multiply two decimal numbers together and get an answer less than either one of the numbers you multiplied.

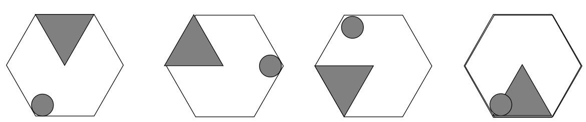
(1.04)

Keeping Skills Sharp

Write answers here:

1. $222 + p + 4 = 259$
2. $\frac{8}{15} - \frac{2}{15} =$
3. $7 + 0.08531 =$
4. $125 \times 28 =$
5. 15 feet = ___ yds
6. What is the measure of each of the interior angles of an equilateral triangle?
7. Find the median for the following test grades:

   95, 98, 88, 91, 85, 94.
8. $21 - 6 \times 3 =$
9. If you toss a fair coin 250 times, about how many times should it land on tails?
10. Draw the next figure in the pattern.



1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________________

2 ______________________________

3 ______________________________

4 ______________________________

5 ______________________________

6 ______________________________

7 ______________________________

8 ______________________________

9 ______________________________

10 ______________________________

Answer Key

Grade 6
WEEK 4

Fraction Action

Bill owns $\frac{1}{8}$, Rasheed owns $\frac{2}{8}$, and Juan owns $\frac{5}{8}$.

Solve This!

One solution is $3 \times 4 = 12$.

Mathematically Speaking

When a number is multiplied by a number less than one, it gets smaller.

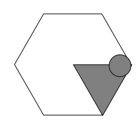
Probability Pizzazz

11; 12

Geometry Gems

$8x + 24$

Keeping Skills Sharp

1. 33
2. $\frac{6}{15} = \frac{2}{5}$
3. 7.08531
4. 3500
5. 5 yards
6. 60°
7. 92.5
8. 3
9. about 125
10. 

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Which is greater: $\frac{1}{2}$ or .55?
2. What is $\frac{2}{5}$ when written as a decimal?
3. Give two other forms of the fraction $\frac{6}{4}$.
4. Write three fractions equivalent to the number 4.
5. What is $\frac{1}{4}$ of 500?
6. $45 + 35 + 25 + 15 + 5$
7. $40 - 29.99$
8. $980 \div 20$
9. 36×25
10. Add the factors of 10.

Mental Math

1. 0.55
2. 0.4
3. $\frac{3}{2}$ or $1\frac{1}{2}$
4. Some possibilities:
   $\frac{8}{2}$, $\frac{4}{1}$, $\frac{12}{3}$
5. 125
6. 125
7. 10.01
8. 49
9. 900
10. $1 + 2 + 5 + 10 = 18$

Fraction Action

A mechanic makes \$15.25 an hour for a forty hour work week. She pays $\frac{1}{4}$ of her income in taxes. She saves 0.20 of her income. After paying taxes and putting money in savings, how much does she have left each week?

(1.04)

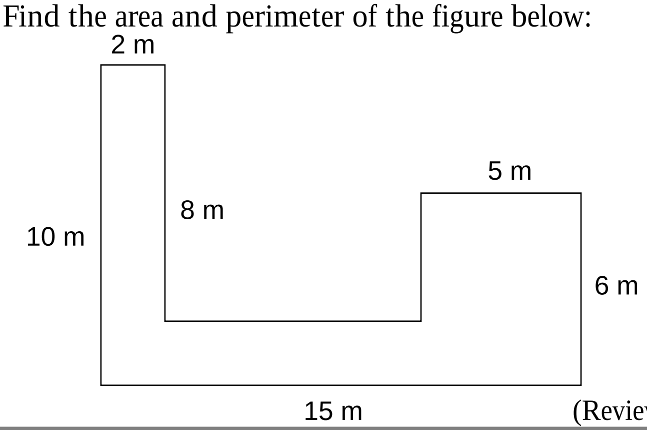
Probability Pizzazz

Mrs. Allen is eating lunch at the cafeteria. She decideds to have one salad, one dessert, and one drink. There are four salad choices, five desseert choices, and three drink choices. How many different lunch combinations are possible?

(4.01)

Geometry Gems

Find the area and perimeter of the figure below:



(Review)

Solve This!

Make a table

Gary spent \$2.30 when he bought 8 pieces of fruit. Apples cost \$0.25 and pears cost \$0.35. How many of each fruit did he buy?

Apples	Cost	Pears	Cost	Total Cost

(1.07)

Mathematically Speaking

Ann is five years older than twice her brother Dan's age, *a*. Write an algebraic expression to represent the sum of their ages.

(5.01)

Keeping Skills Sharp

Write answers here:

1. $120 - b = 102$
2. $405 \times \frac{1}{5} =$
3. $8 - 0.28 =$
4. $2586 \div 3 =$
5. 15,840 feet = _____ miles
6. Find the perimeter of the triangle whose sides measure 7.5 cm, 7.1 cm, and 8.2 cm.
7. Find the mode for the following set of measurements:

   5 m, 7 m, 5 m, 5 m, 7 m, 6 m, 10 m, 5 m, 7 m
8. $23 - (6 + 2) \div 2 =$
9. If you roll a fair six-sided number cube, what is the probability of rolling an odd number?
10. Complete the pattern: 12, 6, 3, 1.5, ___, ___, ___

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. __________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6
WEEK 5

Fraction Action

$\$15.25 \times 40$ hours = \$610.00

$\frac{1}{4}$ of 610 = 152.50

$\frac{1}{5}$ of 610 = 122

\$335.50 is left.

Geometry Gems

Perimeter = 58 meters
Area = 66 square meters

Probability Pizzazz

60 possible combinations

Solve This!

Apples	Cost	Pears	Cost	Total Cost
5	\$1.25	3	\$1.05	\$2.30

Mathematically Speaking

$3x + 5$

Keeping Skills Sharp

1. 18
2. 81
3. 7.72
4. 862
5. 3
6. 22.8 cm
7. mode = 5 m
8. 19
9. $\frac{3}{6}$ or $\frac{1}{2}$
10. 0.75, 0.375, 0.1875

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. 640 + 280
2. 1000 – 390
3. 47.6 – 12.4
4. 14.0721 to the nearest hundredth
5. 57,412 to the nearest thousand
6. Find the area of a square where one side is 4 meters.
7. What is $\frac{1}{2}$ of 1200?
8. What is 3 times 410?
9. What is $\frac{1}{2}$ of 5 written as a decimal?
10. Divide 100 by 10 , add 3, subtract 7 and multiply by 2.

Mental Math

1. 920
2. 610
3. 35.2
4. 14.07
5. 57,000
6. 16 square meters
7. 600
8. 1,230
9. 2.5
10. 12

Fraction Action

Chef Lee made a recipe of soup which yields 30 cups. If he puts $1\frac{1}{4}$ cups of soup in each serving, how many servings does he have?

(1.04)

Probability Pizzazz

Barry is tossing two fair number cubes, numbered one to six, and recording the product of the two numbers. What is the probability that the product will be an even number? a number less than or equal to six?

(4.02)

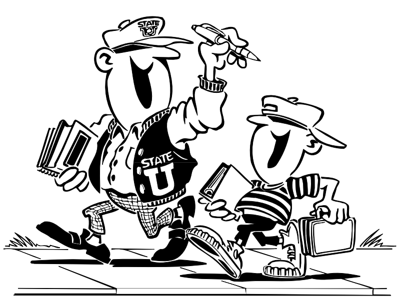
Geometry Gems

If the length of a rectangle is twice its width, *w*, write an expression to represent the perimeter of the rectangle. If the perimeter of the rectangle is 72 inches, what is the length and width of the rectangle?

(5.01)

Solve This!

Mark tutors for his little brother for $1\frac{1}{4}$ hours each weekday afternoon and $2\frac{3}{4}$ hours on Saturday. What is the total number of hours he tutors his brother in a week?



(1.04)

Mathematically Speaking

Simplify: $14x + 8 - 20x \div 5 + 2(x - 1)$

(5.01)

Keeping Skills Sharp

Write answers here:

1. $Z - 22 = 26$
2. What is the name of the point where the sides of an angle intersect?
3. $8.51 - 3.2 =$
4. Estimate: $295 \div 19$
5. 1 gallon = ___ cups
6. Find the area of a walkway that goes around a rectangular swimming pool. The pool has a length of 30 feet, and a width of 18 feet. The walkway has a width of 4 feet all around the pool.
7. Find the range of the following temperature readings:

   25˚, 5˚, 101˚, 16˚, 78˚
8. $6 \times (100 - 76) =$
9. If you roll a fair six-sided number cube. What is the probability of rolling an eight?
10. Complete the pattern: 1, 2, 6, 24, ___, ___

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________________

2 ______________________________

3 ______________________________

4 ______________________________

5 ______________________________

6 ______________________________

7 ______________________________

8 ______________________________

9 ______________________________

10 ______________________________

Answer Key

Grade 6
WEEK 6

Solve This!

He babysits for 9 hours in a week.

Fraction Action

24 servings

Geometry Gems

Perimeter = $6x$

length = 24 inches

width = 12 inches

Mathematically Speaking

$12x + 6$

Probability Pizzazz

P (even number) = $\frac{27}{36}$ or $\frac{3}{4}$

P (number ≤ 6) = $\frac{14}{36}$ or $\frac{7}{12}$

Keeping Skills Sharp

1. 48
2. vertex
3. 5.31
4. 15
5. 16
6. 448 ft^2
7. 96˚
8. 144
9. $P(8) = 0$
10. 120, 720

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. $22 \times 1{,}000$
2. 13×100
3. $720 \div 9$
4. $6{,}500 \div 10$
5. $4{,}870 - 210$
6. $\frac{3}{7} \times \frac{7}{10}$
7. How many ounces are in $2\frac{1}{2}$ pounds?
8. How many quarts are in 10 pints?
9. 8 feet = _?_ yards
10. List the prime numbers from 2 to 20.

Mental Math

1. 22,000
2. 1,300
3. 80
4. 650
5. 4660
6. $\frac{3}{10}$
7. 40 ounces
8. 5 quarts
9. $2\frac{2}{3}$ yards
10. 2, 3, 5, 7, 11, 13, 17, 19

Fraction Action

It is $3\frac{11}{12}$ miles around Westwood Park's bike trail. After skating around the trail $5\frac{1}{2}$ times, Bonnie lost a wheel. About how many miles had she skated?

(1.04)

Probability Pizzazz

If you toss two fair number cubes with faces labeled zero to five, what is the probability that the sum of the two numbers will be greater than seven? Is there one sum that is more likely to occur than any other sum? Explain.

(4.02)

Geometry Gems

Janine made a poster in the shape of a regular pentagon. If the perimeter of the poster is 60 inches, what is the length of each side of the poster? What is the sum of the measures of the interior angles of the poster?

(Review)

Solve This!

Jimmy spends $\frac{3}{4}$ of an hour getting ready for work. It takes 30 minutes to travel to his office. If he needs to be at work at 9:00 a.m., what time should he get up?

(1.04)

Mathematically Speaking

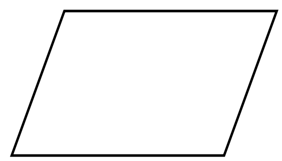
Explain why one is called the multiplicative identity and zero is called the additive identity.

(5.01)

Keeping Skills Sharp

Write answers here:

1. $156 - h = 131$
2. If a coach estimates that each football player will eat $\frac{3}{4}$ of a pizza, how many should he order to feed 16 players?
3. $4 - 1.58 =$
4. $13\frac{1}{2} \div 2\frac{1}{4} =$
5. 1 meter = ___ centimeters
6. Find the perimeter of the parallelogram:
   base = 10.1 cm; side = 8.2 cm; height = 9.1



7. Find the median for the following measurements: 12 cm, 16 cm, 18 cm, 21 cm, 28 cm, 30 cm
8. $9 + 2 \times 5 + 6 =$
9. If the letters of the word "CITY PLANNER" were each written on a card and placed in a bag,, what is the probability of picking an "N"?
10. Complete the pattern: 1, 4, 16, 64, ___, ___

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6

WEEK 7

Solve This!

7:45 a.m.

Geometry Gems

12 inches; 540˚

Fraction Action

Best estimate might be 4 miles × 5.5 trips 22 miles.

Mathematically Speaking

Answers will vary. Ex. Multiplying one by any number does not change the value of the number. Adding zero to any number does not change the value of the number..

Probability Pizzazz

P (sum > 7) = $\frac{6}{36}$ or $\frac{1}{6}$

The sum of 5 is more likely than any other sum

P (sum = 5) = $\frac{6}{36}$ or $\frac{1}{6}$

Keeping Skills Sharp

1. 25
2. 12 pizzas
3. 2.42
4. 6
5. 100
6. 36.6 cm
7. median = 19.5 cm
8. 25
9. $\frac{2}{11}$
10. 256, 1024

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. 820 + 900
2. 524 + 260
3. 3600 ÷ 9
4. 50 × 48
5. 8 × 6 × 500
6. What time is it 4 hours and 15 minutes after 1:30 p.m.?
7. How many ounces are in 3 cups and 1 pint?
8. What is the product of 8, 0, 5, and 6?
9. Which is larger, a meter or 3 feet?
10. How many centuries are in 475 years?

Mental Math

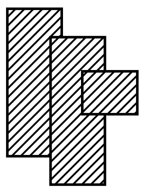
1. 1,720
2. 784
3. 400
4. 2,400
5. 24,000
6. 5:45 p.m.
7. 40 ounces
8. 0
9. 1 meter
10. $4\frac{3}{4}$ centuries

Fraction Action

Show how to divide $2\frac{1}{4}$ rectangular candy bars

so that three friends may share them equally.

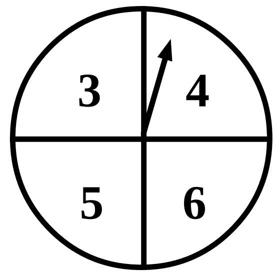
What fractional part of a candy bar will each receive?



(1.04)

Probability Pizzazz

Emily spins the fair spinner shown below twice and determines the sum of the two numbers.



What is the probability that the two numbers will produce the smallest possible sum? the largest possible sum? a sum of nine?

(4.02)

Geometry Gems

If one of the angles of an isosceles triangle measures 64˚, determine all the possibilities for the measures of the other two angles.

(Review)

Solve This!

John bought 9 CDs. Some of them cost \$12.75, and the rest cost \$11.95. The total was \$112.35. How many did he buy at each price?

# at \$12.75	Cost	# at \$11.95	Cost	Total

(1.04)

Mathematically Speaking

Simplify the following:

$8(x + 2) - 4x + 7$

(5.01)

Keeping Skills Sharp

Write answers here:

1. $y - 12 = 16$
2. $\frac{18}{25} \div 2 =$
3. $0.5 - 0.0281 = 31$
4. $837 \div f =$
5. 1 ton = ____ pounds
6. Find the perimeter of a regular octagon with sides of 5.5 cm.
7. Find the range of the given distances: 2 km, 101 km, 125 km, 227 km, 307 km.
8. $9 + 6 - 4 \times 3 + 12 =$
9. If you roll a pair of fair six-sided number cubes, what is the probability of rolling two numbers whose sum is 2?
10. Complete the pattern: 1, 64, 2, 32, 4, 16, ___, ___

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________	6 ____________
2 ____________	7 ____________
3 ____________	8 ____________
4 ____________	9 ____________
5 ____________	10 ____________

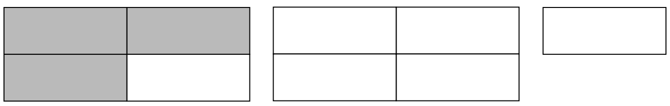
Answer Key

Grade 6 WEEK 8

Fraction Action

Dividing each bar into fourths makes a total of

9 fourths. Each friend can have $\frac{3}{4}$.



Solve This!

6 CDs cost \$12.75, 3 cost \$11.95

Mathematically Speaking

4x + 23

Geometry Gems

Two possibilities: 64˚, 58˚, 58˚ or 64˚, 64˚, 52˚

Probability Pizzazz

P (smallest sum) = $\frac{1}{16}$ P (largest sum) = $\frac{1}{16}$

P (sum of 9) = $\frac{4}{16}$ or $\frac{1}{4}$

Keeping Skills Sharp

1. 28
2. $\frac{9}{25}$
3. 0.4719
4. 27
5. 2000
6. 44 cm
7. range = 305 km
8. 15
9. $\frac{1}{36}$
10. 8, 8

Mental Math

This section provides an opportunity for sharpening students' mental computation.

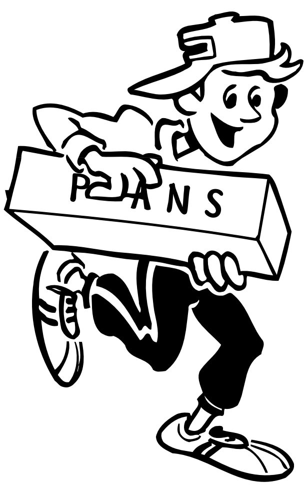
1. 600 + 3,300
2. 900 – 100 – 20
3. 590 – 300
4. 30 + 25 + 20
5. 6,300 ÷ 7
6. Number of faces on 3 Kleenex boxes.
7. Number of vertices on a cube.
8. How many quarters are in \$6.75?
9. What time is 1 $\frac{1}{2}$ hours before noon?
10. 64 in = ___ ft

Mental Math

1. 3,900
2. 780
3. 290
4. 75
5. 900
6. 18
7. 8
8. 27
9. 10:30 a.m.
10. 5 $\frac{1}{3}$ ft or 5 ft 4 in

Fraction Action

For a fund raiser, the sixth grade boxed 5 pounds of pecans. If each box weighed $\frac{1}{3}$ of a pound, how many boxes were there?



(1.04)

Solve This!

Matt is running in a 9 mile race. Each mile he runs is $\frac{3}{4}$ of a minute longer than the mile before it. If his first mile is 5 minutes, how long will it take him to run the entire race? How many seconds is this?

(1.07)

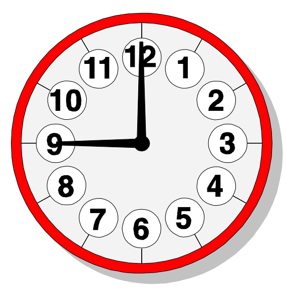
Probability Pizzazz

Suzy is tossing four fair coins and recording the results. If she does this 600 times, predict the number of times she will get exactly two heads.

(4.02)

Geometry Gems

If it is 9:00 p.m., what is the first time(approximate) during the next hour that the hands on the clock will form an acute angle?



(Review)

Mathematically Speaking

Explain how a right triangle can help you decide whether another angle is acute or obtuse

(review)

Keeping Skills Sharp

1. What is the difference between 26 and 8?

2. Write $\frac{4}{12}$ in simplest form..

3. $.06 + \square = 2.1$

4. $\begin{array}{r} 201 \\ \square \,\overline{)16\square 8} \end{array}$

5. If you needed 10 cups of milk in a recipe, how many quarts of milk must you buy to make the recipe?

6. How many feet of border will I need to put around the 4 sides of my bulletin board if the length is 5 yards and the width is 2 yards?

7. What is the range of ages of the following students: John 16, Peter 15, Sue 13, Paul 16, Jane 12?

8. $1 + 12 \div 2 \times 6 - 5 =$ ___

9. If you roll a pair of six-sided number cubes, what is the probability of rolling two numbers whose sum is 6?

10. What are the next numbers in the pattern?

    1, 2, 3, 5, 8, 13, ___, ___

Write answers here:

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Grade 6

Answer Key

WEEK 9

Fraction Action

15 boxes

Probability Pizzazz

About 225 times
P (exactly 2 Heads) = $\frac{6}{10}$ or $\frac{3}{8}$

Geometry Gems

Approximately 9:31 p.m.
Answer assumes that hour hand is fixed.

Solve This!

72 minutes,1 hour 12 minutes or 4,320 seconds

Mathematically Speaking

Angles with measure smaller than the measure of a right angle are acute, angles with measure larger than the measure of a right angle but less than 180˚ are obtuse.

Keeping Skills Sharp

1. 18
2. $\frac{1}{3}$
3. 2.04
4. $\boxed{8}\overline{)16\boxed{0}8}$ = 201
5. 3 quarts
6. 42 feet
7. 4 years
8. 32
9. $\frac{5}{36}$
10. 21, 34

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. 200 + 80 + 8000
2. 124 + 8
3. 225 + 25 + 50
4. 225 + 50
5. 490 ÷ 70
6. What are the first 4 square numbers?
7. 6000 lbs = ____ tons
8. Write $\frac{1}{3}$ as a decimal.
9. How many US flags can a company make if they have 2500 stars?
10. What is $\frac{2}{5}$ of 40?

Mental Math

1. 8280
2. 132
3. 300
4. 275
5. 7
6. 1, 4, 9, 16
7. 3 tons
8. $.3\overline{3}$ or .333…
9. 50
10. 16

Fraction Action

A package of ground beef weighs $\frac{1}{2}$ lb. A second package weighs $\frac{3}{4}$ lb. Together will there be enough to make 6 quarter-pound hamburgers? Explain how you know.

(1.04,1.07)

Probability Pizzazz

The Gum Machine

Karen and Diane are having an argument. They both know that a gumball machine is loaded with gumballs of 6 different colors. Karen feels lucky. She thinks she can get each color by using only 6 pennies. Diane feels it will take at least 15. Let's assume that the machine is loaded with an equal number of each color. How many pennies do you think are needed to get one of each color? Do you agree with either Karen or Diane?

Use a fair number cube to experiment and find your answer.

(4.03)

Solve This!

John's rubber ball bounces exactly half the height from which it is dropped. He drops the ball from a building that is 64 feet tall. How high will the ball bounce on its sixth bounce?

(1.07)

Geometry Gems

If a square is cut along one of its diagonals, two polygons of equal area are formed. Will this also be true of a regular pentagon? Draw and explain your answer.

(2.02)

Mathematically Speaking

Write four pairs of equations that show multiplication and division are inverse operations.

(Review)

Keeping Skills Sharp

Write answers here:

1. Solve for m: $462 + m + 856 = 1844$
2. Which is greater? $\frac{5}{8}$ or $\frac{7}{16}$
3. Which quadrilaterals could have a 45° vertex angle?
4. What is the product of the first five whole numbers?
5. How many yards are there in 2 miles?
6. What is the perimeter of a square with each side 12 meters long?
7. What is the range of the following test scores?

   69, 85, 72, 98, 85
8. $6 \times 2 - 8 \div 4 =$
9. If you have 5 blue marbles, 3 red marbles, 5 white marbles, and 7 yellow marbles, what is the probability of not getting a yellow if you draw one of them out of a sack?
10. Complete the pattern:1, 2, 4, 8, ___, ___, ___

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. __________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________ 6 ____________________

2 ____________________ 7 ____________________

3 ____________________ 8 ____________________

4 ____________________ 9 ____________________

5 ____________________ 10 ____________________

Answer Key

Grade 6

WEEK 10

Solve This!

Bounce	Height
1st	32 ft
2nd	16 ft
3rd	8 ft
4th	4 ft
5th	2 ft
6th	1 ft

Fraction Action

The hamburger is only enough for 5 quarter-pound burgers.

Geometry Gems

No. In a square, the diagonal is also a line of symmetry. Regular pentagons have no lines of symmetry that pass through two vertices. Therefore, diagonals will always form polygons of different sizes.

Mathematically Speaking

Answers will vary.

Probability Pizzazz

Answers will vary.

Keeping Skills Sharp

1. 526
2. $\frac{5}{8}$
3. parallelogram, trapezoid, rhombus, or kite
4. 0
5. 3520 yards
6. 48 meters
7. 29
8. 10
9. $\frac{13}{20}$
10. 16, 32, 64

Mental Math

This section provides an opportunity for sharpening students' mental computation.

Write each fraction as an equivalent percent .

1. $\frac{1}{2}$
2. $\frac{1}{4}$
3. $\frac{3}{4}$
4. $\frac{1}{10}$
5. $\frac{3}{10}$

Estimate:

6. 81×2
7. $143 \div 2$
8. $115 - 82$
9. $529 + 105$
10. 19×19

Mental Math

1. 50%
2. 25%
3. 75%
4. 10%
5. 30%
6. 160
7. 70
8. 40
9. 600
10. 400

Fraction Action

Show how to divide half a melon into 4 equal pieces. What fractional part of the whole melon does each piece represent?

(1.04)

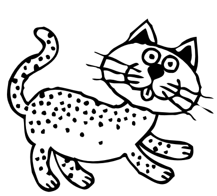
Probability Pizzazz

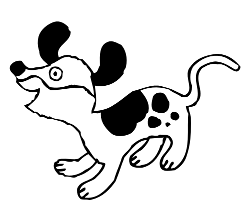
Imagine a new type of lottery. To make a four-digit number, digits are randomly chosen from 1, 5, 7 and 9, and no digit is repeated. The order of the digits is important. If your lottery number is 1579, what is the probability that you will win?

(4.02)

Solve This!

Marcy conducted a survey to determine how many students in the 6th grade had dogs or cats for pets. Thirty percent of the students had only cats, one-fourth of them had at least one dog and one cat, twenty-five percent had only dogs, and two-tenths had no dogs or cats. If there are 160 students in the class, determine the number of students in each category.





(1.02,1.07)

Geometry Gems

(1) What happens to the area of a rectangle if one side is doubled?

(2) What happens to the area of the rectangle if both the length and width are doubled?

(2.02)

Mathematically Speaking

Solve the following:

$$2x + 17 > 42$$

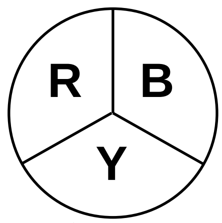
(5.03)

Keeping Skills Sharp

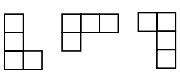
Write answers here:

1. Solve for b: $100 + b + 5 = 125$
2. $\frac{1}{2} + \frac{1}{4} + \frac{1}{4} =$
3. $0.2 + 0.3 + 0.5 =$
4. $175 \div 25 =$
5. 5 gallons = ___ quarts
6. Find the perimeter of a rectangle whose length is twice its width, when the width is 5 inches.
7. Find the median of the following temperature readings:

   1˚, 10˚, 2˚, 9˚, 3˚, 8˚, 4˚, 7˚, 5˚, 6˚
8. $2 \times 7 + 3^2 \div 9 =$
9. If you spin the spinner 120 times, about how many times would you expect it to land on **B**?



10. If the original figure continues to be rotated 90^0 in a clockwise direction, draw the next two figures.



_____ _____

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________

2 ______________________

3 ______________________

4 ______________________

5 ______________________

6 ______________________

7 ______________________

8 ______________________

9 ______________________

10 ______________________

Answer Key

Grade 6

WEEK 11

Fraction Action

Diagrams will vary. Answer is $\frac{1}{8}$.

Geometry Gems

When one side is doubled, the area doubles. When both dimensions are doubled, the area is multiplied by four.

Solve This!

only cats - 48; only dogs - 40;
dogs and cats - 40; no dogs or cats - 32

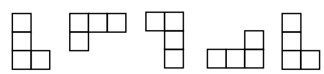
Mathematically Speaking

$x > 12.5$

Probability Pizzazz

$\frac{1}{24}$

Keeping Skills Sharp

1. 20
2. 1
3. 1
4. 7
5. 20
6. 30 in
7. 5.5°
8. 15
9. 40
10. 

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. 4,000 + 2,000 + 50 + 40
2. 17,000 – 5,000
3. 3,000 – 100
4. 5,000 – 500
5. $2 \times 7 \times 5$
6. Nearest ten: 689.2
7. What is the smallest common multiple of 8 and 10?
8. $0.033 \div 10$
9. 64.2×100
10. $\frac{1}{4} + \frac{1}{2}$

Mental Math

1. 6,090
2. 12,000
3. 2,900
4. 4,500
5. 70
6. 690
7. 40
8. 0.0033
9. 6,420
10. $\frac{3}{4}$

Fraction Action

Susie walks her dog, Cooper to school every day at 4 p.m. After she walks for 18 minutes, she still has $\frac{1}{4}$ of the trip to walk. How long will the rest of the trip take?

(1.07)

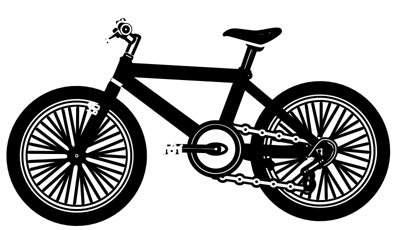
Probability Pizzazz

A radio station plays three songs and four commercials every 20 minutes. For one 20 minute segment the director chooses three different songs to be played and the producer chooses four different commercials. The producer then decides that the order will be song, commercial, two songs, three commercials. How many possible arrangements are there for this 20 minute segment?

(4.01)

Solve This!

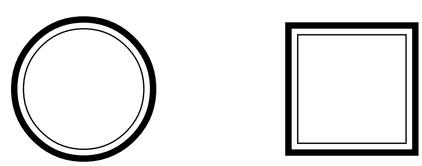
Peter bought a used bicycle with some of his money. He made 3 payments of $29.75 each and spent $8.50 for 2 new tires. How much did he spend for the bicycle?



(1.04, 1.07)

Geometry Gems

Which requires more fencing, a circular garden with diameter 6 m or a square garden with side 4.25 m? How much more?



(2.02)

Mathematically Speaking

Evaluate if $a = \frac{1}{2}$ and $b = 2\frac{5}{8}$

$$5a^2 + 12a - \frac{2}{3}\ b$$

(5.02)

Keeping Skills Sharp

Write answers here:

1. Solve for M: $140 - 70 = M$

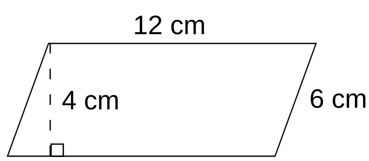
2. $\frac{1}{2} - \frac{1}{4} =$

3. $0.5 + 0.25 + 0.25 =$

4. Solve for R: $123 \times R = 1{,}476$

5. 2 miles = ____ feet

6. Find the area.



7. Find the median of the following scores .

1	1 2 3 3
2	4 5 5 9 9
3	1 2 6 7

8. $2 \times 3^2 \div 9 + 7$

9. On a multiple choice question with 4 answer choices, what is the probability of choosing the correct answer if you guess?

10. Complete:

R, Y, R, Y, B, R, Y, R, Y, B, R, ___, ___, ___

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ________________ 6 ________________

2 ________________ 7 ________________

3 ________________ 8 ________________

4 ________________ 9 ________________

5 ________________ 10 ________________

Answer Key

Grade 6

WEEK 12

Fraction Action

6 minutes

Solve This!

$97.75

Geometry Gems

The circular garden requires about 1.8 meters more fencing.

Mathematically Speaking

$5\frac{1}{2}$

Probability Pizzazz

144

Keeping Skills Sharp

1. 70
2. $\frac{1}{4}$
3. 1
4. 12
5. 10,560
6. 48 cm^2
7. 25
8. 9
9. $\frac{1}{4}$
10. **Y, R, Y**

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Which is larger $\frac{7}{8}$ or $\frac{7}{9}$?
2. What is the approximate value of pi?
3. How do you find the area of a rectangle?
4. How many ounces are in a pound?
5. Write 0.66 as a percent.
6. What is the sum of the first 3 prime numbers?
7. $\frac{1}{8} + \frac{2}{4} + 1$
8. $1.14 \div 0.2$
9. $8.3 - 4.5$
10. $\frac{5}{12} - \frac{2}{6}$

Mental Math

1. $\frac{7}{8}$
2. 3.14
3. Multiply the length times the width.
4. 16 oz
5. 66%
6. 10
7. $1\frac{5}{8}$
8. 5.7
9. 3.8
10. $\frac{1}{12}$

Fraction Action

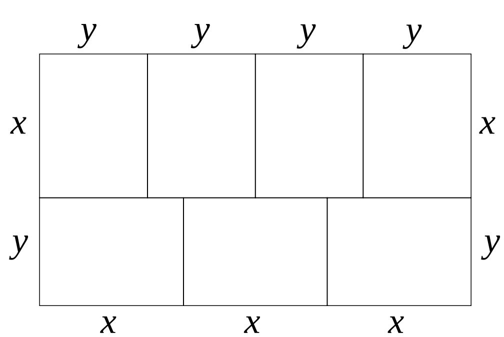
At the school picnic, the class spent $\frac{1}{2}$ of an hour eating, $1\frac{3}{4}$ hours playing basketball, $1\frac{2}{3}$ hours playing soccer, $\frac{1}{5}$ of an hour eating dessert, and $\frac{1}{20}$ of an hour running to get out of the rain.

(1) If the picnic started at 11:00 a.m., when did it end?
(2) How much more time was spent playing than eating?

(1.04, 1.07)

Solve This!

Seven sisters wanted to plant gardens of equal areas. Each garden had an area of 48 yd^2. If their gardens are arranged as seen below, what is the perimeter of the entire garden?



(2.02)

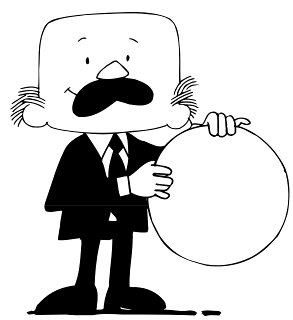
Probability Pizzazz

A fair number cube (numbered 1 - 6) is rolled twice. What is the probability that the first roll is a prime number, and the second roll is a composite number?

(4.02)

Geometry Gems

Which has the greater area:
a circle with circumference of 40.5 feet or
a circle with radius 80 inches?
Explain.



(2.02)

Mathematically Speaking

Simplify: $\frac{1}{2}(2a + 16b) + \frac{2}{3}(12a + 6b)$

(5.01)

Keeping Skills Sharp

Write answers here:

1. $9 \times 4 + 14 \div 7 =$
2. Solve for *c:* $c + (6 - 2) \times 3 = 20$
3. $5 + 1.25 =$
4. Solve for *n:* $16 \times n = 256$
5. 14 ft = ___ yd ___ ft
6. Find the area of a rectangular garden whose length is 8 feet and whose width is 72 inches.
7. Add one number to the following set of data (ages of children in years) so that the mode does not change.

   1, 1, 2, 2, 3, 3, 3, ___
8. $6 \times 3 + 5 \times 4 =$
9. If the first letters of the months are written on cards (1 letter per card) and the cards are placed in a bag, what is the probability of picking a "**J**"?
10. Complete the pattern: A, C, E, G, I, ___, ___, ___

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6

WEEK 13

Solve This!

$x = 8$ and $y = 6$. The perimeter would be 76 units.

Fraction Action

(1) The picnic ended at 3:10 p.m.
(2) They spent 2 hours 43 minutes more playing than eating.

Geometry Gems

The circle with radius 80 inches has the larger area. The other circle has a radius of only about 77 inches.

Probability Pizzazz

$\frac{6}{36}$

Mathematically Speaking

$9a + 12b$

Keeping Skills Sharp

1. 38
2. 8
3. 6.25
4. 16
5. 4 yd 2 ft
6. 48 ft^2
7. Anything except 1 or 2.
8. 38
9. 25% or $\frac{1}{4}$
10. K, M, O

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Write in exponential notation sixteen to the seventh power.
2. Write $\frac{1}{5}$ as a decimal.
3. $\frac{5}{12}$ of 24
4. How many ounces are in 5 pounds?
5. 0.3×0.5
6. $600 - 51$
7. Write the ratio of 6 blackbirds to 8 bluebirds.
8. Estimate $1\frac{18}{19} + 2\frac{1}{12}$
9. $5^2 \times 3^2$ is the prime factorization for what number?
10. $5 + 1\frac{1}{4}$

Mental Math

1. 16^7
2. 0.2
3. 10
4. 80 oz.
5. 0.15
6. 549
7. 6 to 8 or 3:4
8. approximately 4
9. 225
10. $6\frac{1}{4}$

Fraction Action

Lori and Randy had a new room to paint. Lori spent about $2\frac{9}{20}$ hours painting and Randy spent about $3\frac{1}{2}$ hours. About how much time did they spend altogether on painting the room?

(1.04)

Probability Pizzazz

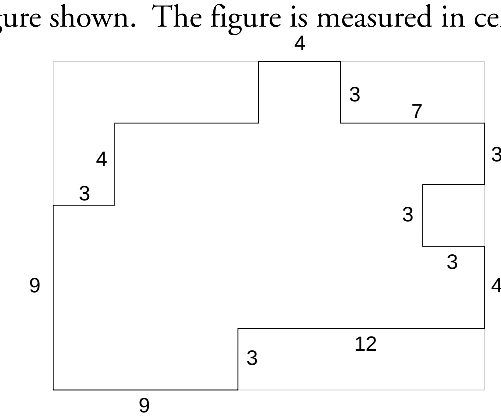
How many three-digit area codes (with no repeating digits) can be made using 2, 5, 7, and 9?

What is the probability that one of these area codes is divisible by 9? . . .not divisible by 2?

(4.02)

Geometry Gems

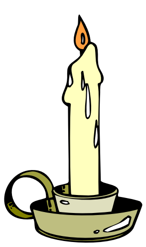
Find the area and the perimeter of the figure shown. The figure is measured in centimeters.



(2.02)

Solve This!

A candle was 45 centimeters long. It was lit and 20% burned off. Then the candle went out. The next day the candle was lit and 25% burned off. Then it went out. On the third day the candle was lit, $\frac{1}{3}$ burned off. Then it went out. How long was the candle after the third day?



(1.02, 1.07)

Mathematically Speaking

Tisha is five years older than John. Alex is three more than twice John's age. Sara is twice as old as Tisha. If John's age is represented by *A*, what is the algebraic representation for the other ages?

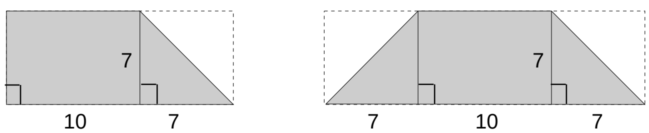
(5.02)

Keeping Skills Sharp

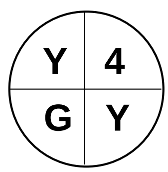
Write answers here:

1. $672 + 28 =$
2. $7 \times 4 - 2 \div 1 \times 6 =$
3. Solve for *J*: $6.72 - J = 3.92$
4. $300 \div 25 =$
5. Use <, >, or =.

   72 inches ◯ 2 yards
6. Find the areas:



7. Add one number to the following set of scores so that the median does not change:70, 60, 90, 80, 100.
8. $3 + 4 \times 6 - 3 =$
9. What is the probability of the spinner landing on **Y**?



10. Complete:

    1, 2, 2, 4, 8, 32, 256, ___

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________

2 ____________________

3 ____________________

4 ____________________

5 ____________________

6 ____________________

7 ____________________

8 ____________________

9 ____________________

10 ____________________

Answer Key

Grade 6

WEEK 14

Geometry Gems

228 square centimeters is the area.
The perimeter is 80 centimeters.

Solve This!

18 cm

Fraction Action

About 6 hours

Mathematically Speaking

Tisha: $A + 5$; Sara: $2(A + 5)$; Alex: $2A + 3$

Probability Pizzazz

There are 24 possible area codes,

P(divisible by 9) = $\frac{6}{24}$ or $\frac{1}{4}$

P(not divisible by 2) = $\frac{18}{24}$ or $\frac{3}{4}$

Keeping Skills Sharp

1. 700
2. 16
3. 2.8
4. 12
5. 72 inches = 2 yards
6. Area #1 is 94.5 square units.
   Area #2 is 119 square units.
7. 80
8. 24
9. $\frac{2}{4}$ or $\frac{1}{2}$
10. 8,192

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Write 3 to the 5th power in standard form.
2. One angle of a pair of supplementary angles has a measure of 42˚. What is the measure of the second angle?
3. Write 0.75 in fraction form.
4. How many pounds are in 3 tons?
5. How many minutes are in 12 hours?
6. $1\frac{1}{2} - \frac{3}{4}$
7. What is the probability of rolling a 6 on a fair die?
8. $\frac{3}{4} + \frac{1}{2}$
9. $\frac{1}{2} \div \frac{1}{2}$
10. 3.2 – 1.4

Mental Math

1. $3^5 = 243$
2. 138˚
3. $\frac{3}{4}$
4. 6,000 pounds
5. 720 minutes
6. $\frac{3}{4}$
7. $\frac{1}{6}$
8. $1\frac{1}{4}$
9. 1
10. 1.8

Fraction Action

Shade the rectangle to show $\frac{1}{3}$ of $\frac{1}{4}$.

What fractional part of the polygon is $\frac{1}{3}$ of $\frac{1}{4}$?

(1.04)

Solve This!

Misty spent half of her allowance buying four books. She spent one-fourth of her allowance buying seven pens that cost 50 cents each. How much did each book cost?

(1.07)

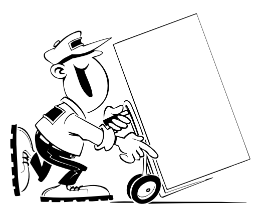
Probability Pizzazz

Pete had a pizza party. Participating at the party were Pierre, Patrick, Paul, Pele, and Fred. After Pete had seated himself at the table, how many different seating arrangements were possible?

(4.01)

Geometry Gems

Select three rectangular objects from home or school. Determine the length, width, perimeter and area of each.



(2.01)

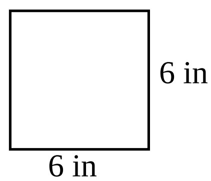
Mathematically Speaking

Simplify: $\frac{2}{3}(6R + S) + \frac{1}{4}(8R + 15S)$

(5.01)

Keeping Skills Sharp

1. Solve for *L:* $139 + L + 982 = 1{,}388$
2. When graphing on the coordinate plane, the vertical axis is called the ________________.
3. $0.425 + 0.175 =$
4. $67 \times Z = 2278$
5. What polygon has perpendicular diagonals ?
6. Find area and perimeter:



7. Find the range of the following ages: 3, 10, 4, 3, 7, 3, 12, 8, 21, 14, 3, 11
8. Simplify: $6 + 7 \times 2$
9. If the letters in the word “math” are written on cards, what is the probability of picking one card at random and it being from the first half of the alphabet?
10. Complete the pattern: 3, 8, 13, 18, 23, ___, ___, ___

Write answers here:

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

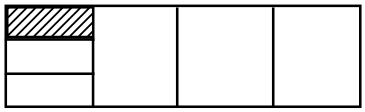
Answer Key

Grade 6

WEEK 15

Fraction Action

$\frac{1}{3}$ of $\frac{1}{4}$ = $\frac{1}{12}$



Solve This!

$1.75

Geometry Gems

Answers will vary

Probability Pizzazz

120

Mathematically Speaking

$6R + 4\frac{5}{12}\ S$

Keeping Skills Sharp

1. 267
2. y-axis
3. 0.6
4. 34
5. rhombus, kite, square
6. $A = 36\text{ in}^2$ $P = 24\text{ in}$
7. 18
8. 20
9. $\frac{3}{4}$
10. 28, 33, 38

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Write 0.25 as a percent.
2. Four quarts = ____ cups
3. Six meters = ___ centimeters
4. $\frac{1}{4} + \frac{3}{4}$
5. Two minutes = ____ seconds
6. Compare and order from least to greatest:
   $\frac{1}{2}$, $\frac{1}{4}$, 1, $\frac{3}{4}$
7. What are the factors of 12?
8. 0.36 + 5
9. $\frac{2}{3} \times \frac{4}{5}$
10. 425 + 175

Mental Math

1. 25%
2. 16
3. 600
4. 1
5. 120 seconds
6. $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1
7. 1, 2, 3, 4, 6, 12
8. 5.36
9. $\frac{8}{15}$
10. 600

Fraction Action

The *Titanic* is $2\frac{2}{5}$ miles below the surface of the Atlantic Ocean. If you dive at the rate of $\frac{3}{4}$ miles per hour, how long would it take you to get to the ship?

(1.04, 1.07)

Probability Pizzazz

Put six different markers (one red, two green, three blue) in a paper bag and without looking select one, record the result and return the marker to the bag. Do this 50 times. How many times was each color selected? Based on your results, determine the probability of selecting a particular colored marker.

(4.03)

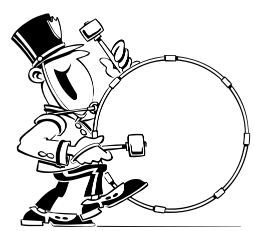
Solve This!

Coach Jones has been cutting ribbons to attach to award medals. She has $\frac{1}{2}$ of a yard left. When two students give their ribbons to Coach Jones, she has a total of $\frac{3}{4}$ of a yard. What length of ribbon would be needed to make seven student award medals?

(1.04, 1.07)

Geometry Gems

Select three circular objects from home or school. Determine the radius, diameter, and circumference of each.



(3.02)

Mathematically Speaking

Ed and Ted spent a total of \$11.25 on raffle tickets. Ed bought five tickets and Ted bought ten tickets. Write and solve an equation to determine the cost, *C*, of a ticket.

(5.03)

Keeping Skills Sharp

Write answers here:

1. Add: $3 + 4 + 7 + 6 + 5 + 5$
2. $2\frac{1}{2} - 1\frac{1}{2} = \frac{3}{w}$ Solve for *w*.
3. $6.3 + 0.63 + 63 =$
4. $91 \div 30 =$
5. 18 inches = ____ feet
6. Find the perimeter of a rectangular garden whose length is 8 feet and whose width is 72 inches.
7. The following high temperatures were recorded for the first six days of the month. What would the high temperature need to be on the seventh day so that the median for the seven days would be exactly the same as the median for the first six days?

   34˚, 41˚, 39˚, 43˚, 45˚, 50˚
8. Simplify: $6 + 3 + 4 \div 2 \times 3$
9. If the first letters of the days of the week are put on cards (one letter per card), and the cards are put in a bag, what is the probability of drawing an "S" when drawing a card from the bag?
10. Complete: 1, 6, 2, 6, 6, 3, 6, 6, 6, ___, ___, ___, ___, ___

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. __________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6

WEEK 16

Fraction Action

$\frac{16}{5}$ or 3.2 hours or 3hrs 12min.

Geometry Gems

Answers will vary.

Solve This!

$\frac{7}{8}$ of a yard

Mathematically Speaking

C = cost of a ticket; $5C + 10C = 11.25$; $C = \$0.75$

Probability Pizzazz

Answers will vary.

Keeping Skills Sharp

1. 30
2. 3
3. 69.93
4. $3.03\overline{3}$
5. 1.5
6. 28 feet or 336 inches
7. 42°
8. 15
9. $\frac{2}{7}$
10. 4, 6, 6, 6, 6

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Nearest tenth to: 8.475
2. Add: 78 + 31
3. 10 + 10 + 10 + 20 + 20
4. Add: 1 + 2 + 3 +. . . +9 + 10
5. Find one-half of 998.
6. Add: 347 + 653
7. What is $\frac{1}{3}$ of 27?
8. Find the area of a square with sides of 5 meters.
9. Compute: 1000 – 457
10. Multiply: 43×11

Mental Math

1. 8.5
2. 109
3. 70
4. 55
5. 499
6. 1,000
7. 9
8. 25 m^2
9. 543
10. 473

Fraction Action

Two volunteers helped to fix up their school gym. Marc worked $2\frac{1}{6}$ hours and Kim worked $3\frac{2}{3}$ hours. How many hours did they work altogether?

(1.04)

Solve This!

Five students each bring 16 yards of ribbon to school for a project. How can the ribbon be divided so that Arnie gets exactly twice as much as Susan?

(1.04, 1.07)

Probability Pizzazz

Toss three fair coins 30 times and record the results. How many times did you get three heads? three tails? two heads? two tails? Based on your results what is the probability you will get two tails the next time you toss three coins?

(4.03)

Geometry Gems

Draw each of the following on a rectangular coordinate system and label the verticies.

- a scalene triangle
- a quadrilateral that is <u>not</u> a parallelogram
- a pentagon

(Review)

Mathematically Speaking

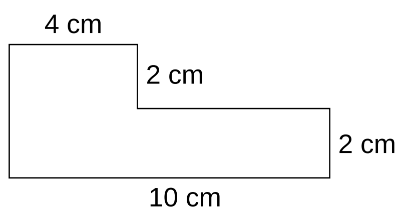
Solve for H:

$$4H - 3.8 = 12.24$$

(5.03)

Keeping Skills Sharp

1. Solve for M: $16 + 23 + M + 17 = 60$
2. What is the sum of the interior angles of an octagon?
3. $1.6 + 2.3 + 4 + 1.7 =$
4. $4.6 \times 18.3 =$
5. How many sides are there in a trapezoid?
6. Find the area:



7. Find the range of the following measurements:

   20 m, 10m, 22m, 12m, 14m, 14m, 5m, 27m, 45m, 32m, 24m
8. Simplify: $3^2 \div 9 + 2 \times 7$
9. If 2 fair coins are tossed, what is the probability that both will land on heads?
10. Complete the pattern: **S, M, T, W, ___, ___, ___**

Write answers here:

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ___________________

2 ___________________

3 ___________________

4 ___________________

5 ___________________

6 ___________________

7 ___________________

8 ___________________

9 ___________________

10 ___________________

Answer Key

Grade 6

WEEK 17

Solve This!

Arnie gets $53\frac{1}{3}$ yds, Susan gets $26\frac{2}{3}$ yds.

Fraction Action

Answer: $5\frac{5}{6}$ hours

Probability Pizzazz

Answers will vary.

Mathematically Speaking

$H = 4.01$

Geometry Gems

Answers will vary.

Keeping Skills Sharp

1. 4
2. 1080°
3. 9.6
4. 84.18
5. four
6. 28 cm^2
7. 40 m
8. 15
9. $\frac{1}{4}$
10. **T, F, S**
    (Days of the week)

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. $\frac{1}{2}$ of 5
2. How many centimeters are in 3 meters?
3. Is $\frac{3}{8}$ closer to $\frac{1}{2}$ or 1?
4. 3 hours 15 minutes = ___ minutes
5. Write the ratio of 6 green balls to 10 red balls in fraction form.
6. Add: 11.3 + 12.81
7. What is $\frac{2}{5} \div 4$?
8. Compute: 16 – 1.84
9. 25×8
10. Add: $\frac{1}{4} + \frac{2}{4} + 5$

Mental Math

1. $2\frac{1}{2}$ or 2.5
2. 300 centimeters
3. $\frac{1}{2}$
4. 195
5. $\frac{6}{10}$
6. 24.11
7. $\frac{1}{10}$
8. 14.16
9. 200
10. $5\frac{3}{4}$

Fraction Action

Paul works for 3 hours. Sally works $2\frac{1}{2}$ times as long as Paul. Rasheed works $\frac{3}{4}$ hour less than Paul. Toshi works $1\frac{1}{3}$ times as long as Rasheed. How long does each person work?

(1.04, 1.07)

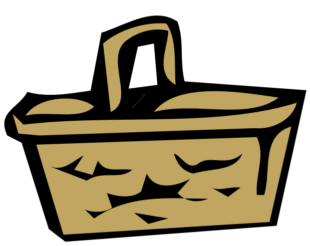
Probability Pizzazz

Roll two fair number cubes (numbered 1-6), 30 times and record the product of the two numbers. How many times was the product an odd number? a number greater than or equal to twenty? a number smaller than six?
Based on your results, what is the probability that the product will be an even number the next time you roll the cubes?

(4.03)

Solve This!

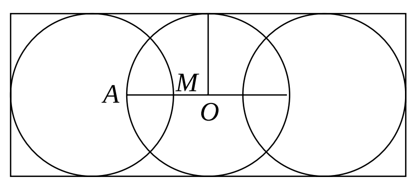
At a class picnic there are seven more students than adults. If there are 39 people in all, how many students are there?



(5.03)

Geometry Gems

The three circles in the figure are congruent. Point M is the midpoint of $\overline{AO}$ and AM = 3 cm. Find the area of the rectangle



(2.02)

Mathematically Speaking

At the school fair a hotdog costs twice as much as a bag of popcorn, and a drink is 50¢ less than a hotdog. If P represents the price of popcorn, write an expression to represent the total cost of two hotdogs, two drinks and a bag of popcorn. (5.02)

Keeping Skills Sharp

Write answers here:

1.
$$
\begin{array}{r}
2\ 3\ \square \\
1\ \square\ 9 \\
+\ \square\ 1\ 4 \\
\hline
6\ 1\ 8
\end{array}
$$

2. Shade in $\frac{2}{3}$ of the squares.

□ □ □ □ □ □

3.
$$
\begin{array}{r}
2\square.4 \\
-\quad 2.89 \\
\hline
23.5\square
\end{array}
$$

4. If four cats each catch eight mice every day, how many mice will they catch during the month of January?

5. If you run 1,760 feet in a race, what part of a mile is this?

6. How many feet of fencing do I need if two sides of my backyard are each 6 yards, one side is 15 yards and the house will be used as the fourth side?

7. Find the median weight for the following measurements:

   85 lbs, 68 lbs, 42 lbs, 44 lbs,

   31 lbs, 32 lbs, 48 lbs, 65 lbs,

   35 lbs, 28 lbs

8. Simplify: $6 \times 2 + 4 - 8 \div 2$

9. If the probability of John making a 100 on his test was 80%, what is the probability of John not making a 100?

10. Complete the pattern:

    6, 8, 7, 9, 8, 10, 9, ___, ___, ___

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ____________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ________________

2 ________________

3 ________________

4 ________________

5 ________________

6 ________________

7 ________________

8 ________________

9 ________________

10 ________________

Grade 6

Answer Key

WEEK 18

Fraction Action

Paul works 3 hours.
Sally works 7.5 hours.
Rasheed works 2.25 hours.
Toshi works 3 hours.

Geometry Gems

The rectangle is 30 by 12, area is 360 cm^2.

Solve This!

There are 23 students and 16 adults.

Mathematically Speaking

9 *P* - 100

Probability Pizzazz

Answers will vary.

Keeping Skills Sharp

1. $$\begin{array}{r} 2\,3\,\mathbf{5} \\ 1\,\mathbf{6}\,9 \\ \underline{+\,\mathbf{2}\,1\,4} \\ 6\,1\,8 \end{array}$$
2. ■■■■□□
3. $$\begin{array}{r} 2\mathbf{6}.4 \\ \underline{-\;\;2.89} \\ 23.5\mathbf{1} \end{array}$$
4. 992
5. $\frac{1}{3}$
6. 81 feet
7. 43 lbs
8. 12
9. 20% 10. 11, 10, 12

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. How many days are in two years?
2. Estimate: 4.6 + 6.2 + 7.84
3. How many centimeters are in one kilometer?
4. Write in fraction form: 0.05
5. 250 + 10 + 100
6. $\frac{5}{8} - \frac{4}{8}$
7. 0.64 ÷ 0.2
8. $2 \div \frac{1}{2}$
9. 1.3 + 4.2
10. $3\frac{1}{2} - 1\frac{1}{2}$

Mental Math

1. 730 days
2. 19
3. 100,000
4. $\frac{5}{100} = \frac{1}{20}$
5. 360
6. $\frac{1}{8}$
7. 3.2
8. 4
9. 5.5
10. 2

Probability Pizzazz

Materials: three number cubes

The probability that the three cubes will show three different numbers is given by the ratio:

$$\text{Probability} = \frac{\text{ways to roll 3 different numbers}}{\text{total ways to roll the 3 cubes}}$$

If different numbers must be rolled, there are 6 possibilities for the first cube, 5 possibilities for the second cube, and 4 possibilities for the third cube.

P(3 different numbers) =

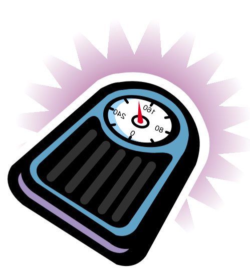
$$\frac{6 \cdot 5 \cdot 4}{6 \cdot 6 \cdot 6} = \frac{5}{9} \approx .56 \text{ or } 56\%$$

Students are to roll the three cubes 10 times each and compile their information. Does the experiment reflect the theoretical probability?

(4.04)

Solve This!

Stephanie weighs 96 pounds and JoAnne weighs 86 pounds. The sum of their weights is twice as much as Lane's weight. Write and solve an equation to determine *w*, Lane's weight.



(5.03)

Fraction Action

Terry watches $\frac{1}{2}$ of a video on Saturday. He watches another $\frac{1}{3}$ of the video on Sunday. How much of the video did he watch?

(1.04, 1.07)

Geometry Gems

Complete the chart showing how lines may intersect. If the task is not possible, write NP in the cell.

Number of Points of Intersection

Number of Lines	0	1	2	3	4	5
1						
2					NP	
3						
4						

(3.01)

Mathematically Speaking

Do squares with the same area have equal perimeters?

Do rectangles with the same area have equal perimeters? Explain.

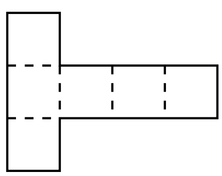
(2.02)

Keeping Skills Sharp

1. Define prime number.
2. Replace each box with a number.

$$\begin{array}{r} \square\ 6\ 2\ \square \\ -\ 2\ \square\ 1\ 6 \\ \hline 6\ 4\ \square\ 0 \end{array}$$

3. A circle has a circumference of 30 cm. What is its radius when measured to the nearest tenth of a centimeter?
4. When cut out and folded, what solid figure can be made out of this shape?



5. How many faces are in a triangular prism?
6. Which letter does <u>not</u> have a line of symmetry?
   C Z W
7. Which is a better buy:
   3 for $1.00 or 2 for $0.75?
8. $1\frac{3}{4} \times 2\frac{3}{5} =$
9. What is the sum of the measures of the angles of a triangle?
10. Write 2,642 in words.

Write answers here:

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________ 6 ____________________

2 ____________________ 7 ____________________

3 ____________________ 8 ____________________

4 ____________________ 9 ____________________

5 ____________________ 10 ____________________

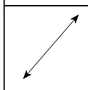
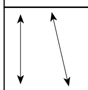
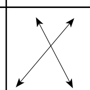
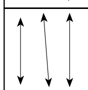
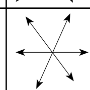
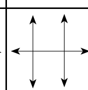
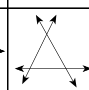
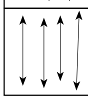
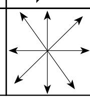
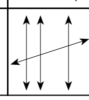
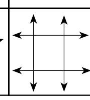
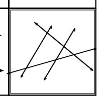
Answer Key

Grade 6

WEEK 19

Geometry Gems

Number of Points of Intersection

Number of Lines	0	1	2	3	4	5
1		NP	NP	NP	NP	NP
2			NP	NP	NP	NP
3					NP	NP
4			NP			

Fraction Action

$\frac{5}{6}$ of the video

Solve This

91 pounds

Mathematically Speaking

All squares must have equal sides, so an area of 36 in.^{2} means the side must be 6 inches and the perimeter 24 inches. However, rectangles do not have to have equal sides. If a rectangle has an area of 36 in.^{2}, its sides might be 4×9 or 3×12. In each case the perimeter would be different.

Probability Pizzazz

Answers will vary

Keeping Skills Sharp

1. A prime number has exactly two factors, 1 and itself.
2. $$\begin{array}{r} \mathbf{8}62\mathbf{6} \\ -\ 2\mathbf{2}16 \\ \hline 64\mathbf{1}0 \end{array}$$
3. 4.8 cm
4. cube
5. five
6. Z
7. 3 for $1.00
8. 4.55 or $4\frac{11}{20}$
9. 180 degrees
10. Two thousand six hundred forty-two

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. $9\frac{2}{4}$ to the nearest whole number.
2. How many months are in 12 years?
3. List the factors of 14.
4. How many centimeters are in 1 kilometer?
5. Write 60% as a decimal.
6. $7 + \frac{3}{8} + \frac{5}{8}$
7. $8 \div .25$
8. $11 - 7\frac{1}{2}$
9. $5^2 + 5$
10. Estimate: $7\frac{1}{8} + \frac{13}{14}$

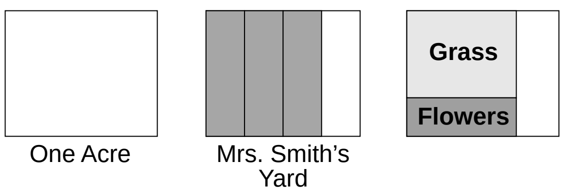
Mental Math

1. 10
2. 144
3. 1, 2, 7, 14
4. 100,000 cm
5. 0.60
6. 8
7. 32
8. $3\frac{1}{2}$
9. 30
10. about 8

Fraction Action

(1.04, 1.07)

Mrs. Smith has $\frac{3}{4}$ of an acre of yard. She plants grass on $\frac{2}{3}$ of it. What fractional part of an acre is Mrs. Smith's grass?



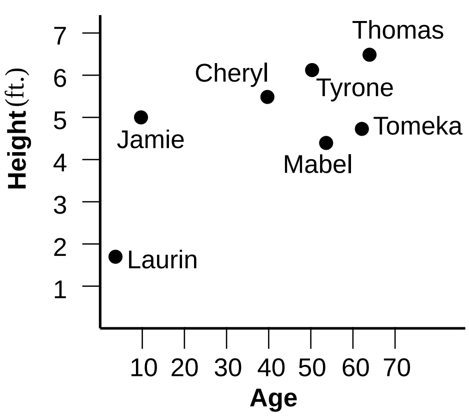
Probability Pizzazz

There are five red, three green, and two blue cubes in a box. Without looking, you select one cube and place it on the table. You then select another cube in the same manner. What is the probability that both cubes will be green?

(4.05)

Solve This!

How many people are taller than 63 inches?



(Review)

Geometry Gems

Triangle ABC: A(4,10), B(10,18), C(7,5) is transformed according to the rule

$$(x', y') = (x - 3, y + 2).$$

What are the coordinates of A′B′C′ ?

Are the two triangles congruent? Explain.

(3.03)

Mathematically Speaking

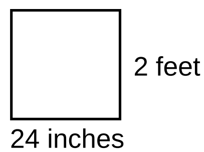
If R ÷ S = T, is T always less than R? Explain.

(1.04)

Keeping Skills Sharp

Write answers here:

1. Solve for W: $422.4 \div 12 = W$
2. Robin ordered 6 extra-large pizzas. Each pizza is divided into 14 slices. How many slices of pizza are there altogether?
3. Write 7^2 in standard form.
4. Write $\frac{1}{3}$ as a decimal.
5. What is 2.1 less than 5.62?
6. Find the area in square feet.



7. Write the largest possible number using these digits: 3, 4, 5, 6, 7.
8. What is the value of 5 in 100.5?
9. Draw two squares and shade $1\frac{1}{2}$ of them.
10. What time will it be $4\frac{1}{2}$ hours from now?

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6 WEEK 20

Mathematically Speaking
No, explanations will vary.

Solve This
Two people

Geometry Gems
A′(1,12), B′(7, 20), C′ (4, 7)

The triangles are congruent.

Fraction Action
One-half of an acre is planted with grass.

Probability Pizzazz
P(green, green) = $\frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$

Keeping Skills Sharp
1. $W = 35.2$
2. 84
3. 49
4. $0.3\overline{3}$
5. 3.52
6. 4 square feet
7. 76,543
8. five tenths
9. answers will vary
10. answers will vary

Mental Math
This section provides an opportunity for sharpening students' mental computation.

1. 300 + 7,000 + 50
2. 3,800 - 300 - 200
3. 20 + 60 -30 - 10
4. 60 + 20 -40 - 30 + 20
5. 6 x 9 x 500
6. $5\frac{3}{4} + \frac{3}{4}$
7. $6\frac{1}{5} - \frac{4}{5}$
8. $46\frac{5}{8} + 4\frac{5}{8}$
9. If one book costs $12.50, how much will three books cost?
10. 12 cups are to 3 quarts as __ cups are to 1 quart.

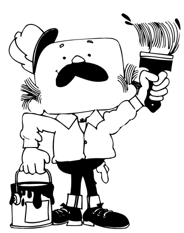
Mental Math
1. 7,350
2. 3,300
3. 40
4. 30
5. 27,000
6. $6\frac{1}{2}$
7. $5\frac{2}{5}$
8. $51\frac{1}{4}$
9. $37.50
10. 4

Fraction Action

Tom painted $\frac{1}{3}$ of the fence.

Ed painted $\frac{1}{4}$ of the fence.

What part of the fence is unpainted?



(1.04, 1.07)

Probability Pizzazz

Larry has a boat and a cottage at the beach. When hurricanes threaten, there is a 10% chance his boat will be sunk and a 15% chance that his cottage will be damaged. What is the probability that his boat will sink and his cottage will be damaged this season?

(4.04)

Solve This!

Everyone in a club ordered either a small pizza for \$3.50 or a sub for \$4.50. There are ten people in the club and the total bill was \$38. How many ordered subs, and how many ordered pizza?

# of Subs	Cost	# of Pizzas	Cost	Total

(1.04, 1.07)

Geometry Gems

A turtle crawls around a circle with a radius of 2 units and a center at point *C* (3,4). Another turtle crawls around a circle with a radius of 3 units and a center at point *D* (-5,4). What is the shortest distance that the turtles could be from one another?

(3.04)

Mathematically Speaking

Write and solve a problem that fits the following equation:

$$2x + 18 = 60$$

(5.03)

Keeping Skills Sharp

Write answers here:

1. How much is 68 tens?
2. What is the quotient when 18 is divided by 3?
3. 5 pounds = ___ ounces
4. What is the largest whole number that will make this true?

   m to the nearest hundred is 600.
5. Which is more, 0.607 or 0.67?
6. $\frac{3}{4}$ of 18.5 is ?
7. What is 75% of 120?
8. $\frac{3}{12} \div \frac{1}{3} =$
9. $7\frac{1}{2} + 4\frac{3}{9} =$
10. Marcie has a formula which tells her how many scoops, *S*, of coffee she needs to put in a pot when she knows the number of ounces, *N*, she wants to make. The formula is $S = \frac{N}{10} + 1$

    How many scoops will she need to make 40 ounces?

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6
WEEK 21

Fraction Action

$\frac{5}{12}$ of the fence is unpainted

Geometry Gems

3 units

Mathematically Speaking

Answers will vary.

Solve This

Three ordered subs and seven ordered pizza.

Probability Pizzazz

0.10 x 0.15 = 0.0150 or

$\frac{10}{100} \times \frac{15}{100} = \frac{150}{10{,}000}$

Keeping Skills Sharp

1. 680
2. 6
3. 80 ounces
4. 649
5. 0.67
6. 13.875 or $13\frac{7}{8}$
7. 90
8. $\frac{3}{4}$
9. $11\frac{5}{6}$
10. 5 scoops

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. 9×600
2. 90×9
3. $2{,}800 \div 70$
4. $1{,}800 \div 3$
5. 6500 + 120 + 40
6. Find the greatest common factor of 24 and 40.
7. Write $4\frac{5}{6}$ as an improper fraction.
8. How many centimeters are in $4\frac{1}{4}$ meters?
9. 4 kilometers = ____ meters
10. 9.4 meters = ____ centimeters

Mental Math

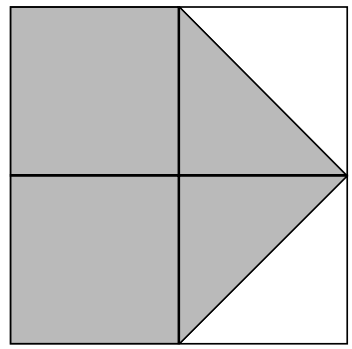
1. 5,400
2. 810
3. 40
4. 600
5. 6,660
6. 8
7. $\frac{29}{6}$
8. 425 centimeters
9. 4,000 meters
10. 940

Fraction Action

Each pizza crust uses $1\frac{5}{8}$ cups of flour. If you have 5 cups of flour, how many pizzas can you make?

(1.04, 1.07)

Probability Pizzazz

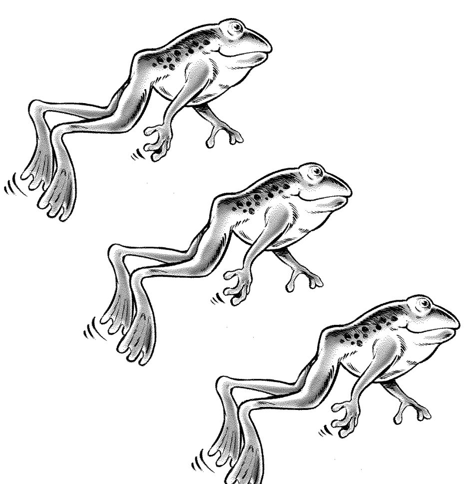


If a raindrop falls on this road sign, what is the probability that it will fall in the shaded area?

(2.02, 4.04)

Solve This!

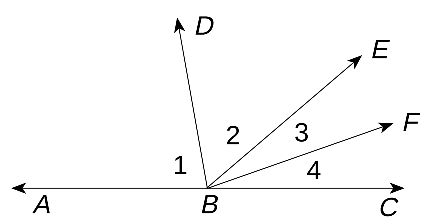
In a race, Andy frog can move 5 feet in 5 seconds. Bernie frog moves 600 inches in a minute and Charlie frog moves 2 yards in 8 seconds. Which frog is fastest?



(1.07)

Geometry Gems

$\overrightarrow{BF}$ bisects $\angle EBC$. $\overrightarrow{BE}$ bisects $\angle DBC$.
If $\angle 1$ has a measure of 80°, find the measure of $\angle 4$.



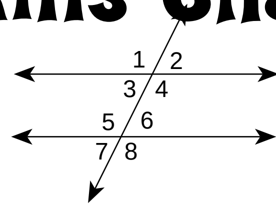
(Review)

Mathematically Speaking

Solve for M: $3M - 4.2 < 28.5$

(5.03)

Keeping Skills Sharp



1. What type of angles are $\angle 1$ and $\angle 2$?
2. Write an algebraic expression for *q*.

x	y
2	9
1	7
0	5
p	q

3. Circle each number that is divisible by both 2 and 3.
   6, 10, 12, 14, 16, 18
4. Complete the following: 4, 7, 12, 19, ___, ___, ___
5. Simplify:
   $20 + 7 \times (4 \div 2)$
6. Write in order from least to greatest.
   5.52, -23.5, 3.25, -0.552, 3.025
7. What is the value of the digit 4, in the number 93,048,210?
8. Draw a line segment that is 7 cm long.
9. Write as a decimal: $\frac{45}{100}$
10. There are 24 hours in a day. How many hours are in 2 weeks?

Write answers here:

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________
2 ____________________
3 ____________________
4 ____________________
5 ____________________
6 ____________________
7 ____________________
8 ____________________
9 ____________________
10 ____________________

Answer Key

Grade 6

WEEK 22

Probability Pizzazz

75%

Fraction Action

3 pizzas

Geometry Gems

25°

Solve This

Andy is the winner at 12 in./sec.
Frog Bernie travels at 10 in./sec.
Frog Charlie travels at 9 in./sec.

Mathematically Speaking

$M < 1.09$

Keeping Skills Sharp

1. supplementary
2. $q = 2p + 5$
3. 6, 12, 18
4. 28, 39, 52
5. 34
6. -23.5, -0.552, 3.025, 3.25, 5.52
7. 40,000
8. See drawing
9. 0.45
10. 336 hours

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. What is the least common multiple of 4 and 5?
2. 396 + 504
3. 255 ÷ 5
4. Find the product of 8 and 40.
5. Estimate the sum of 15,960 and 7,040.
6. Which is larger (5×43) or 200?
7. Can Sally do 300 sit-ups in 7 days if she does 40 a day?
8. How much would three candy bars cost if each one is 45¢?
9. Jane bought 2 CD's for $9.50 each. What was her total cost?
10. What is the greatest common factor of 12 and 20?

Mental Math

1. 20
2. 900
3. 51
4. 320
5. About 23,000
6. 5×43
7. No
8. $1.35
9. $19.00
10. 4

Fraction Action

A recipe Juan is using calls for the following ingredients: $3\frac{2}{3}$ cups of flour,

$1\frac{3}{4}$ cups of sugar, $1\frac{1}{4}$ tsps. of baking powder,

and $1\frac{1}{2}$ tsps. of salt.

If he triples the recipe, how much of each ingredient will he need?

(1.04, 1.07)

Probability Pizzazz

Rod went to buy school clothes at the mall. He bought three pairs of jeans that all look different. He also bought five different colored sweaters and two pairs of sneakers, a white pair and a black pair. How many different outfits are possible?

(4.01)

Solve This!

Jim and Pete had a pizza eating contest. Jim ate $1\frac{1}{2}$ cheese pizzas and $1\frac{2}{3}$ pepperoni pizzas. Pete ate $1\frac{3}{4}$ cheese pizzas and $1\frac{1}{2}$ pepperoni pizzas. Who ate more and how much more?

(1.04, 1.07)

Geometry Gems

Points A, B(12, 2), C(6, 2), P, and Q are collinear. Point C is the midpoint of $\overline{PB}$, and P is the midpoint of $\overline{QB}$. If the length of $\overline{AB}$ is 28 units, find the length of AQ.

(3.04)

Mathematically Speaking

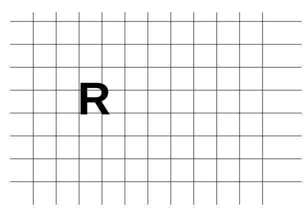
Explain the relationship between the diameter of a circle and its circumference.

(3.02)

Keeping Skills Sharp

Write answers here:

1. Name the underlined place value: 8.6$\underline{3}$2
2. 4.38 ÷ 2.5 =
3. 4.623 + 12.312 =
4. There are 12 marbles in a bag: 1 black, 2 orange, 4 green, 5 yellow. What is the probability of choosing green or yellow?
5. What is the range of these scores: 20, 8, 43, 7, 10, 37, 20, 5, 19, 28, 41?
6. What is the circumference of a circle with radius 15.5 cm?
7. 9 kilometers = ___ meters
8. Estimate your mass in kilograms.
9. Show how this letter could look with a translation to the right:



10. How many edges are on a cube?

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out. Each question will be repeated only once.

1 ________________________ 6 ________________________

2 ________________________ 7 ________________________

3 ________________________ 8 ________________________

4 ________________________ 9 ________________________

5 ________________________ 10 ________________________

Answer Key

Grade 6 WEEK 23

Geometry Gems

CB = 6, so *PC* = 6. *PB* = 12, so *QP* = 12. *AB* = 28, and ***AQ* = 4 cm.**

Solve This

Pete ate $\frac{1}{12}$ pizza more than Jim.

Fraction Action

Flour: 11 cups, Sugar: $5\frac{1}{4}$ cups

Baking powder: $3\frac{3}{4}$ tsps., Salt $4\frac{1}{2}$ tsps.

Probability Pizzazz

$3 \times 5 \times 2 = 30$ outfits

Mathematically Speaking

The diameter, *d*, of a circle is the measure of the longest chord of the circle. The circumference, *C*, of a circle is the measure of the distance around the circle. $C = \pi \times d$

Keeping Skills Sharp

1. hundredths
2. 1.752
3. 16.935
4. $\frac{9}{12}$
5. 38
6. 97.4 cm
7. 9,000 m
8. Answers will vary
9. Answers will vary
10. 12

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Nearest hundredth to 19.539
2. How many days are in 12 weeks? 15 weeks?
3. $45 \div 9 + 6$
4. $18{,}000 \div 9$
5. Nearest whole number to $11\frac{2}{5}$.
6. $9{,}000 \times 16$
7. Is 93 divisible by 2? 3? 6? 5?
8. Multiply 21×6 and subtract 6.
9. If two tapes cost $9.50, about how much will three tapes cost?
10. $\frac{1}{3} + 3\frac{1}{3} + 5$

Mental Math

1. 19.54
2. 84 days; 105 days
3. 11
4. 2,000
5. 11
6. 144,000
7. no, yes, no, no
8. 120
9. $14.25
10. $8\frac{2}{3}$

Fraction Action

Compare. Use >, <, or =.

$\frac{3}{10}$ ◯ $\frac{1}{4}$

$3\frac{1}{2}$ ◯ $3\frac{2}{4}$

$\frac{3}{9}$ ◯ $\frac{4}{15}$

$12\frac{5}{8}$ ◯ $12\frac{9}{12}$

$7\frac{8}{12}$ ◯ $7\frac{2}{3}$

(1.03)

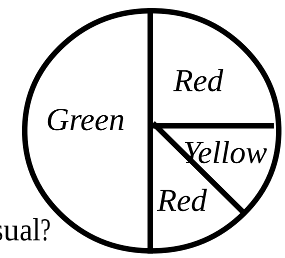
Probability Pizzazz

Sidney spun this spinner 240 times and recorded the following results:

Red 84,

Yellow 27

Green 129



Assuming that this is a fair spinner, are these results unusual? Explain.

(4.04)

Solve This!

Lisa sold $75 worth of play tickets. Adult tickets cost $4 each and children's tickets cost $3 each. How many children's tickets could she have sold? Is there more than one answer?

(1.07)

Geometry Gems

What are all the possibilities for the intersection of a triangle and a parallelogram in a plane? What is the maximum number of points of intersection for these two polygons?

(3.01)

Mathematically Speaking

Evaluate if $r = 1.5$ and $t = \frac{3}{4}$

$$2r^2 + 10r - \frac{2}{5}t$$

(5.02)

Keeping Skills Sharp

Write answers here:

1. 4,927 + 699 – 582 =
2. $\frac{4}{5} - \frac{1}{4} =$
3. 394.63 – 36.493 =
4. What is the least common multiple of 18 and 24?
5. What is the largest prime factor of 200?
6. Jesse ate $\frac{2}{3}$ of a pizza and rob ate $\frac{3}{4}$ of a pizza. Jesse says he ate more pizza than Rob. How is this possible?
7. The oldest person at a movie theatre is 95. The youngest person is 10. What is the range of ages?
8. $5 \times (3 + 2) - 4$
9. What is the probability of drawing a green scarf out of a drawer if there are 6 green, 8 blue and 4 black scarves in the drawer?
10. What is the median of the following set of temperatures?

    8˚, 12˚, 14˚, 10˚, 12˚, 9˚, 6˚, 9˚?

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6
WEEK 24

Fraction Action

>, = , >, <, =

Geometry Gems

0, 1, 2, 3, 4, 6, and an infinite number of points of intersection are possible.

Mathematically Speaking

19.2

Probability Pizzazz

Results are not unusual. Explanations will vary.

Solve This

There is more than 1 answer.
Possible ticket combinations:

Adult	Children
0	25
3	21
6	17
9	13
12	9
15	5
18	1

Keeping Skills Sharp

1. 5,044
2. $\frac{11}{20}$
3. 358.137
4. 72
5. 5
6. The pizzas were different sizes.
7. 85
8. 21
9. $\frac{6}{18}$
10. 9.5˚

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. Estimate: 16.43 – 8.7
2. Estimate: 21.673 + 0.123
3. Estimate: 3.8×4.2
4. $\frac{2}{5} \times \frac{10}{6}$
5. 74 – 2.3
6. $2\frac{1}{2} \times \frac{1}{3}$
7. Which is smaller: 16 ounces or 3 cups?
8. Find $\frac{2}{3}$ of 150.
9. Find 25% of 1,000.
10. A square has a perimeter of 48 inches, what is the area?

Mental Math

1. About 7
2. About 22
3. About 16
4. $\frac{2}{3}$
5. 71.7
6. $\frac{5}{6}$
7. 16 ounces
8. 100
9. 250
10. 144 square inches

Fraction Action

Mr. Jones is buying supplies for a scout camping trip. The breafast cereal comes in a 24 ounce box. If a single serving is 1.5 ounces, how many boxes will he need for 45 servings?

(1.04, 1.07)

Probability Pizzazz

The digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 are written on tiles and placed in a bag. Without looking, Susan draws one tile, records the number, replaces the tile, draws a second tile and records that number.

What is the probability that she will draw only one prime number?

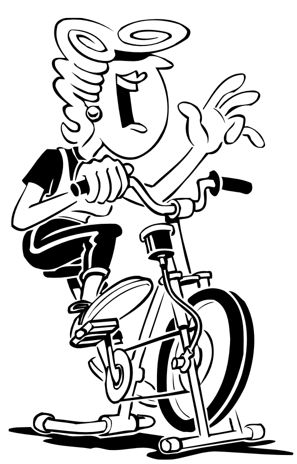
What is the probability that she draws the same prime number both times?

(4.05)

Solve This!

Dave's mom joined a health club in January. It costs $99.00 to join, in addition to a monthly fee. Her total expenses for the year were $519.00.

Write an equation that represents this situation and determine the monthly fee, *m*.



(5.03)

Geometry Gems

Graph a polygon, R, in the coordinate plane and label all its verticies. Rotate the figure 180° clockwise about the origin and give the coordinates of the image, R′.

(3.03)

Mathematically Speaking

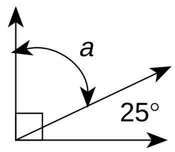
Jesse multiplied two and two-thirds by seven and one-half and got a product of fourteen and two-sixths. What mistake did he make and what is the correct product?

(1.04)

Keeping Skills Sharp

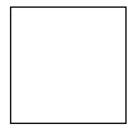
Write answers here:

1. What is the measure of angle *a*?



2. Name this shape:

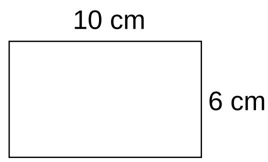
3. How many lines of symmetry does this figure have?



4. 60 meters = ____ centimeters

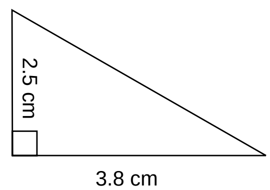
5. 2 yards = ____ inches

6. What is the perimeter of this rectangle?



7. Define the diameter of a circle.

8. What is the area of a triangle with a base of 3.8 cm and height of 2.5 cm?



9. Compute the median and range of this group of scores.
86, 95, 100, 83, 90, 62, 75, 73, 65, 100, 82, 67, 94, 92

10. Write $\frac{1}{4}$ as a decimal.

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6
WEEK 25

Fraction Action

Three boxes of cereal

Solve This

$99 + 12m = 519$
monthly fee, *m*, is $35.00

Probability Pizzazz

P(only one prime number) = 0.48
P(same prime twice) = 0.04

Geometry Gems

Answers will vary

Mathematically Speaking

20; explanations will vary

Keeping Skills Sharp

1. 65
2. parallelogram
3. 4
4. 6,000
5. 72
6. 32 centimeters
7. a line segment with endpoints on the circle and passing through the center of the circle
8. 4.75 cm^2
9. median 84.5, range 38
10. 0.25

Mental Math

This section provides an opportunity for sharpening students' mental computation.

Write each percent as its fraction equivalent.

1. 20%
2. 50%
3. 60%
4. 75%
5. 25%

Estimate.

6. 111×21
7. $226 \div 25$
8. $141 - 12$
9. $603 + 312$
10. 7×17

Mental Math

1. $\frac{1}{5}$
2. $\frac{1}{2}$
3. $\frac{3}{5}$
4. $\frac{3}{4}$
5. $\frac{1}{4}$
6. 2000 (answers may vary)
7. 9
8. 130
9. 900
10. 140 (answers may vary)

Fraction Action

Write two fractions that are equivalent to each of the following:

A $\frac{2}{3}$

B $\frac{2}{5}$

C $\frac{11}{12}$

(Review)

Probability Pizzazz

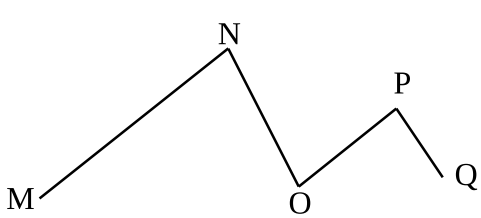
A drawer contains five black socks, three brown socks and one blue sock. Jess pulls three socks out of the drawer, one at a time, without looking.

What is the probability that the first sock is black, the second sock is black and the third sock is blue?

(4.05)

Solve This!

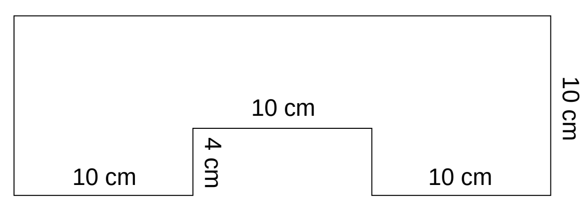
The distance from M to N is 32 meters. From N to O the distance is $\frac{3}{4}$ of the distance from M to N. From O to P is $\frac{2}{3}$ of the distance from N to O. From P to Q is $\frac{1}{2}$ the distance from P to O. What is the distance from P to Q?



(1.07)

Geometry Gems

What is the perimeter of this figure?



(2.02)

Mathematically Speaking

Explain the relationship among 75%, 0.75 and $\frac{3}{4}$.

(1.02)

Keeping Skills Sharp

Write answers here:

1. Simplify: $\frac{20}{8}$
2. What is a variable?
3. Solve for z : $z - 7 = 15$
4. Solve for n : $7n = 14$
5. Which property does this equation illustrate?
   $15 + 9 = 9 + 15$
6. Write as a mathematical equation:
   Twenty divided by a number equals 5.
7. Fill in the missing number in this pattern:

   22, 23, 25, 28, ___, 37
8. What rule does this sequence follow?
   {2, 4, 8, 16, ... } Write an expression for the nth term of the sequence.
9. What are intersecting lines?
10. What are two angles called if the sum of their measures is equal to 180°?

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6

WEEK 26

Fraction Action

Answers will vary

Probability Pizzazz

$\frac{5}{9} \bullet \frac{4}{8} \bullet \frac{1}{7} = \frac{20}{504}$

Mathematically Speaking

75%, 0.75 and $\frac{3}{4}$ are all equivalent.

All may be renamed as $\frac{75}{100}$.

Solve This

8 meters

Geometry Gems

88 cm

Keeping Skills Sharp

1. $2\frac{1}{2}$
2. A letter that is used to represent a number in an equation or expression.
3. $z = 22$ 4. $n = 2$
5. commutative property of addition
6. $20 \div n = 5$
7. 32
8. Each number is two times the preceding number. The nth term of the sequence is 2^n.
9. lines that meet or cross
10. supplementary angles

Mental Math

This section provides an opportunity for sharpening students' mental computation.

Write each percent as its decimal equivalent.

1. 50%
2. 25%
3. 75%
4. 30%
5. 10%

Estimate.

6. 42×31
7. $100 \div 21$
8. $73 - 21$
9. $290 + 350$
10. 61×19

Mental Math

1. 0.5
2. 0.25
3. 0.75
4. 0.3
5. 0.1
6. 1,200
7. 5
8. 50
9. 650
10. 1,200

Fraction Action

The distance around the lake on the greenway path is $2\frac{7}{8}$ miles. If Eve rides her bike around the lake three times how far will she have pedaled?

(1.04, 1.07)

Probability Pizzazz

A sack contains 10 yellow marbles, 10 green marbles and 10 black marbles. What is the probability of drawing three marbles, without replacement, of the same color from the sack without looking?

(4.05)

Solve This!

Lee is training for a marathon and wants to run at least 58 miles this week. She has already run 25 miles and will run the same distance each day for the next four days. Write an inequality that represents this situation and find the minimum number of miles, *m*, that she needs to run each day.

(5.03)

Geometry Gems

Quadrilateral ABCD: A(2, 1), B(4, 6), C(1, 5), D(-1, 3) is reflected over the *x*-axis. What are the coordinates of A′B′C′D′?

(3.03)

Mathematically Speaking

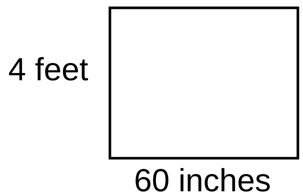
You are having a party for 65 people. You know that each person drinks two cups of punch. Explain how you would find out how many gallons of punch are needed.

(Review)

Keeping Skills Sharp

Write answers here:

1. Find the area in square feet.



2. Order from least to greatest: -3.75, 22.4, 0.06, 2.35, -12.09, 0.224.
3. Compare using <, >, or =. $-7 \bigcirc -12$
4. What is the place value of the underlined digit: 2$\underline{6}$1,842?
5. Estimate 62×102.
6. Write 4^3 as a product of factors.
7. Simplify: $3 \times 4 \div 2 + 8$
8. What is 35% of 20?
9. $\frac{3}{6} = \frac{?}{8}$
10. Write 25.734 in words.

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6
WEEK 27

Solve This

$3m + 25 \geq 58$
Lee needs to run at least 8.25 miles each day.

Geometry Gems

A′(2, -1), B′(4, -6), C′(1, -8), D′(1-, -3)

Fraction Action

$8\frac{5}{8}$ miles

Probability Pizzazz

$$\frac{10}{30} \bullet \frac{9}{29} \bullet \frac{8}{28} + \frac{10}{30} \bullet \frac{9}{29} \bullet \frac{8}{28} + \frac{10}{30} \bullet \frac{9}{29} \bullet \frac{8}{28} = \frac{18}{203}$$

Mathematically Speaking

Multiply 65 by 2: 130 cups of punch are needed
Divide 130 by 16 (16 cups per gallon):
$8\frac{1}{8}$ gallons of punch are needed

Keeping Skills Sharp

1. 20 ft^2
2. -12.09, -3.75, 0.06, 0.224, 2.35, 22.4
3. $-7 > -12$
4. 10,000 or ten thousand's place
5. 6,000
6. $4 \times 4 \times 4$
7. 14
8. 7
9. ? = 4
10. twenty-five and seven hundred thirty-four thousandths

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. What is 10% of 60?
2. What number is half-way between 27 and 31?
3. 50×40
4. $\frac{5}{6} + \frac{1}{6}$
5. What is $\frac{1}{6}$ of 600?
6. How much time is there from 7:20 a.m. to 8:30 a.m.?
7. Which is greater: 0.406 or 0.46?
8. Solve for n: $\frac{1}{2} = \frac{n}{10}$.
9. Nearest hundredth to 23.673
10. $\frac{48}{4 \times 2}$

Mental Math

1. 6
2. 29
3. 2,000
4. 1
5. 100
6. 1 hour and 10 minutes
7. 0.46
8. $n = 5$
9. 23.67
10. 6

Fraction Action

Sam spent half of his money on a shirt.

At another store he spent half of the money he had left.

Later, he bought a CD for $6.75. He had $2.50 left at the end. How much money did Sam have in the beginning?

(1.04, 1.07)

Probability Pizzazz

Jane has five pieces of candy and will eat one piece each of the next five days. Three pieces are wrapped in blue foil and two pieces are wrapped in yellow foil. What is the probability that she will eat a piece of candy wrapped in yellow foil on the fifth day?

(4.02)

Geometry Gems

Triangle *LMN*: *L*(2, 8), *M*(4, 5), *N*(7, 6) is transformed according to the rule

$$(x', y') = (x + 3, y - 4).$$

Give the coordinates of triangle $L'M'N'$.

(3.03)

Solve This!

Sally put red, white and blue handkerchiefs in a drawer. One-third of the handkerchiefs were red, one-fourth of the handkerchiefs were white and ten were blue. How many handkerchiefs were in the drawer and how many of each color were there?

(1.07)

Mathematically Speaking

What are the maximum number of points of intersection for a circle and a pentagon in the same plane?

(3.01)

Keeping Skills Sharp

Write answers here:

1. Write one and five thousandths in standard form.
2. Evaluate if $x = 2.5$: $15(x + 7.5) - 2.38$.
3. Complete the equation with <, >, or = : $\frac{3}{4}$ ___ $\frac{4}{5}$
4. Solve for R: $3.5R = 53.9$.
5. What is the value of 9 in 1.0309?
6. Give the greatest common factor of 12, 27, and 36.
7. List the factors of 10.
8. Make a factor tree for 36.
9. $37.4 \div 5.5 = ?$
10. 7.3825 to the nearest tenth is ?

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________ 6 ____________________

2 ____________________ 7 ____________________

3 ____________________ 8 ____________________

4 ____________________ 9 ____________________

5 ____________________ 10 ____________________

Answer Key

Grade 6

WEEK 28

Solve This!

There were a total of 24 handkerchiefs — 10 blue, 8 red, and 6 white.

Fraction Action

$37.00

Geometry Gems

$L'(5, 4)$; $M'(7, 1)$; $N'(10, 2)$

Probability Pizzazz

P(yellow on day 5) = $\frac{4}{10}$ or $\frac{2}{5}$

Mathematically Speaking

10 points of intersection

Keeping Skills Sharp

1. 1.005
2. 147.62
3. <
4. $R = 15.4$
5. nine ten-thousandths
6. 3
7. 1, 2, 5, 10
8. answers will vary
9. 6.8
10. 7.4

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. What is 5% of 60?
2. 600 x 30
3. 640 ÷ 40
4. List the prime factors of 35.
5. $8\frac{1}{2} - 5\frac{3}{4}$
6. $3 \times 2\frac{1}{2}$
7. $7 \cdot 3 \cdot \frac{1}{7} \cdot 1$
8. Estimate: $\frac{7}{8} + \frac{9}{10}$
9. Write $9 \times 9 \times 9$ in exponential notation.
10. Write $\frac{2}{5}$ as a decimal.

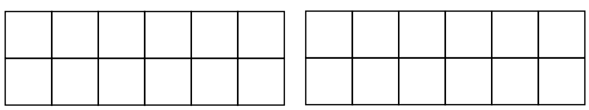
Mental Math

1. 3
2. 18,000
3. 16
4. 5, 7
5. $2\frac{3}{4}$
6. $7\frac{1}{2}$
7. 3
8. about 2
9. 9^3
10. 0.4

Fraction Action

Shade in the diagram below to show $1\frac{5}{12}$. Shade using hash marks.

Now shade the model to show subtracting $\frac{5}{4}$.



What is $1\frac{5}{12} - \frac{5}{4}$?

(1.04, 1.07)

Probability Pizzazz

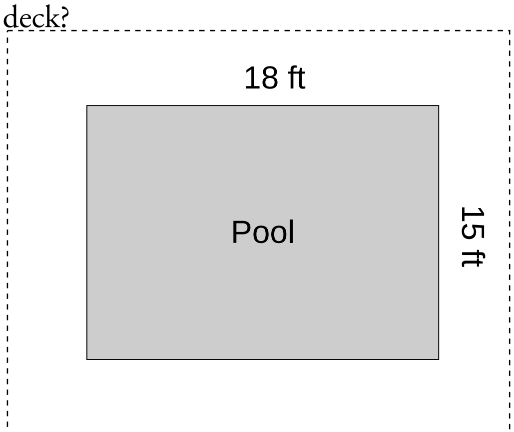
Draw a spinner, using numbers less than 20, that satisfies the following conditions:

- the probability of spinning a prime number is 25%
- the probability of spinning an even number is 50%
- the probability of spinning an odd number is 50%

(4.04)

Solve This!

A deck 3 feet wide is to be built on each side of the pool as shown below. What is the area of the deck?



(2.02)

Measurement Gems

A sailboat has a mast that holds a triangular sail. The sail has a base of twelve meters and a height of nine meters. The cost of the sail is \$15 per square meter. What will it cost to make the sail?

(2.02)

Mathematically Speaking

Find the population of five different countries. Write these data in both standard form and scientific notation.

(1.06)

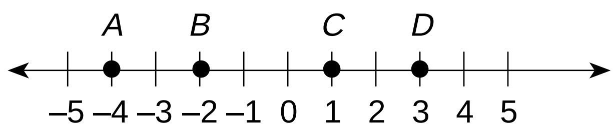
Keeping Skills Sharp

Write answers here:

1. What is the ratio of circles to triangles?

   ○ ○ ○ △ △ △ △

2. Write 236 in expanded form using exponents.
3. 572.3907 to the nearest tenth is ?
4. What is the value of the 3 in 2.03467?
5. What is the opposite of the number at point *D*?



6. Name the first five positive multiples of 8.
7. What is the prime factorization of 36?
8. Find the product: 15.8×2.7
9. 1,756 to the nearest hundred is ?
10. How many diagonals are in a regular hexagon?

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6 WEEK 29

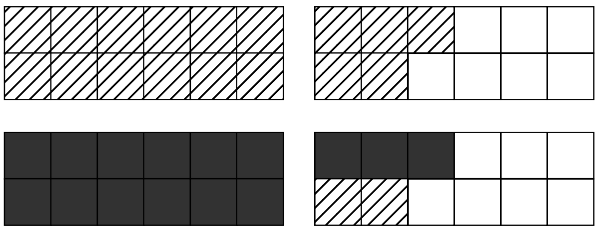
Measurement Gems

The area of the sail is 54 square meters. Cost would be $54 \times 15 = \$810$.

Solve This!

234 square feet

Fraction Action



$\frac{2}{12}$ or $\frac{1}{6}$

Mathematically Speaking

Answers will vary.

Probability Pizzazz

Answers will vary.

Keeping Skills Sharp

1. 3:4; 3 to 4; or $\frac{3}{4}$
2. $(2 \text{ x } 10^2) + (3 \text{ x } 10^1) + (6 \text{ x } 10^0)$
3. 572.4
4. three hundredths
5. –3
6. 8, 16, 24, 32, 40
7. $2^2 \times 3^2$
8. 42.66
9. 1,800
10. 9

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. What is 30% of 60?
2. What number is halfway between 50 and 100?
3. Write in standard form: $7.2 \text{ x } 10^3$
4. What is $\frac{2}{3}$ of 18?
5. 4.5 – 1.21
6. How much time is there from 9:00 a.m. until 3:30 p.m.?
7. 259 + 99
8. If you go 540 miles in 27 hours, how many miles per hour are you travelling?
9. Write 0.86 as a percent.
10. Write in standard form 2×10^4.

Mental Math

1. 18
2. 75
3. 7,200
4. 12
5. 3.29
6. 6 hours, 30 minutes
7. 358
8. 20 miles per hour
9. 86%
10. 20,000

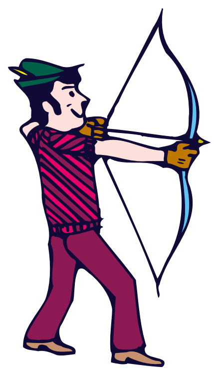
Fraction Action

Marie is making picture frames that are $5\frac{1}{2}$ inches wide and $6\frac{3}{4}$ inches long. She puts silver ribbon around the edge of each one. If she makes 12 of them, how many feet of ribbon will she need?

(1.04)

Probability Pizzazz

Hank is shooting arrows at a circular target with a diameter of 3 feet. In the center of the target is a red, circular region with a radius of 6 inches. What is the probability that an arrow will land on the target in the red region? What is the probability that an arrow will land on the target but miss the red region?



(4.02)

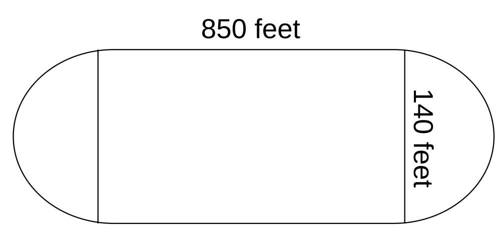
Solve This!

Carl wants to plant flowers around a rectangular garden. The plants should be 6 inches apart to allow for adequate growth. The perimeter of the garden is 30 feet. The first plant is placed at a corner of the rectangle. How many plants are needed?

(1.07, 2.02)

Measurement Gems

The race track below has ends which are semi-circles. What is the distance around the track?



(2.02)

Mathematically Speaking

Evaluate the expression below for $s = 4$, $t = 3$, and $v = 7$.

$$(s^3t^2 - v)^2$$

(1.06, 5.02)

Keeping Skills Sharp

Write answers here:

1. Solve for *p*: $3p + 2.9 = 38.6$
2. $\frac{3}{5} - \frac{1}{3} =$
3. $394.063 - 36.49 =$
4. Give the factors of 10,005 between 1 and 10.
5. Which is smaller, 1 quart or 3 pints?
6. A rectangle has a perimeter of 48 inches. Give three possibilities for length and width and the area for each case.
7. Three people in a club are 15 years old and two members are 12 years old. What is the probability that a member selected at random is 12 years old?
8. $15 - 2 \times (5 + 3) \div 4 =$
9. A class has 16 boys and 8 girls. If a name is drawn at random, what is the probability that a girl's name is drawn?
10. What is the range of the following set of measurements:

    82 cm, 1.2 m, 140 cm, 95 cm, 2.3 m, 1.8 m, 163 cm, 2 m,

    35 cm, 0.8 m

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6

WEEK 30

Fraction Action

$2 \times (5.5 + 6.75) \times 12 = 294$ inches $= 24.5$ feet

Solve This!

60 plants

Measurement Gems

The straight sides of the track are each 850 feet. The ends are two semicircles with diameter of 140 feet. The round part would have length of $140 \times \pi$ feet. The total length is approximately 2139.8 feet.

Probability Pizzazz

P(arrow lands in red region) = $\frac{1}{9}$
P(arrow misses the red region) = $1 - \frac{1}{9} = \frac{8}{9}$

Mathematically Speaking

5,085,025

Keeping Skills Sharp

1. $p = 11.9$
2. $\frac{4}{15}$
3. 357.573
4. 3 and 5
5. One quart is smaller.
6. Answers will vary.
7. $\frac{2}{5}$
8. 11
9. $\frac{8}{24}$
10. Range is 1.95 m or 195 cm

Mental Math

This section provides an opportunity for sharpening students' mental computation.

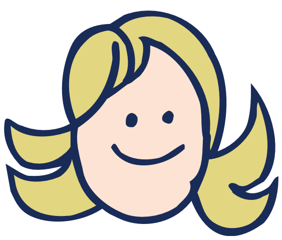
1. Estimate: $21.13 - 8.7$
2. Estimate: $21.923 + 0.823$
3. Estimate: 5.8×4.1
4. Write $2\frac{1}{4}$ as a percent.
5. $71 - 2.8$
6. $2\frac{1}{3} \times \frac{1}{2}$
7. What is the largest prime factor of 100?
8. Find $\frac{3}{4}$ of 160.
9. Find 20% of 1000.
10. Which is the largest: $\frac{1}{3}, \frac{1}{2}, \frac{4}{9}, \frac{6}{13}$?

Mental Math

1. 12
2. 23
3. 24
4. 225%
5. 68.2
6. $\frac{7}{6}$ or $1\frac{1}{6}$
7. 5
8. 120
9. 200
10. $\frac{1}{2}$

Fraction Action

After Marie's birthday party, there were $2\frac{2}{3}$ pizzas left. Marie gave half of the leftover pizza to her friend to take home. Marie ate $\frac{1}{4}$ of what was left. How much pizza did she eat?



(1.04)

Probability Pizzazz

John has a bag of number tiles labeled 0 - 9. Without looking, he will select a tile, record the number, return the tile to the bag, select a second tile and record that number.

What is the probability that neither of the tiles selected will be a prime number? that both tiles selected will be a prime number? that exactly one tile selected will be a prime number?

(4.05)

Solve This!

In a line of 26 people waiting to buy tickets to a concert, 12 have umbrellas, 10 have raincoats and 7 have both umbrellas and raincoats. The rest have neither.

A. How many have umbrellas only?

B. How many have neither?

(1.07)

Geometry Gems

Points $A(3, 6)$ and $B(11, 6)$ are the endpoints of the diameter of a circle graphed in the coordinate plane. What is the circumference of the circle? Express your answer as a multiple of π.

(2.02, 3.04)

Mathematically Speaking

When conducting a survey, it is necessary to select a representative sample. Give an example of a survey topic and an appropriate sample population for the survey.

(4.06)

Keeping Skills Sharp

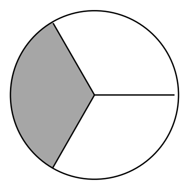
Write answers here:

1. How many days of the year have gone by prior to July 4th?

   prior to your birthday?
2. Will the sum be greater than one or less than one?

   $$\frac{21}{40} + \frac{3}{4}$$
3. Solve for *m*: $2.6m + 8.2 = 17.3$
4. Four children want to share three bags of M&M's™. There are 52 candies in each bag. How many M&M's™ does each child get?

   Write an algebraic expression to represent this situation.
5. 5 feet + 20 inches =
6. What is the perimeter of a $2\frac{3}{8}$ inch by $2\frac{3}{8}$ inch square?
7. What percent of the circle is shaded?



8. Evaluate: $9y^3$, if $y = \frac{2}{3}$
9. $4 - 2 \times 2 + 8 \times 6 \div 2 =$
10. What part of a gallon is six cups?

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________

2 ____________________

3 ____________________

4 ____________________

5 ____________________

6 ____________________

7 ____________________

8 ____________________

9 ____________________

10 ____________________

Answer Key

Grade 6
WEEK 31

Fraction Action

Marie ate one-third of a pizza.

Solve This!

A. 5 B. 11

Geometry Gems

8 π units

Mathematically Speaking

Answers will vary.

Probability Pizzazz

P(neither tile selected is prime) = $\frac{36}{100}$ or $\frac{9}{25}$

P(both tiles selected are prime) = $\frac{16}{100}$ or $\frac{4}{25}$

P(exactly one tile selected is prime) = $\frac{48}{100}$ or $\frac{12}{25}$

Keeping Skills Sharp

1. 184 days (185 days in a leap year); answers will vary depending on birthdays
2. greater than one
3. $m = 3.5$
4. $4x = 3(52)$
5. 6 feet 8 inches or $6\frac{2}{3}$ feet
6. $9\frac{1}{2}$ inches
7. $33\frac{1}{3}$ %
8. $2\frac{2}{3}$
9. 24
10. $\frac{3}{8}$

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. What is 40% of 80?
2. Find the least common multiple of 5 and 3.
3. Write the first five positive multiples of 9.
4. Write the prime factorization for 12.
5. Find the greatest common factor of 24 and 32.
6. Solve for x: $2x = 12.18$
7. $148 \div 4$
8. 2.5 x 42
9. Write the next 3 multiples of 12: 12, 24, 36, ___, ___, ___
10. 0.009×0.2

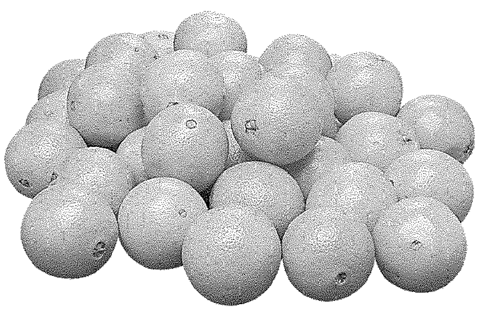
Mental Math

1. 32
2. 15
3. 9, 18, 27, 36, 45
4. $2 \cdot 2 \cdot 3$ or $2^2 \cdot 3$
5. 8
6. 6.09
7. 37
8. 105
9. 48, 60, 72
10. 0.0018

Fraction Action

The regular price for oranges is 6 for $2.52.

If they are on sale for $\frac{1}{4}$ off, how much would six oranges cost?



(1.04)

Probability Pizzazz

A baseball coach has five players each of which could play the following positions: left field, center field, right field. How many different ways can she fill these three positions?

(4.01)

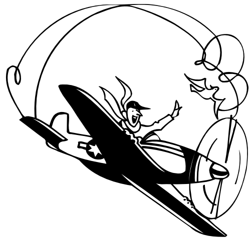
Geometry Gems

Triangle *RST* is located in the coordinate plane with the following vertices: *R*(2, 5), *S*(2, -2), and *T*(6, 1). Find the area of triangle *RST* and give the coordinates of another triangle that has an area half that of triangle *RST*.

(3.04)

Solve This!

An airplane took four hours to fly 1,500 miles. How many hours will it take the airplane to fly 2,100 miles if it flies at the same speed? Explain.



(5.04)

Mathematically Speaking

What value for y is a solution of $2y + 3 \geq 15$ but <u>not</u> a solution of $2y + 3 > 15$? Explain.

(5.03)

Keeping Skills Sharp

Write answers here:

1. What is the sum of the first eight prime numbers.
2. Compute: $\frac{1}{4}+\frac{2}{5}$ and $\frac{3}{4}-\frac{2}{3}$
3. Order the following from smallest to largest:
   $\frac{5}{9}, \frac{4}{8}, \frac{11}{15}, \frac{3}{7}$
4. Find the product of the first 5 prime numbers.
5. You leave your house at 6:30 a.m. and get home from school at 3:45 p.m. How many minutes were you gone?
6. The sides of a square are 4 meters. If you double the length of the sides, how does this affect the area?
7. $12\frac{2}{3} \div 1\frac{1}{3}$
8. Solve: $1 \times 2 + 3 \times 4 - 5 + 6 \times 7 - 8 + 9$
9. There is an 80% chance of rain today. Write this number as a fraction.
10. Simplify: $4(3x + 7) - 6x + 5$

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________ 6 ____________________

2 ____________________ 7 ____________________

3 ____________________ 8 ____________________

4 ____________________ 9 ____________________

5 ____________________ 10 ____________________

Answer Key

Grade 6

WEEK 32

Fraction Action

$1.89

Solve This!

If the plane flew 1,500 miles in four hours, the average speed is 375 mph.
2,100 miles ÷ 375 miles/hour = 5.6 hours or 5 hours and 36 minutes

Geometry Gems

The area of triangle *RST* is 14 square units. Answers will vary for the coordinates of the new triangle.

Probability Pizzazz

60 different ways (permutations)

Mathematically Speaking

Explanations will vary.
$y = 6$

Keeping Skills Sharp

1. 77
2. $\frac{13}{20}$, $\frac{1}{12}$
3. $\frac{3}{7}$, $\frac{4}{8}$, $\frac{5}{9}$, $\frac{11}{15}$
4. 2,310
5. 555 minutes
6. The area is four times larger than the original area.
7. $9\frac{1}{2}$
8. 52
9. $\frac{80}{100}$ or $\frac{4}{5}$
10. $6x + 33$

Mental Math

This section provides an opportunity for sharpening students' mental computation.

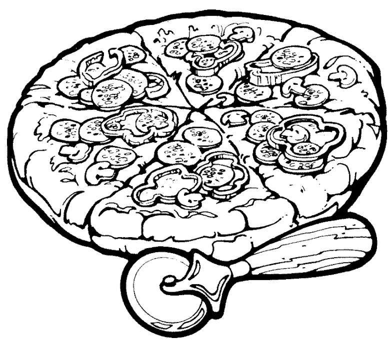
1. What is 70% of 80?
2. What number is halfway between 1,500 and 3,500?
3. 3,900 ÷ 30
4. $4 \times 6 \times 5 \times 10$
5. $5\frac{1}{4}$ ft = ___ feet ___ inches
6. Compare: $-3 \bigcirc -2$
7. Compare: $3 \bigcirc \frac{12}{4}$
8. Estimate: 37.93 + 11.77
9. What is the greatest common factor of 35 and 21?
10. Write with exponents: $5 \times 5 \times 5 \times 5 \times 5 \times 5$

Mental Math

1. 56
2. 2,500
3. 130
4. 1,200
5. 5 feet 3 inches
6. $<$
7. $=$
8. 50
9. 7
10. 5^6

Fraction Action

If $\frac{2}{3}$ of a mini pizza cost \$2.40, what would $\frac{1}{2}$ of a mini pizza cost?



(1.07)

Probability Pizzazz

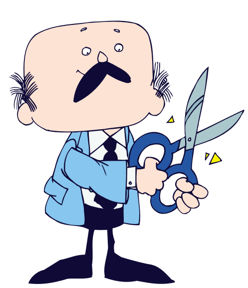
Design and conduct a survey. Explain the purpose of the survey, question(s) used, and procedure you followed.

Display the data collected in an appropriate format and analyze the results.

(4.06)

Solve This!

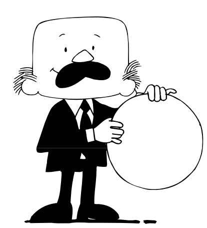
Mike is making a round tablecloth with a diameter of 8 feet. He wants to sew red trim around the outside edge and 6 inches from that he will sew yellow trim. If the fabric store sells trim in one-fourth of a yard increments, what is the minimum amount of trim he will need to buy?



(2.02)

Geometry Gems

A circle with center located at (5, 0) passes through the origin. What is the circumference of the circle?



(2.02, 3.04)

Mathematically Speaking

List all the numbers less than 75 with exactly three factors. Find the next two numbers, each greater than 75, that have exactly three factors.

(1.05)

Keeping Skills Sharp

Write answers here:

1. Which is the best estimate for 197 + 52: 250, 300, 255?
2. Find the sum. Simplify your answer.
   $\frac{3}{15} + \frac{2}{15}$
3. Find the difference: $13\frac{1}{4} - 2\frac{2}{3}$
4. Simplify: $6(3y + 4) + 2(y - 5)$
5. Which is larger: 2 quarts or 12 cups?
6. Find the circumference of a circular clock face whose diameter is 15 cm.
7. Evaluate: $2x^2 + 3x - 5$, if $x = 4.2$
8. Solve for m: $3m + 5 = 22$
9. If you roll two fair six-sided number cubes that are numbered 1 – 6, what is the probability of rolling two numbers that are the same?
10. Give the prime factorization of 144.

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ___________________
2 ___________________
3 ___________________
4 ___________________
5 ___________________
6 ___________________
7 ___________________
8 ___________________
9 ___________________
10 ___________________

Answer Key

Grade 6
WEEK 33

Fraction Action

Whole pizza = \$3.60
Half of pizza = \$1.80

Solve This!

Red trim: 8.5 yards
Yellow trim: 7.5 yards

Geometry Gems

10π units

Mathematically Speaking

4 = 1, 2, 4
9 = 1, 3, 9
25 = 1, 5, 25
49 = 1, 7, 49
121 = 1, 11, 121
169 = 1, 13, 169

Probability Pizzazz

Answers will vary.

Keeping Skills Sharp

1. 250
2. $\frac{1}{3}$
3. $10\frac{7}{12}$
4. $20y + 14$
5. 12 cups
6. about 47 centimeters
7. 42.88
8. $m = 5\frac{2}{3}$
9. $\frac{6}{36}$ or $\frac{1}{6}$
10. $2^4 \times 3^2$

Mental Math

This section provides an opportunity for sharpening students' mental computation.

Find the following:

1. $\frac{3}{2}$ of 20
2. $2\frac{1}{4} \times 200$
3. $\frac{3}{4}$ of 800
4. Write $\frac{7}{20}$ as a percent.
5. Write $66\frac{2}{3}$ % as a decimal.

Estimate the following:

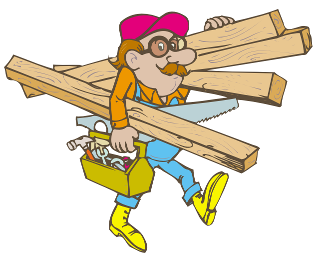
6. 13×33
7. $172 \div 17$
8. $88 - 22$
9. $72 + 27$
10. 52×37

Mental Math

1. 30
2. 450
3. \$600
4. 35%
5. $0.66\overline{6}$
6. 300
7. 10
8. 70
9. 100
10. 2,000

Fraction Action

John had a board $32\frac{3}{4}$ inches long. He cut off $\frac{5}{16}$ of an inch so it would fit a shelf. How long is the board now?



(1.04)

Solve This!

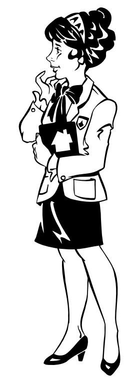
Which of the following could be the perimeter of a rectangle with an area of 72 cm^2? Explain.

36 cm, 40 cm, 100 cm, 144 cm

(2.02)

Probability Pizzazz

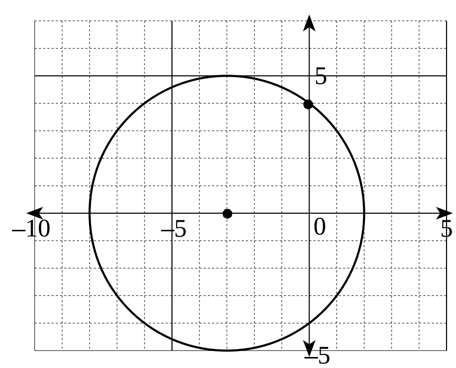
Laura packed five sweaters, four skirts, three jackets, two pairs of shoes and one belt for a trip. How many days can Laura wear her clothes without repeating the exact outfit?



(4.01)

Geometry Gems

The circle shown has a diameter with one endpoint at (0, 4). Where is the other endpoint of that diameter?



(3.04)

Mathematically Speaking

Can the sum of two prime numbers be a prime number? Explain.

(Review)

Keeping Skills Sharp

Write answers here:

1. 10,401 – 997 =
2. $\frac{2}{3}$ of 12 =
3. 3,796.32 + 4.963 =
4. 965 ÷ 30 =
5. Which is heavier: a 10 pound rock or a 100 ounce rock?
6. Find the area of a room that is 16 feet by 13 feet.
7. What is the mode of these test scores? the median?
   36, 64, 75, 79, 81, 81, 82, 83, 83, 85, 86, 88, 88, 90, 90, 90, 95, 99
8. Solve: $3 + 4 \times 6 - 8 + 4 - 1$
9. If a card was randomly chosen from a deck of cards numbered 1 – 50, what is the probability of drawing a number less than 10?
10. Complete the pattern:
    5, 7, 6, 9, 8, 12, 11, ___, ___, ___, 20

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ____________________ 6 ____________________

2 ____________________ 7 ____________________

3 ____________________ 8 ____________________

4 ____________________ 9 ____________________

5 ____________________ 10 ____________________

Answer Key

Grade 6

WEEK 34

Fraction Action

$32\frac{7}{16}$ inches long

Solve This!

36 cm Explanations will vary.

Geometry Gems

The other endpoint of the diameter is at (–6, –4).

Mathematically Speaking

Yes, but one of the numbers must always be two.

Probability Pizzazz

120 days

Keeping Skills Sharp

1. 9,404
2. 8
3. 3,801.283
4. $32.16\overline{66}$
5. 10 pound rock
6. 208 feet^2
7. 90 ; 84
8. 22
9. $\frac{9}{50}$
10. 16, 15, 21

Mental Math

This section provides an opportunity for sharpening students' mental computation.

Write each decimal as its fraction equivalent (in simplest form).

1. 0.7
2. 0.5
3. 0.25
4. 0.4
5. 0.9

Estimate.

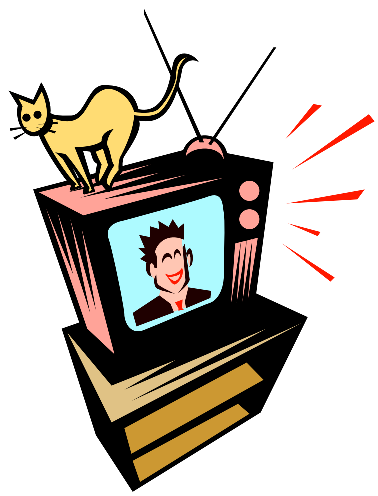
6. 25×37
7. $169 \div 17$
8. $517 - 121$
9. $77 - 21$
10. 37×4

Mental Math

1.	$\frac{7}{10}$	2.	$\frac{1}{2}$
3.	$\frac{1}{4}$	4.	$\frac{2}{5}$
5.	$\frac{9}{10}$	6.	1,000
7.	10	8.	400
9.	60	10.	160

Fraction Action

One week Joe watched TV for $5\frac{1}{4}$ hours and Amy watched TV for $4\frac{5}{6}$ hours. How much longer did Joe watch TV than Amy?



(1.04)

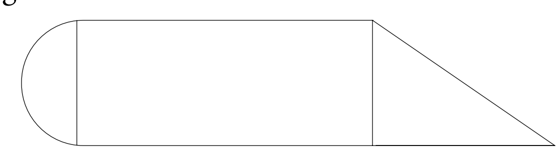
Probability Pizzazz

Amy tossed a pair of fair dice 150 times, and recorded the product of the numbers each time. Twenty of the trials produced a product that was an odd number. Are these results unusual? Explain.

(4.04)

Measurement Gems

The plan below is for a flower garden. The center rectangle has a base of 18 feet and a height of 8 feet. The base of the triangle is 12 feet. The rounded area is a semicircle. Find the area of the garden.



(2.02)

Solve This!

In a candy sale, Marie sold \$43.75 worth of candy. Tom sold as much as Marie and Ann together. Susan sold three times as much as Tom. Bill sold \$250 worth which was \$52 more than Susan. How much did Ann sell?

(1.07)

Mathematically Speaking

A circular spinner for a gameboard has three colors. One-fourth is colored green; $\frac{2}{3}$ is red; and the rest is blue. Draw and shade this spinner. How did you decide how much to color for each section?

(1.04)

Keeping Skills Sharp

Write answers here:

1. Add five million, six hundred seventy-two thousand, four hundred ninety-two and four million, nine hundred thousand, eighty-six.
2. Find the difference between $3\frac{2}{3}$ and $1\frac{7}{8}$.
3. The bill for your lunch was \$6.92. How much should you give the cashier if you want a dime in change?
4. A farmer has 180 eggs to put in packages of one dozen. How many dozen does he have?
5. How many inches tall is a $4\frac{3}{4}$ foot fence post?
6. What is the area of the front surface of a door if the door measures 7 feet by 3 feet and there is a 1 foot by 1 foot window in the middle?
7. Write in scientific notation: 5,697,000,000
8. Simplify: $9 \div 3 + 4 - 3 + 8 \times 2$
9. The letters in the word MISSISSIPPI were put in a bag. What is the probability of drawing out a vowel?
10. What is the 20th term in this sequence? ABCAABBCCAAA …

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6

WEEK 35

Fraction Action

25 minutes

Solve This!

Ann sold $22.25 worth of candy

Measurement Gems

The rectangle has an area equal to 144 square feet.
The triangle has an area equal to 48 square feet.
The semi-circle has an area equal to about 12.6 square feet.
The total area equals 204.6 square feet.

Mathematically Speaking

Answers will vary. Most students will divide the spinner in twelve equal sections to solve this problem. One-twelfth of the spinner is blue.

Probability Pizzazz

Yes, explanations will vary.

Keeping Skills Sharp

1. 10,572,578
2. $1\frac{19}{24}$
3. $7.02
4. 15
5. 57 inches
6. 20 feet^2
7. 5.697×10^9
8. 20
9. $\frac{4}{11}$
10. A

Mental Math

This section provides an opportunity for sharpening students' mental computation.

1. What is 5% of 80?
2. 400 – 99
3. 3 gallons = ___ quarts
4. $\frac{1}{4} + \frac{1}{2} + \frac{1}{3}$
5. $4\frac{1}{4} + \underline{\ ?\ } = 5$
6. $7 \times 4\frac{1}{7}$
7. Write $1\frac{1}{2}$ as a decimal.
8. What percent is 4 out of 5?
9. Write the next 3 multiples of 14: 14, 28, 42, ___, ___, ___.
10. $29\frac{1}{2} + 3\frac{3}{4}$

Mental Math

1. 4
2. 301
3. 12
4. $1\frac{1}{12}$
5. $\frac{3}{4}$
6. 29
7. 1.5
8. 80%
9. 56, 70, 84
10. $33\frac{1}{4}$

Fraction Action

Gene typed his book report for $\frac{2}{5}$ of an hour before school and $\frac{3}{4}$ of an hour after school. How long did he type in all?

(1.04)

Solve This!

A recipe to make 5 dozen cookies calls for:

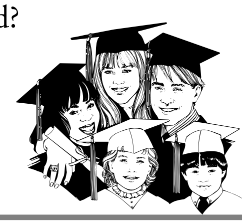
4 cups of flour
2 cups of sugar
$1\frac{1}{2}$ cups of peanut butter
$\frac{3}{4}$ cup of butter

What ingredients would be needed to make 20 cookies?

(1.04, 1.07)

Probability Pizzazz

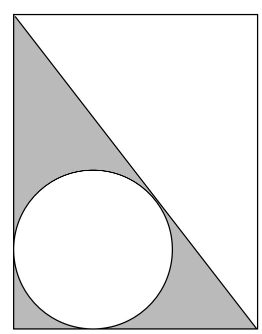
From a group of five students, how many different three-member committees can be formed?



(4.01)

Measurement Gems

In the diagram, the rectangle has a height of 8 inches and a width of 6 inches. The circle has a radius of 2 inches. What is the area of the shaded region?



(2.02)

Mathematically Speaking

The ratio of boys to girls in Ms. Taylor's class is 3:5. If there are 24 students in the class, how many girls are in the class?

(5.04)

Keeping Skills Sharp

Write answers here:

1. Give an estimate for 392 + 403 + 97 + 101.
2. Evaluate: $15ab - 2a$, if $a = 10$ and $b = 3$.
3. 43.06 – 2.94 =
4. $398 \times 402 =$
5. 24 cups = ___ pints
6. Find the area of a square when one side is 8 meters.
7. Find the range of these test scores: 50, 97, 88, 94, 83, 79, 82.
8. $\frac{1}{2} + \frac{3}{4} \times \frac{1}{3} + \frac{3}{5} =$
9. What is the probability of spinning two sixes in a row on a fair spinner that is divided into seven equal parts and numbered 1–7?
10. Susie swims 20 laps on even days of the month and 21 laps on odd days of the month. During the month of April, how many laps will she have swum by midnight on April 6th?

1. ___________
2. ___________
3. ___________
4. ___________
5. ___________
6. ___________
7. ___________
8. ___________
9. ___________
10. ___________

Mental Math

Directions to Students:
Write your answers as the questions are called out.
Each question will be repeated only once.

1 ______________________ 6 ______________________

2 ______________________ 7 ______________________

3 ______________________ 8 ______________________

4 ______________________ 9 ______________________

5 ______________________ 10 ______________________

Answer Key

Grade 6 WEEK 36

Fraction Action

$1\frac{3}{20}$ hour or 69 minutes

Probability Pizzazz

10 committees (combinations)

Measurement Gems

Area of the rectangle is 48 in^2.
Area of the triangle is 24 in^2.
Area of the circle is about 12.6in^2.
Shaded area is about 11.4 in^2.

Solve This!

$\frac{2}{3}$ cup of sugar

$\frac{1}{4}$ cup of butter

$1\frac{1}{3}$ cups of flour

$\frac{1}{2}$ cup of peanut butter

Mathematically Speaking

15 girls

Keeping Skills Sharp

1. 1,000
2. 430
3. 40.12
4. 159,996
5. 12
6. 64 square meters
7. 47
8. $1\frac{7}{20}$
9. $\frac{1}{49}$
10. 123 laps

Mental Math

This section provides an opportunity for sharpening students' mental computation.

Write each fraction as its decimal equivalent.

1. $\frac{7}{10}$
2. $\frac{1}{3}$
3. $\frac{1}{8}$
4. $\frac{3}{4}$
5. $\frac{1}{5}$

Estimate.

6. 17×12
7. $141 \div 14$
8. $101 - 23$
9. $67 + 32$
10. 6×41

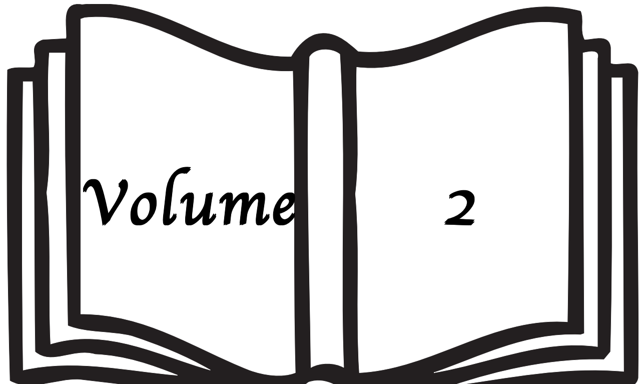
Mental Math

1. 0.7
2. $0.3\overline{33}$
3. 0.125
4. 0.75
5. 0.2
6. 200
7. 10
8. 80
9. 100
10. 240

Grade Six

Classroom

Strategies



The learner will understand and compute with rational numbers.

1

1.01 Develop number sense for negative rational numbers.

a) Connect the model, number word, and number using a variety of representations, including the number line.

b) Compare and order.

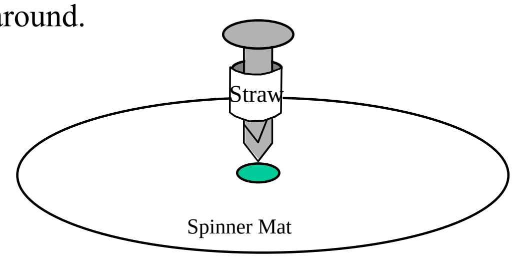
c) Make estimates in appropriate situations.

Notes and textbook references

A. **James Bond Game** (Blackline Master I - 21)

Students use the spinner to race from sea level to the bottom of the sea and then to the top of a cliff. Students will use integers to measure above or below sea level and also to indicate a move upwards or downwards.

An easy way to make spinners is to punch a paper brad through the center of the spinner, and place a large paper clip over the brad. To improve this technique, cut off a small section of straw to pass the brad through before you punch it through the paper. The straw forms a smooth wall for the paper clip to spin around.



Notes and textbook references

Blackline Master I - 1 contains a problem-solving guide which may be useful to share with students as they begin their academic year.

B. Thermometers (Blackline Master I - 22)
Students will use the thermometer model to investigate some temperatures in the colder parts of the U.S.

C. Enrichment Activity: Temperature on the Beach
(Blackline Master I - 23) Students complete a data table to show what happens to temperatures of beverages in various containers.

D. Life on the Line Make a personal lifeline (number line) using the month and year of your birth as 0. Encourage students to think of events that happened before their birth (the birth of a sibling or the marriage of their parents would be good examples) to represent negative numbers and the events happening after their birth (when they walked or began school) to represent positive numbers. This is an excellent way to incorporate fraction use for example, if you began to crawl at 9 months old, you would place that event on the number line at 3/4, since 9 months out of 12 would be the fraction 9/12 which would simplify to 3/4. This is a fun activity, which involves the whole family and can allow students to connect mathematics to real life situations.

E. Secret Message Game (Blackline Master I - 24)
When the students list the integers in order, the corresponding letters spell out a message.

F. Integer War (Blackline Masters I - 25 and I - 26)
Students work in pairs or in two teams. Students are given the blackline masters and instructed to cut the number cards apart. They may wish to keep the number line diagram for reference. The cards are placed face down on a table and shuffled. A dealer deals 14 cards to each player/team and 14 are left face down on the table as the draw area. On any play, each team will choose one of his cards to turn face up in a play area. These two cards are the comparison cards. Now the player/team member whose turn it is will turn up one of the cards from the draw area. If the card drawn is higher than either of the comparison cards, the player/team wins one point. If the card drawn is between the two comparison cards, the player/team wins five points. If the card drawn is less than both the comparison cards, the opponent of the player/ team wins one point. Play alternates until each player/team has had seven plays. High score wins.

Notes and textbook references

G. **Classroom Number Line** Use a brightly colored rope held by two students to demonstrate comparing and ordering rational numbers. Begin by having a student at one end hold a card numbered zero and a student at the other end holding the card one. Hand other students cards with a variety of rational numbers written on them such as, fractions, decimals, mixed numbers, or improper fractions. It would be helpful if while students were seated they would change all the numbers to one form such as, decimals. Then allow one student at a time to place his/her card on the number line using a clothespin. This activity involves not only using number sense, but it encourages communication, reasoning, and justification. You can also use just the specific number topic you are working on; for example, you could use only decimals or fractions. This is also an excellent way to involve every student and help him or her to be successful.

H. **Using Butcher Paper** Have groups of students draw a number line from -5 to 5 on a sheet of butcher paper six feet long. Have students use a ruler to mark the numbers. Assign each group a set of numbers to plot on their number line. Each group should share its number line with the class. This encourages mathematical discourse.

I. **Connection to Meteorology** Have students use the almanac to record the highest and lowest temperatures for selected states. Then have them list the temperatures from least to greatest. This is a good way to show students that negative numbers get smaller the farther they are away from zero. Students could place their temperatures on a number line or you could use a class size thermometer.

J. **Checkbook Activity** (Blackline Master I - 95) Give the students the following scenario: Bill's dad has devised a method of making sure he always has extra money in his checking account. In his check register, he rounds each check amount to the next highest whole dollar. For example, if he wrote a check to the dry cleaners for $18.34, he would put it in the check register as $19.00. This would give him an extra $0.66 in his account. Use the following checks to determine how much extra money Bill's dad has in his account.

Suggested Classroom Accommodations for Students with Specific Learning Disabilities

Cognitive Strategies	Behavior	Accommodations
Remembering	forgets order of steps	chart of steps displayed
Self-managing	cannot explain concept	self-questioning taught
Information gathering	does not understand on first listening	frequent summaries paraphrasing strategy
Organizing	cannot make visual representation	vocabulary recorded with both words and a visualization strategy
Analyzing	cannot locate errors	verbal rehearsal strategy
Problem solving	cannot shift strategies	demonstrate each problem using two strategies
Time managing	poor assignment completion	prioritize assignments; required time chart for increased awareness of time demands
Integrating	poor notes	note taking strategy organized by concepts, not textbook chapters
Generating	weak concept connecting	prediction strategies pattern awareness
Evaluating	poor test taking	alternate tests; frequent assessment; test taking strategies

Some Additional Accommodations

- Modify original task to meet the needs of handicapped students.
- Provide taped material to listen to, rather than read.
- Emphasize higher use of objective test in contrast to subjective tests.
- Provide highlighted text for student use.
- Provide large print materials.
- Increase allowable time for completion.
- Reduce weight of test importance.
- Change fill-in-the-blank to multiple-choice format.
- Offer three choices instead of four in multiple-choice formats.

1.02 Develop meaning for percents.

a) Connect the model, number word, and number using a variety of representations.

Notes and textbook references

A. **Fill a Grid** (Blackline Master I - 29)

This activity provides models for percents based on a 100-cell grid.
Preparation: Laminate the black line sheet or slide it into a sheet protector.
Materials: Paper clip for spinner, dry erase markers, tissue for eraser.
Instructions: Students take turns spinning the spinner and coloring the indicated percentage on their grid. Each spinner section has two percents; the student may choose either of those or the sum of the two. The round is over when a student has colored in his grid completely. The winner's score is the percentage of his opponent's grid not yet colored. Play continues for five rounds. The player with the highest score wins.

B. **Mini Review – Percents** (Blackline Master I - 2)

This mini review covers most of the percentage skills from this unit. Allow students to work in pairs to share strategies and skills.

C. **Percent Models** (Blackline Master I - 27 and I - 28)

Preparation : Copy the Blackline Master I-27 on transparency film to make enough copies for each student to have a small grid. Students may work in pairs. Discuss with the students how to find rectangles on the grid to represent 1%, 10%, 5%, 20%, 25%, etc. Then direct the students to use percents to estimate quantities illustrated on Blackline Master I - 28 by placing the hundreds grid over the pictures on Blackline Master I - 28.

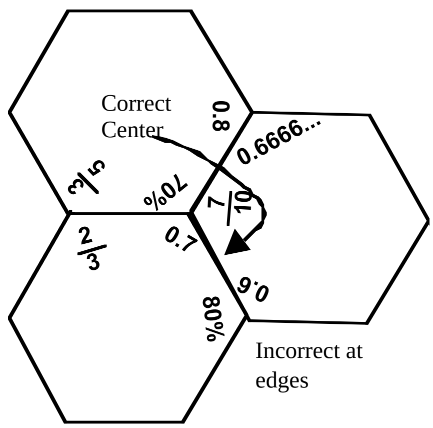
Notes and textbook references

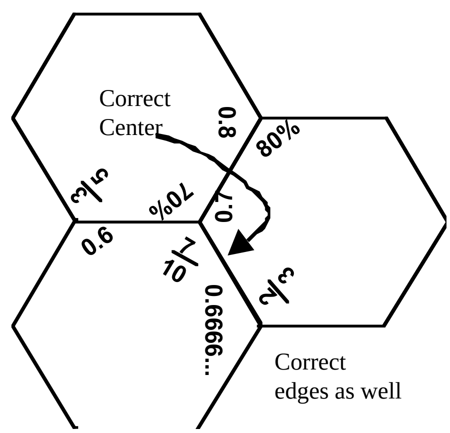
D. Fractions, Decimals and Percent Hexagon Puzzle

(Blackline Master I - 30) Students work in small groups to assemble a puzzle with hexagonal pieces. Where three hexagonal corners meet, the pieces will show a fraction, decimal, and percentage that are equivalent.

Students should be warned that an arrangement of hexagons might have three equivalent numbers at the center, but it could still have incorrect matches at the edges as shown below. This is corrected by exchanging the position of two of the hexagons.

Teachers: You may want to write a letter in each box before copying the puzzle as this will make it easier to check your students' work. The Blackline Master shows the puzzle assembled correctly. Teachers may wish to cut the puzzle pieces and place them in envelopes.





Notes and textbook references

b) Make estimates in appropriate situations.

A. **Homework Percents** Have students keep a one week record of their homework (or other daily grade). Ask the students to make a fraction with the numerator represented by the number they answered correctly, and the denominator represented by the total number of questions. Have them estimate a percent using the fraction, and give an explanation for their estimation. Then students can check their estimate with a calculator. As the week goes on, they should get better at estimating their grade. Teacher should ask questions of the students such as "Was your fraction close to one half? What percent would that be? Did you get almost all of the problems correct? What percent would be almost 100%?"

B. **Smart Shoppers** Students work in cooperative pairs. Teacher can distribute sales flyers from Wal-mart™, Walgreens™, CVS™, etc (most stores will give you a class set of flyers that are about to go out of date). Teacher chooses a few items from the flyer, and tells the students that these items are 20% off. The students than estimate what the new sales cost would be by rounding the price in the flyer and subtracting 20%. When activity is finished, the class could have a discussion about which items you would save the most on and why.

C. **Dinner Out** When Joe and his friends go to dinner they always want to be sure and give the waiter at least a 15% tip. When the check comes, the total amount of their dinner bill is $59.28. Teacher should use this scenario to model how to estimate the amount of tip. First, round the dinner bill to the nearest dollar. Second, estimate 10% by moving the decimal point one place value to the left .(Multiplying by one-tenth). Estimate half of the 10% and add that to the 10% to arrive at the tip.

After modeling, the teacher will give each pair (or group) of students a menu from a local restaurant and have students select their dinner including beverage and dessert. Students should then estimate the tip amount for their dinner.

Notes and textbook references

The concept of rational numbers is one that students have difficulty mastering. Using activities that promote peer communication allows students to develop and confirm their own understanding of fractions and decimals.

1.03 Compare and order rational numbers.

A. **Rational Race** (Blackline Masters I - 3 through I - 12)

Materials (per group): Playing mat, deck of problem cards, paper clip for spinner, chips or other playing pawns.
Procedure: Students work in teams of two to race around the track. Each team has a pawn at the starting block. On a team's turn, the other team draws a card and covers the answer with their thumb. They then show the card to the team in play. The team in play attempts to find the answer. If the team finds the correct solution, they spin the spinner to see how far they advance. If the team misses the solution, they move back one space (but no farther back than the start). The first team to reach the finish wins.

Alternate whole class play: Print the playing grid and cards on transparency film. Cover the answers with sticky dots. Divide the class into several teams and within those teams have consulting pairs of students who work together. On a team's turn, one of the pairs will be designated as the ones to produce an answer for the team. If this designated team fails to produce a correct answer, a pair from the opposing team may be called upon to give the answer and move forward for their team. Note: If the class is divided into more than three groups, the teacher may wish to use various colors of dry erase markers to signify the teams instead of pawns.

B. **Chalk Tray Racko** (Blackline Masters I - 31 through I - 38)

Preparation: Print the masters onto heavy paper or copy the numbers onto index cards. Only one deck is needed. Divide the class into two teams. Shuffle the deck thoroughly and "deal" each team eight cards. Display the cards in the order drawn in a row on the chalk tray. Display the cards for one team on the left side of the tray and the other on the right. The object of the game is to be the first team to display eight cards in numerical order.
Playing the Game: On a team's turn, a student is selected to come to the board. He may choose the discarded card showing, or he may draw from the top of the deck. The student may replace one of the cards in his team's display with his drawn card if that improves his team's chance of winning. After playing, the student shows the unused card as the new discarded card.

Example: The first team has these cards showing:

32%, 0.2999, 0.049, 5.5%, 1, 0.3902, 0.69, 72.2%

The discarded card is 103%. That card is not helpful, so the player chooses a card from the pile. He draws 1.01%.

This card is less than 0.049, so the player chooses to replace 0.2999 with 1.01%. His teams' display now reads:

32%, 1.01%, 0.049, 5.5%, 1, 0.3902, 0.69

The new discard is 0.2999.

Notes and textbook references

C. Mathematical Message (Blackline Master I - 39)
Students put the numbers in order to decode a secret message. Spaces are provided on the blackline master for students to put the numbers in decimal form in order to arrange them more easily. You may wish to provide other strategies to the students as well.

D. Patterns for Repeating Decimals (Blackline Master I - 40)
This worksheet enables students to discover for themselves how some repeating decimals can be changed into rational numbers.
(Note: Part II of the Blackline Master is considered to be enrichment)

E. Fraction Card Games (Blackline Master I - 41 through I - 47)

Concentration – Deal all cards face down in five rows of 14. Players take turns turning over two cards at a time. If the fractions are equivalent, the student keeps the pair. The winner is the person with the most cards when all have been taken.

Go Fishing – Deal five cards to each player. Stack the remainder face down in the middle of the table. The object is to get pairs of two equivalent fractions. At each turn players may ask others in the group for a certain fraction. As long as someone gives the person a card, the player may keep asking. When no one has an equivalent fraction to give the player, the person "goes fishing" by drawing from the deck. At the end of the game, the player with the most pairs wins.
Note: You may adapt other card games to use with your equivalent fraction deck.

Notes and textbook references

F. Converting Repeating Decimals. Show students an algebraic way to convert repeating decimals to ratios.

Example 1: $x = 0.44444...$

Use equations:

$$\begin{aligned} 10x &= 4.44444... \\ \underline{-\quad x} &\underline{= -\,0.44444} \end{aligned} \qquad \text{and now subtract}$$

$$9x = 4$$

$$x = 4/9$$

Example 2: $x = 0.2333333\ldots$

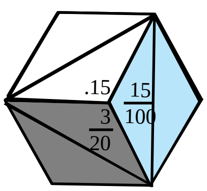
Use equations:

$$\begin{aligned} 100x &= 23.33333... \\ \underline{-10x} &\underline{= -2.33333}... \end{aligned} \qquad \text{and now subtract}$$

$$90x = 21$$

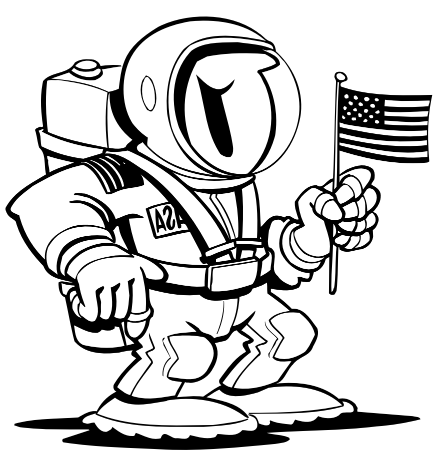
$$x = 21/90 = 7/30$$

(Teachers: This is an enrichment activity that should be done after teaching equations.)



G. Spaceship Shape Up (Blackline Masters I - 49 and I - 50) Materials needed: scissors, glue sticks, and blackline masters for each group. Students work in groups of three to complete the design of a space ship by filling in equivalent fractions and decimals.

A dark, light, and medium-shaded rhombus will be needed to fill in each hexagon. Equivalent fractions will meet where the rhombuses meet. Each hexagon should be filled in with the dark rhombus at the bottom, light rhombus at the top, and medium-shaded rhombus at the right side as shown in the diagram here. A practical suggestion is to let one student in each group be responsible for pieces with the same shading.



Notes and textbook references

H. **Rational Race** (Blackline Masters I - 51 through I - 54)

Materials needed: Rational number cards, playing mat, pawns for each team, paper clip spinner.

Students compete in teams to complete a racetrack. Rational number cards are divided between two teams. On a given turn, the spinner is spun to determine a target number. Then each team turns over a card. The team whose card shows a rational number closest to the target advances one square. If the team card shows exactly the target number, the team advances three squares. If the two teams are equidistant from the target number, a new target number is spun until one of the cards showing is a clear winner. The first team to reach finish is the winner. While playing this game, the students will have an opportunity to challenge each other and discuss strategies for comparing rational numbers. Communication about math concepts helps students develop and confirm their own understanding of these topics.

I. **Order-Up** (Blackline Masters I - 52 through I - 54)

Materials needed: rational number cards. Two teams compete in this game. The cards are shuffled, and five cards are dealt to each team. The team places the cards in order as dealt from left to right (the order battery). The remaining cards are placed in a stack face down (the draw pile). The top card is turned face up beside the draw pile (the discard pile).

The object of the game is to get five cards in the order battery in numerical order from smallest to largest. On a team's turn, the player can choose to take the top card from the draw pile, or the top card from the discard pile. They then decide if they wish to replace a card in the order battery with the newly drawn card. By replacing, the students are working toward getting five cards in numerical order. If they choose to replace, the card removed from the battery becomes the top card on the discard pile. If they wish, they may keep the battery as is, and place the newly drawn card on the discard pile. If the draw pile is exhausted, the discard pile is reshuffled and turned over to refill the draw pile.

J. **Robot Packing Company** (Blackline Master I - 55)

Two students or teams can play opposite each other on one playing mat. Each team is attempting to fill in the four crates. One of them is divided into fourths, one into sixths, and two are divided into twelfths. On a player's turn, he will spin the spinner to determine which amount of a crate he can fill. Students should be able to justify their selection when the model is not identical to the fraction named. Play stops when a player spins and cannot fill in that amount in his crates. At the end of play, the player with the smallest amount empty is the winner.

Notes and textbook references

1.04 Develop fluency in addition, subtraction, multiplication, and division of non-negative rational numbers.

a) Analyze computational strategies.

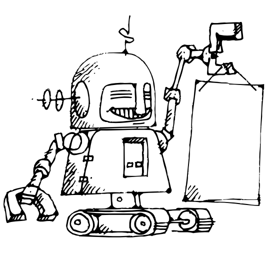
b) Describe the effect of operations on size.

c) Estimate the results of computations.

d) Judge the reasonableness of solutions.

A. **Bode's Number Patterns** (Blackline Master I - 17)
AU is the abbreviation for an Astronomical Unit which represents the distance from the Earth to the Sun. Bode used the AU to find an interesting number pattern relating the orbits of the planets. Students will explore, expand and evaluate this number pattern.

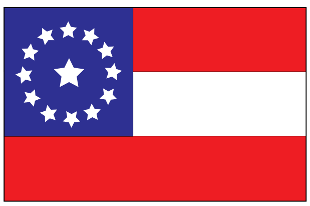
B. **Alien Test Taking** (Blackline Master I - 18)
Materials: Paper reinforcement rings or sticky dots.
Allow students to work in pairs to answer the questions on this test. The students are not allowed to use pencils or calculators to do the computation but should rely on their understanding of numbers. Students often rely on memorized procedures and fail to recall that the numbers should make sense. The purpose of this activity is to connect computational algorithms with meaning. When students work in pairs, they will have an opportunity to share strategies with each other. Some strategies you may want to point out are estimation, elimination, and checking the units or tens digit of the answer. For example, when multiplying 103 x 3.5, the least digit in the answer must be a five. This eliminates many of the solutions.

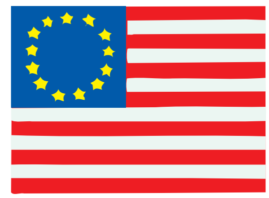


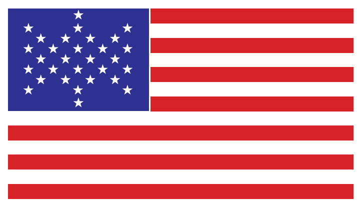
C. **Mini-Review – Fractions** (Blackline Masters I - 13 and I - 14) This mini review covers most of the fraction skills from this unit. Allow students to work in pairs to share strategies and skills.

Notes and textbook references

D. **Alien Flags** (Blackline Master I - 19)
Teachers may want to begin this exercise by showing students pictures of previous flags of the United States with fewer than 50 stars. In each flag arrangement an appealing design was used to display the stars. The stars were often arranged in rows of the same size, but what happened with the design when the number of stars could not be evenly divided? In this activity, students will use rational numbers to compute the number of symbols that will be used from each Alien culture. Finally, they will use the comets and stars to create a pleasing and symmetric design for a new flag of the **Alien Federation.**





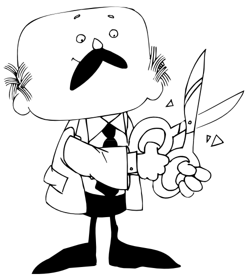


E. **Division of Mixed Numbers with Models** (Blackline Master I - 56 through I - 59)
Divide students into groups and provide a deck of cards for each group. Be sure the cards are shuffled well. Have the students arrange the cards so that a problem, a model, and an answer card match in each case. As the teacher models during the discussion, this task will help students understand the concept of dividing mixed numbers.

When dividing a mixed number by a whole number, it is often convenient to think of the whole number as a number of groups. Example: If I have 4 1/2 apples, how much will each person get if I divide them into three equal parts? When dividing a mixed number by a fraction, it is often more convenient to think of the problem by thinking of how many groups would be needed if each group contained the same amount. Example: I have 1 1/2 cups of paint. Each board I paint requires 1/2 cup. How many boards can I paint?

F. **Mini-Review – Decimals** (Blackline Masters I - 15 and I - 16) This mini review covers most of the decimal skills from this unit. Allow students to work in pairs to share strategies and skills.

Notes and textbook references



You may wish to cut the puzzle pieces apart and place them in envelopes as the Blackline Master gives the solution.

G. **Multiplication and Division of Fractions Square Puzzle** (Blackline Master I - 60) With this puzzle, students will match multiplication and division of fraction problems with their solutions. Students should work in groups. At the start of the puzzle, each student should have some of the pieces in his possession. Have the students work out the problems on their squares and then match sides. Students can use this group activity to share mental math strategies with each other. (Teachers: You may give the students the starting square if necessary)

H. **Dominos for Multiplication and Division of Mixed Numbers** (Blackline Master I - 61) With this puzzle, students will match problems involving multiplication and division of mixed numbers with their solutions. One domino will match another at a star.

I. **Addition and Subtraction of Fractions Square Puzzle** (Blackline Master I – 63) Students should work in groups to complete this puzzle. At the beginning of the activity, each student should be in possession of some of the small squares. To match the squares, the students should place a problem next to its solution. The group activity gives the students the opportunity to discuss their strategies for solving the puzzle.

J. **Decimal Dice** (Blackline Master I - 62)

Materials: Playing mat, four dice, calculator.

Instructions: On a player's turn, he will roll the four dice. Using the digits rolled, the player creates a division problem. The problem should be written in a fraction format.

For example, if the student rolls 4, 2, 2, 1, he may write $\frac{42}{21}$.

If the target 2 is open, this would be a good problem for the round. If 2 is not available, but 200 is, he may insert a decimal in any position desired such as $\frac{42}{.21}$

Each problem should be constructed to have an answer as close as possible to one of the target numbers. "Big Boy" means the largest possible answer. Each player will get a total of nine turns in which he will attempt to get close to each of the nine targets. Once he has used one of the target numbers, he cannot reuse that same target in a future round. At the end of the nine rounds, the players use a calculator to determine who came closest to each target. One point is awarded for each target winner; highest score is the winner.

Notes and textbook references

K. **Fraction Blocks** (Blackline Master I - 64)

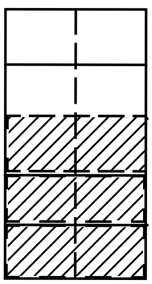
Materials – Scissors. Students have worked with pattern blocks since the early grades. The standard blocks make good models for 1/2, 1/3, and 1/6. In this activity, we have added some additional blocks to represent 1/4 and 1/12. Students should work in groups to complete the chart by filling in the shaded boxes. Manipulating the blocks will help them find the solutions.

L. **Modeling Fraction of a Number**

Use paper-folding or shading to model the process. A paper rectangle can be used to represent the whole number. Waxed paper is good because the divisions are easily seen.

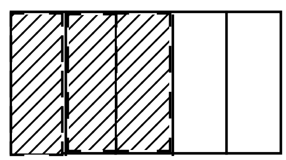
Example: A sheet represents 30. You need to find 3/5 of 30 or the product of

$$3/5 \times 30 = H$$



Fold the paper into five equal parts. Rulers are helpful, or scissors, to trim the paper to an easily divided size. Shade three-fifths. The five large rectangles each represent six, and three of them make 18. Other foldings are possible. Giving students a tactile model and allowing them to represent the parts is a powerful tool in a problem-solving approach to this concept.

Other examples: 1/4 x 20
2/3 x 27



M. **Modeling Tenths** (Blackline Master I - 65)

Using the "Tenths" models ,have students shade in a decimal fraction (such as 0.3) a given number of times (such as 5) using a different color for each new shading of the decimal number. Shade on the same model until it is full and continue on a second and third when necessary. Record the total area shaded in an equation like this: 5 x 0.3 = 1.5. Use problems like these:

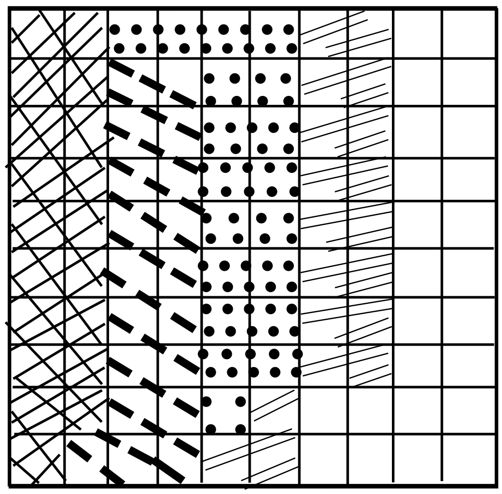
4 x 0.6 = ______	3 x 0.7 = ______
9 x 0.2 = ______	10 x 0.3 = ______

Discuss why the solutions are less than the whole number factors.

N. **Decimals on the Number Line** (Blackline Masters I - 68 and I - 69) On a number line divided into tenths, have students show "jumps" of given decimal lengths and record the results in a multiplication equation. For example: 6 x 0.7 = 4.2.

Notes and textbook references

O. **Modeling Hundredths** (Blackline Master I - 66)
Using the "Hundreds Grids" have student shade in a decimal fraction (0.19) a given number of times - four. Use a different color for each new shading of the decimal number. Shade on the same grid until full, continuing onto other grids as necessary.



Record the total shaded in an equation like this:
4 x 0.19 = 0.76.

The North Carolina Manipulatives Kit contains tools for understanding fractions. Decimal Squares and Fraction Bars are two such manipulative tools.
.

Use problems like these :

4 x 0.63 = _____ 6 x 0.19 = _____
2 x 0.94 = _____ 7 x 0.51 = _____

P. **Multiplication as Repeated Addition** Remind students that multiplication is repeated addition.
For example: **5 x 3 = 3 + 3 + 3 + 3 + 3**

Show this problem:
6 x 0.5 = ______

Ask how to show this as repeated addition.
(0.5 + 0.5 + 0.5 + 0.5 + 0.5 + 0.5)

Discuss solving multiplication as addition. Relate to solutions on the tenths circles and hundredths grids. See 1.04 M and 1.04 O for examples.

Notes and textbook references

Q. **Base 10 Activity** (Blackline Masters I - 70 and I - 71)
Students need several ten rods and unit cubes from the Base 10 Blocks (or orange and white Cuisenaire™ rods, or graph paper cut into one 1x10 rectangle and 1x1 squares), a regular die, and a set of cards prepared with the following decimal numbers: 3.2, 2.6, 1.9, 0.8, 2.1, 1.5, 0.3, 0.2, 3.6, 1.2. In pairs, students draw a card and show that number with blocks, using the 10 rod as a **one** rod and the unit cube as **tenths**. They then roll the die and make as many sets of the decimal number as shown on the die. They then combine the sets, regrouping as necessary, recording the results as an equation, such as 2.1 x 4 = 8.4. Discuss the pattern and placement of the decimal in solutions.

R. **Building Decimals** Base ten blocks and hundreds grids supply helpful models for developing this objective. Determine a decimal number such as 0.12. Roll a decahedron die or spin a spinner to determine a whole number, for example five. Then build 0.12 five times with base ten blocks or color 0.12 on a hundredths grid five times. If the base ten blocks are built onto a flat using the longs and units, the total is more obvious. The five longs, which represent tenths, are placed side by side and then the five groups of two units, which represent hundredths, are lined up into a long. This models how 5 x 0.12 = 0.60. Ask students to generate problems and model solutions with a partner, taking turns determining the decimal and whole numbers.

5 x 0.12

first, build 0.12 | . .

then build four more | . . | . . | . . | . .

When combined,
the model shows 0.60 or | | | | | . . . .

S. **Recipe Workout** (Blackline Master I - 67)
Students complete a chart to find quantities needed to increase or decrease the number of servings that a recipe will make. This activity shows a need to multiply and divide fractions that connects to a student's real world experiences. Patterns found in the rows and columns of the chart can help students better understand why the fraction algorithms work the way they do. The teacher may substitute any recipe that promotes interest.

Notes and textbook references

T. **Rational Number Operations I** (Blackline Master I - 98)

Students will work in pairs to discover the effects of multiplication and division on rational numbers. Each student will take a turn spinning the spinners. On their chart the students will write the two numbers and then multiply and divide the two numbers.

After completing the chart, the teacher will have a class discussion about what students have learned regarding computation of rational numbers.

1. Which situations produced an answer that was larger than the numbers spun?

Multiplication – Multiplication of two whole numbers gives a product that is larger than either the muliplicand or multiplier but what happens when numbers are less than one?

Why do you think this is true?

2. Which situations produced an answer that was smaller than at least one number spun?

Division – Division of two whole numbers gives a quotient smaller than the dividend but what happens when numbers are less than one?

Why do you think this is true?

U. **Rational Number Operations II** (Blackline Master I - 97)

Students will work in pairs or groups to discover the effects of addition, subtraction, multiplication, and division of fractions. The teacher can follow the same procedures used in **Rational Number Operations I.** Students will complete the activity and follow it up with a classroom discussion.

Questions:

1. When you add fractions, what happens to the sum?

Answer: The sum is larger than either of the individual fractions. Why: Because addition is combining the numbers.

2. When you subtract fractions, what happens to the difference?

Answer: The difference is smaller because you are taking away from the first number (minuend).

3. When you multiply fractions, what happens to the product?

Answer: The product is smaller because your product is part of the original group.

4. When you divide fractions, what happens to the quotient?

Answer: The quotient is larger because you are dividing the first fraction into groups of the second fraction.

Discuss how fraction operations are alike and different from whole number operations.

Notes and textbook references

C. Decimal Operations Students will work in pairs to discover the effects of addition, subtraction, multiplication and division of decimals. Students will draw two cards from a deck of cards. Using their two cards the students will each make a decimal. (Example: If a student picks a 7 and a 2 they will make either 0.72 or 0.27) The students will chart their decimal and their partner's decimal and then complete the computations.
Questions:

1. When you add decimals what happens to the sum?

Answer: The sum is larger than either of the individual decimals,

2. When you subtract decimals what happens to the difference?

Answer: The difference is smaller because you are taking away from the first number.

3. When you multiply decimals what happens to the product?

Answer: The product is smaller because your product is part of the original group.

4. When you divide decimals what happens to the product?

Answer: The quotient is larger because you are dividing the first decimal into groups of the second decimal.

Discuss how decimal operations are alike and different from fraction operations and whole number operations.

V. Shopping Trip Materials Needed: Catalogs or store fliers (Example: Walmart™, Best Buy™, etc.)
Students work in groups of three or four. One student is the shopper and the others will be the checkers. The student who is the shopper chooses 5 items to buy in the flier. They name the items and the actual price. The checkers write down the list of items and the price of each. The checkers estimate the cost of each item and compare estimates. Students will discuss their estimates and support their answers. The next student takes their turn as shopper and play continues until each student has had 2 turns as the shopper.

Notes and textbook references

W. **Space Weights** (Blackline Master I - 20)
Students use facts about planetary gravity to determine weights on various planets. They will use a fraction value and then a more precise decimal value to do the calculations.

X. **Is it reasonable?** The teacher will use a variety of student-related situations to discuss reasonableness of solutions.
Example: The teacher will ask the students for a reasonable average of the age of the students. Would 15 be a reasonable average? Why or why not? Would 11 be a reasonable average? Why or why not? Then, have the students volunteer their ages and figure the exact average. Then compare that to the answers that were offered as a reasonable average and discuss how they differ and whether or not they were reasonable.

Other possible topics:
Shoe size, hand span, height, arm length, number of televisions in your home, number of students who have cell phones, etc.

Y. **Day at the Park** (Blackline Masters I - 100 and I - 101)
This is a whole class game. The students will play against each other in teams of two. Give each team a 3 x 5 card and have them write a large U for unreasonable on one side and a large R for reasonable on the other. Teams will also need paper and pencil. The teacher will show on the overhead and read situation with an answer. Teams should determine the reasonableness of the answer. Then they hold up their card with the correct letter facing the teacher. Teams should be prepared to defend their answer and a point will be given to each team who correctly answers the question.

Z. **You're the Teacher** The teacher will select a quiz or short assessment from a current unit. The teacher will fill in answers (making some reasonable and some not). The students will work in pairs to "correct" the quiz by marking each answer reasonable or unreasonable. They should be prepared to defend their answer in class discussion as a follow-up to the activity.

Notes and textbook references

Tips for Problem Solving in Your Class

- Set the expectation that everyone thinks! State a problem and then give everyone a moment to think about it.
- Use think-pair-share to jumpstart your students' problem-solving processes. First they think over the question, then they talk it over in pairs, then each pair shares with a larger group.
- Don't let textbooks or other published supplementary materials thwart the problem-solving process. Be wary of texts that give many drill problems with one word problem that is solved the same way as the previous problems. Also watch out for problem sets that are all basically identical.
- Incorporate group problem solving into your lessons, so students have a chance to observe their peers.
- Use problems from a variety of sources. Ask questions in a variety of ways.
- Ask a variety of questions from the same problem source data. Students begin to anticipate what a question will be without having really read the problem. Keep them flexible in their expectations.
- Expose students to problems in which the numbers they read in the problem are not necessarily the ones they will "crunch" to solve the problem. Use price lists, menus and other materials so that students will search out meaning and not just begin to crunch numbers.

Notes and textbook references

1.05 Develop fluency in the use of factors, multiples, exponential notation, and prime factorization.

A. **Problem Discussion Cards** (Blackline Master I - 72)
Students should work in groups to solve the given problem. The teacher may wish to have all students in the class working on the same problem, or she may prefer to use different problems in the various groups. After the students have had an opportunity to brainstorm, the groups should share their solutions with the rest of the class.

B. **Exponent Dice (**Blackline Master I - 96)

Ask the students to work in pairs. Give each pair of students dice and a calculator. The students decide who will roll for the "base" and who will roll for the "exponent". Roll the dice. The first die is the base number. The second die is the exponent. You may wish to model the first one for the students.

Students continue for 10 rounds. Look for patterns. Ask the students to answer the following questions:

1. What happens when 1 is the exponent?
2. How could you write 12? Find the product. Will your calculator do this? Try lattice multiplication as the numbers get very large.

C. **Exponents with the Calculator** Give each student a calculator that uses algebraic logic and a list of problems similar to these. Ask the students to write down what they input into the calculator and the solution.

Problem	**Input into Calculator**	**Solution**
$4^3 + 4^2$	**4 x 4 x 4 + 4 x 4**	**80**
$3^2 + 4^3$	**3 x 3 + 4 x 4 x 4**	**73**
$3^3 + 2^3$	**3 x 3 x 3 + 2 x 2 x 2**	**35**

D. **Exponent Steps** Using exponents of 1 through 10 and a base of 2, ask the students to write the steps as begun below:

$2^1 = 1 \times 2$
$2^2 = 1 \times 2 \times 2$
$2^3 = 1 \times 2 \times 2 \times 2$
$2^4 = 1 \times 2 \times 2 \times 2 \times 2$
•
•
•

Then "climb" the steps by finding the solutions. (Use a calculator when appropriate.) Repeat the activity with a base of 3, of 4, and of 8. Culminate the activity by asking the students to write the answers to the following questions.

1. What happens when a number has an exponent of 1?
2. What happens when a number has an exponent of 2?
3. What happens when a number has an exponent of 5?

E. **Game of POWERS** Introduce POWERS. In order to play this game, students need two dice or spinners and a calculator. The goal is to create the largest possible number. The two dice are rolled. Students decide which number to use as the base and which to use as the exponent in an effort to create the largest number. For example, the dice show a two and a five. Students decide whether to create a 2^5 or 5^2. After writing the base and exponent, students can use their calculators to compute the value using repeated multiplication. Two to the fifth power is$1 \times 2 \times 2 \times 2 \times 2 \times 2 = 32$ while five squared is $1 \times 5 \times 5 = 25$. Using these materials, what is the largest possible number? What is the smallest? Is there a strategy for deciding which digit becomes the base and which becomes the exponent? Play **Powers** by establishing a target number. Here the goal is to get as close as possible to the target, such as 250. Students might be asked to build models of the numbers created while playing **Powers**. How might students create a model showing 2^5? If they keep in mind that $2^5 = 1 \times 2 \times 2 \times 2 \times 2 \times 2$, this might suggest an approach. If $2^1 = 1 \times 2$, this might be modeled with two cubes linked. By doubling this, the model is increased to two sets of two cubes, or four cubes. This model is then doubled to become 8 cubes. This model is then doubled again to show 16 cubes. Finally, this set of 16 cubes is doubled to 32. Students might cut rectangles from grid paper showing this progression and labeling each. If each resulting rectangle is treated as a new unit to be doubled, an interesting pattern results. This same pattern occurs as other numbers are raised by consecutive powers. Students might be asked to create this series of models for smaller numbers.

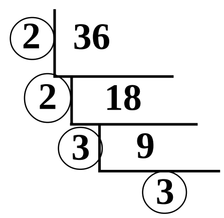
Notes and textbook references

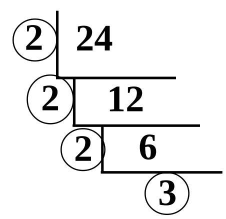
Notes and textbook references

F. **Factors with the Calculator** Encourage the students to use their calculators. By ***chaining***, the students can generate the multiples of several numbers as shown on the chart. Remind the students that zero is a multiple of every number and then discuss other like multiples. Examine the list for patterns. Students can shade the multiples and locate prime numbers.

Number	**Multiples**
3	0, 3, 6, 9, 12, 15, 18, 21, 24, 27, . . .
5	0, 5, 10, 15, 20, 25, 30, 35, 40, 45, . . .
7	0, 7, 14, 21, 28, 35, 42, 49, 56, 63, . . .
9	0, 9, 18, 27, 36, 45, 54, 63, 72, 81, . . .

G. **Factor Ladders** Find the prime factors of a number using the division method. Students should begin with the least prime number that is a factor and proceed to the next factors in ascending order.





Open ended prompt: "When is the product in multiplication less than the larger factor?

H. **Multiples and Factors** Provide each student with a hundred board and a set of linking cubes or connecting cubes or some other stacking blocks that come in a variety of colors. Have students choose one color of cube such as blue. Students count by 2's and place a blue cube on each number named. This places a blue cube on every even number. Then a second color of cube is chosen, perhaps red, and placed on multiples of 3. At this point, any number that is a multiple of both 2 and 3 has a tower of two blocks, blue and red. Continue this process as long as practical. (Note: at some point, students might take a second hundred board and begin coloring this pattern. A blue stripe could be colored on each even number. Then the blue cubes could be removed before continuing to add more colors. Then a red stripe is added to each multiple of three, etc.) What kinds of patterns exist? Are there numbers with only one block? Are there numbers with an even number of blocks? Do some have an odd number of blocks? Why? Have students record their results by writing numbers and their factors. For example: 12 has factors of 1, 2, 3, 4, 6, and 12. Ask students which numbers would have a cube if they had counted by ones? This provides opportunity to discuss the fact that 1 is also a factor of all whole numbers. Ask students to work with a partner to write definitions for the terms "multiple" and "factor".

Notes and textbook references

I. **Tax Collector** (Blackline Masters I - 73 through I - 75)
Provide an opportunity for students to play Tax Collector, page 67 of <u>THE FAMILY MATH BOOK</u>, Lawrence Hall of Science, University of California, Berkeley.

J. **Perfect, Abundant, and Deficient Numbers** Explore the results of adding all the proper divisors of a given number. A proper divisor is a divisor (factor) that is less than the given number.
The results will yield numbers that are perfect, abundant or deficient!

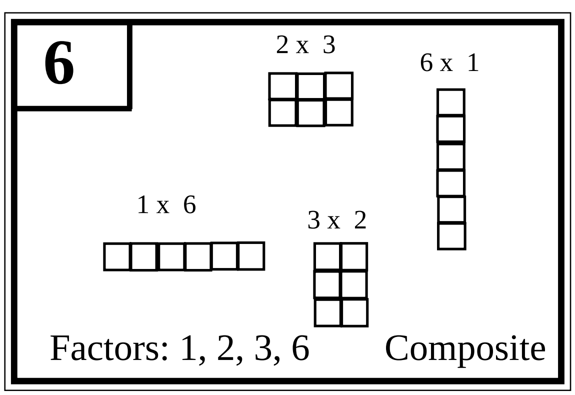
Perfect Numbers are numbers which are equal to the sum of their divisors.
Ex. 6 is **perfect** because 6 = 1 + 2 + 3;
28 is **perfect** because 28 = 1 + 2 + 4 + 7 + 14.

Abundant Numbers are numbers that are greater than the sum of their proper divisors (factors).
Ex. 36 is **abundant** because 1 + 2 + 3 + 4 + 6 + 9 + 12 + 18 = 55, and 55 > 36;
24 is **abundant** because 1 + 2 + 3 + 4 + 6 + 8 + 12 = 36 and 36 > 24.

Deficient Numbers are numbers that are less than the sum of their proper divisors (factors).
Ex. 8 is **deficient** because 1 + 2 + 4 = 7 and 7 < 8;
39 is **deficient** because 1 + 3 + 13 = 17 and 17 < 39.

These explorations give a purpose to a factor search and also keep addition skills sharp. Note: This is an enrichment activity.

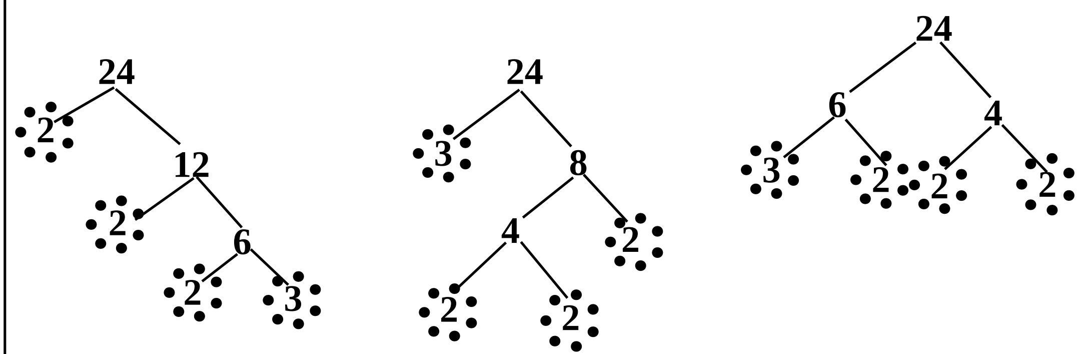
K. **Calendar Factors** Using each date on the calendar, make area models with graph paper of that number. List the factors of that number and tell whether the number is prime or composite. Students may take turns making the chart of each date's number. *Example:* On the sixth of the month, this might be the chart:



Notes and textbook references

L. Prime Numbers This activity should be used after students have developed the definition of prime numbers. Use a factor tree to find the prime factors of a number.

To find all of the factors of 24, write down all of the product combinations of the prime factors and 1. Remind your students that 1 and the number itself are always factors. List the factors of 24. Try the activity again with 36. Note that there are several possible “trees” for each number and that a branch ends when a prime “blooms”.



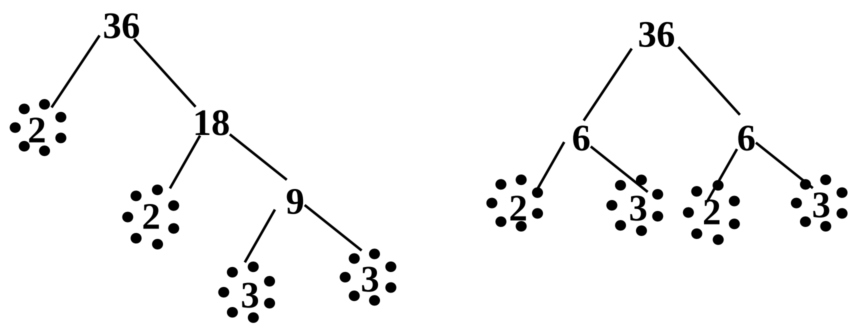
Prime Factorization 24 = 2 x 2 x 2 x 3 = 2^3 x 3

Product Combinations of Prime Factors

2 x 1	= 2
2 x 2	= 4
2 x 2 x 2	= 8
2 x 2 x 3	= 12
2 x 2 x 2 x 3	= 24
3 x 1	= 3
3 x 2	= 6

Ask students to answer the following questions:

1. What is a factor of a number?
2. How can you determine the factors of a number?



Product Combinations of Prime Factors

2 x 1	= 2
2 x 2	= 4
2 x 2 x 3	= 12
2 x 2 x 3 x 3	= 36
3 x 1	= 3
3 x 2	= 6
3 x 3	= 9
3 x 3 x 2	= 18

In January, 1994 a team of scientists using a Cray computer reported finding the largest prime number to date. The number is 2^{859433}-1. If printed in a newspaper, its 258,716 digits would take eight pages!

M. **Writing about Primes and Composites** Review what prime and composite numbers are and then ask the students to work in pairs and write the answers to the following questions:

1. What can be said about the number 1?
2. What can be said about the number 2?
3. What can be said about <u>any</u> composite number?
4. What can be said about <u>any</u> prime number?

N. **Prime Number Dice** Roll a pair of dice and add. Is the sum prime or composite? Suppose you had multiplied, would the product be prime or composite? Suppose you decide to play a game: one person scores a point for each prime number (obtained by either adding or multiplying) and the other person earns a point for each composite number he or she is able to obtain at a turn. Would this be a fair game? Why or why not?

Notes and textbook references

Notes and textbook references

O. **Prime Numbers with the Hundred Board** (Blackline Master I - 76) In these hundred board activities students identify numbers less than 100 with only two factors, one and the number. These, of course, are prime and students can record these as such in their math journals. There should be 25 numbers in this list of primes less than 100. All other positive numbers, except 1 which is neither prime nor composite, are composite. Ask students to imagine that they don't have their list of primes and need to decide whether a given number is prime or composite. How might they approach this task? Would square tiles be useful? Would calculators be helpful? Allow students time to discuss this problem.

P. **Rectangles with Primes and Composites** Write some composite and prime numbers on the chalkboard. Ask students to choose one of the numbers and build all the possible rectangles using square tiles for this number. Ask them to also record these rectangles on grid paper or by drawing appropriate grids. Students might work in small groups to build rectangles for all the numbers on the chalkboard. Ask students to compare results and look for patterns. What conclusions can be drawn about prime and composite numbers?

Q. **Rules of Exponents Triangle Puzzle** (Blackline Master I - 77) Let students work in groups to put the puzzle together. Each pair of touching edges should show equivalent expressions. When the puzzle is completed correctly it will be in the shape shown in miniature on the page. Note: This is an enrichment activity.

R. **Exponent Experts Game** (Blackline Masters I - 78 and I - 79)
<u>Materials:</u> Each group needs a spinner and a set of cards that have been cut apart.
<u>Directions:</u> Students play in groups of two to four students. The cards are shuffled and distributed among the students. On a player's turn, he spins the spinner and gives the answer that results when substituting the spun number for the variable in the expression on one of the cards. One point is awarded for each correct answer. At the end of the game, individual points and team points are totaled.

Notes and textbook references

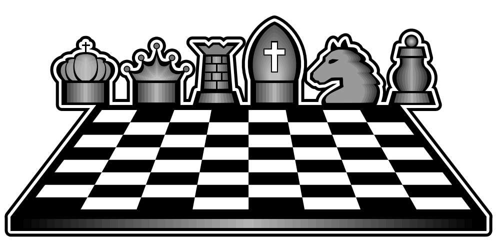
S. **Cooperative Problem-Solving Cards - Exponents** (Blackline Masters I - 80 and I - 81) Let students work in groups of four to solve these two problems. Give each person in the group one of the cards. The students may share the information on the cards with the group, but they cannot give the card to anyone else. This gives each student something to contribute to the group, and each student gets an opportunity to observe the thought processes of his peers.

T. **Lucy Bakes Beans!** In an episode of ***The Lucy Show***, Lucy needs $5000 from her banker to buy new furniture. He tells her that if she can start with a penny on day 1, and then double the amount she has each following day, before a month is over she will have enough money. How many days would it actually take her to get at least $5000?

Lucy finds out that a bean company is offering “double your money back” if the beans are not the best the buyer ever tasted. Lucy knows her Grandmother’s baked beans are the best ever, so she sees this as a chance to double her money. She starts buying beans and then returning them for double the money back. She uses that money to buy twice as many cans as the day before. She plans to continue buying more cans and returning them for double the amount until she has enough to buy the furniture. If the beans cost $0.50 a can, and she makes one buy-and-return transaction per day, how many days would it take her to have enough for her furniture? Note: Lucy finally tastes the beans and decides she can’t accept the money. However, the bean company owner decides to pay her for her testimonial, so there is a happy ending for all.

U. **The King and the Gamemaker** The story is told that the King of Persia was so thrilled with the game of chess that he offered the creator of the game anything he wished. The proud chessman asked for something seemingly simple. He asked for one grain of rice to be placed on the first square of a chessboard, twice as much on the 2nd square, twice as much again on the 3rd square and so on until all 64 squares had been filled with each square having twice as much as the one before.

The king was puzzled, but decided to grant the request. However, this turns out to be enough rice to cover the country of Persia with a blanket of rice one meter thick (or the state of California with a blanket of rice 1 foot thick). We are not told what reward the chessman finally received.



Notes and textbook references

V. **The Towers of Hanoi** (Blackline Masters I - 82 through I - 84) There is an ancient legend that in the great tower of Hanoi there are three diamond spindles. On the middle one there is a stack of 64 disks of different sizes, each one smaller than the one below it. Monks in the temple have the task of moving the disks from one spindle to another, but they can move only one disk at a time, and they can never place a larger disk on top of a smaller one. The legend says that when this task is complete, the temple will disappear in a clap of thunder and the world will end. If the monks are very efficient and move these disks in the quickest way possible with each move lasting only one second, how long do we have until the world ends?

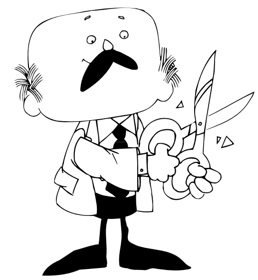
Models of such towers with seven disks can be purchased or made from wooden blocks, nails, and washers. Computer graphics are also useful in solving the problem. A suggested strategy is to start with a smaller number of disks and find the smallest number of moves to transfer all the disks. Gradually increase the number of disks in the puzzle and look for a pattern.

The solution is $2^{64} - 1$ moves. If each move takes a second, this is well over 500 billion years. Note: This is an enrichment activity.

1.06 Use exponential, scientific, and calculator notation to write very large and very small numbers.

Notes and textbook references

A. **Modeling Exponentials** (Blackline Masters I - 85 and I - 86) Teachers should show their students the base-10 blocks at the beginning of this exercise. Small blocks may be used to show the students what the blocks would look like if there were only two on a side instead of ten. Explain to the students that x represents the length of the long block and the edge of each cube. Point out that x^3 can represent a cube of any size and x^2 can represent a flat of any size. Note; this is an enrichment activity.



B. **Scientific Notation Square Puzzle** (Blackline Master I - 87)
This is intended to be a cooperative activity in which students assemble 16 small squares to form a larger square. Edges of the puzzle pieces should match a number in scientific notation to its decimal equivalent. Students will benefit from listening to each other discuss strategies for solving the puzzle.

You may wish to cut the puzzle pieces apart and place them in envelopes as the Blackline Master gives the solution.

C. **Mathematical Message - I** (Blackline Master I - 88) Students will convert each number from exponential notation into decimal notation. When the numbers are placed in numerical order, a message is spelled out.

D. **Population Study** Integrating mathematics with other subjects is one way to help students understand the importance of the math they study. In the 6th grade, students are studying Europe and South America. Have students find the population of each country in the two continents. They should round each number to the nearest million and then write them in scientific notation.

E. **Powers of Ten** A book and short video entitled ***Powers of Ten*** was written in 1977 by Charles and Ray Eames. The Powers of Ten website, http://www.powersof10.com/, has many activities related to the topic and ordering information for an interactive CD. The essence of the film shows a picture of a person lying on a blanket which represents one square meter. Each picture following zooms out or in by a power of ten.

Notes and textbook references

F. **Scientific Notation Web Pages** The following list of websites deal with the topic of scientific notation. Most allow students to practice converting decimal numbers to scientific notation with feedback.
http://www.nyu.edu/pages/mathmol/textbook/scinot.html
http://janus.astro.umd.edu/astro/scinot
http://www.ieer.org/clssroom/scinote.html
http://memers.aol.com/profchm/sci_not.htm/
www.chempractice.com/drills/java_sci_notation.shtml
www.edinformatics.com/math_science/scinot.htm

G. **Scientific Notation Square Puzzle** (Blackline Master I - 89) Students work in groups to rearrange the small squares back into a large square. Two touching edges must contain equivalent expressions. Note: It would be best to cut out the small squares and place them in an envelope before giving the puzzle to the students as the blackline gives the "answer".
This puzzle should be worked by pairs or small groups of students. Each group member should be in possession of some of the puzzle pieces at the start of the activity.

H. **Scientific Notation Team Game** (Blackline Master I - 90)
Materials: Transparency or laminated sheet of the playing mat. Two colors of dry erase markers or two objects with different shapes are used to mark the position of each team. A large paper clip is needed for the spinner.
Directions: Divide the class into two teams, or let students play against each other in teams. The leader begins the game by writing a number in scientific notation in the top rectangle on the board. On a team's turn, they spin and change the number according to the instructions on the spinner. If they are correct, the team advances one square, and the number in play is changed to the number the team just constructed. If they are incorrect, the number in play remains the same and the team is moved backwards one square. The winner is the first team to reach the finish.

I. **Scientifico** (Blackline Masters I - 102 and I - 103)
Students practice translating numbers expressed in scientific notation into standard notation. Students take turns rolling three number cubes and constructing a number in scientific notation. Example: 3, 4, 6 can be written as 3.6×10^4. After recording the number on the recording chart, the student places a marker in the proper place on the game board. The student who completes a row, diagonal, or column is the winner.
Teacher Note: There are two game boards on the Blackline Master. Use one for very large numbers and the other for very small numbers.

1.07 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

Notes and textbook references

A. Interpreting Problems (Blackline Master I - 91)
Students are given fraction and decimal problems to solve with the instructions to draw a picture of each situation. The purpose of this activity is to help students remember to understand a problem before they choose an algorithm to solve it. A similar idea would be to have students draw a picture of each word problem before they try to solve it. Once the problem is drawn, have them identify where the numbers are in the problem. Are they price tags? Numbers of items? Once a student understands the problem well enough to draw it, the solution becomes much easier.

B. Weighty Problems (Blackline Master I - 92)
In sixth grade health classes, students are studying nutrition and weight management. These problems integrate with that topic. Students should work in groups to solve each problem. The teacher may wish to use the same card for each group or to let the groups work on different problems. A class discussion of the results will allow groups to share their strategies.

How thick is a sheet of toilet paper? How can you find out?

C. Problems From a Brochure Provide students with a sales flier, brochure, or menu in which there is a variety of numerical data. Challenge the students to make up problems from this brochure for other students. Then have the students exchange problems and solve. Can one group stump the others? Can the group providing a challenging problem and defend their solution?

D. How a Simple Telescope Works (Blackline Master I - 93) Two sixth-grade science topics are the solar system and technology used to explore space. In this activity, students are told how a simple telescope works. They can use this information to solve problems that involve decimal addition and division.

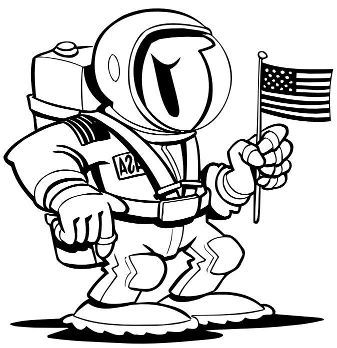
Notes and textbook references

E. **Acme Science Supply** (Blackline Master I - 94)

Students solve problems from a chart that provides information on the sale of scientific supplies.

F. **Comets in the News** (Blackline Master I - 99)

Students use reports of comets in the news to get an idea of the size of comets and the frequency of their appearance. Useful materials for this activity are a state road map and a foam Hefty™ plate.

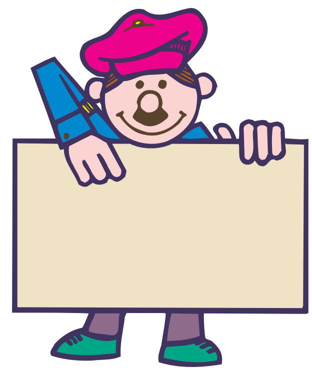


The learner will select and use appropriate tools to measure two- and three- dimensional figures.

2

2.01 Estimate and measure length, perimeter, area, angles, weight, and mass of two- and three-dimensional figures, using appropriate tools.

Notes and textbook references



A. **Space Ship Storage** (Blackline Master II - 1)
Students explore various shapes of rectangles to maximize area.

B. **Index Card Activity**
Materials needed: 3 x 5 index cards and scissors.
Students are instructed to mark a point anywhere along the side of a 3 x 5 card. They will draw a segment from this point to both corners of the opposite edge to form a triangle. Students should calculate the area of the triangle and the area of the entire card. The triangle is cut out. Students should use the pieces cut away from the triangle to verify that the area of the triangle is half the area of the entire card.

C. **Geoboard Activity**
Materials needed: Geoboard, rubber bands, grid paper.
Students will form a triangle on the geoboard with rubber bands. They will then form a rectangle around the triangle so that the heights and bases are the same. Students can count squares to determine the area of the rectangle and to estimate the area of the triangle. Each figure should be recorded on the grid paper. Do the students see a pattern? Even when estimating, do they find the area of the triangle to be about half the area of the rectangle?

Notes and textbook references

D. **Apple Statistics** Have students explore apple statistics at the web site shown here: http://www.michiganapples.com/quickfacts.html. Have students look under the following topics for apple statistics: Newsroom – apple facts, or Industry - current crop. Have students use these statistics to create and solve problems related to measurement. Can one group create a problem that will stump the others?

E. **Measurement Tasks in the Real World** Divide students into groups and give each group a topic of interest such as automobiles, pet care, amusement park rides, medical care, aviation, etc. Challenge the group to think of ways in which measurements must be made in each of these areas. They should attempt to include measurements involving length, weight, perimeter, area, angles, and mass. Have the students discuss tools used, precision of commonly used tools, when estimates might be used, results of overestimation, and results of underestimation.

F. **Estimation Problem Discussion Cards** (Blackline Master II - 6) Divide students into groups to discuss each of the situations presented on the cards. After the group has analyzed each situation, have groups share with each other their ideas on estimation.

G. **Hubble Telescope** (Blackline Master II - 7) Sixth grade students are studying the solar system and technology used to explore space. This activity on the Hubble Telescope asks students to use their knowledge of geometry and measurement to become better acquainted with the Hubble.

H. **Available Tools** The North Carolina manipulative kit contains tape measures and rulers which are marked with millimeters on the metric side and sixteenths of an inch on the customary measurement scale and a trundle wheel. Many science classrooms contain graduated cylinders and math teachers can borrow them to illustrate precision in measurement. Most classrooms have access to containers such as cups, pints, quarts,and liters. The manipulative kits also have balances that can be used to measure to the nearest gram.

Notes and textbook references

I. **Make Your Own Graduated Cylinders** (Blackline Master II - 8)

Materials: cylinders of various sizes such as olive jars, medicine bottles, perfume vials; markers that will mark on plastic or glass, paper with equally spaced lines, such as graph paper or notebook paper. A copy machine may be used to reduce the lined paper if closer lines are needed.
Students follow the directions on the blackline master to make their own set of graduated cylinders using common objects and graph paper.

J. **Precisely!** (Blackline Master II - 9)

Students discuss answers to situations involving the concept of precision. Students should learn that the precision required of a measurement determines the tool that should be used to measure it.

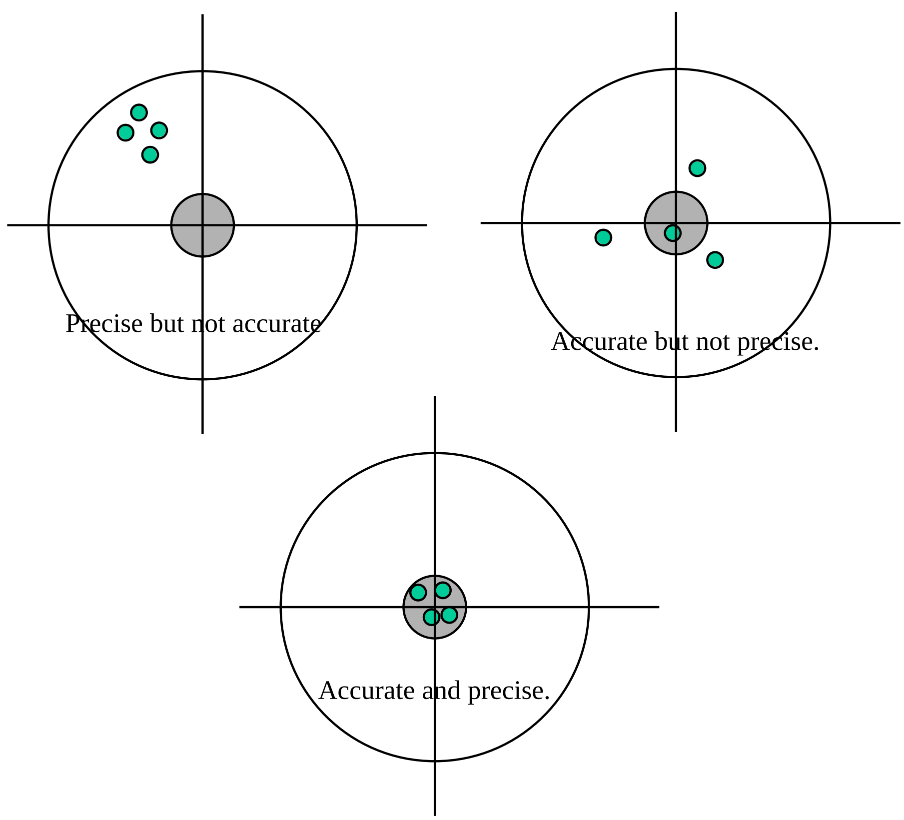
Students should also learn that the precision of measured values limits the precision of calculations made with those measurements. For example, if a student uses an inch ruler to cut a strip 8 inches long and carefully divides the strip into thirds, will each third be exactly 2.6666666666666666 inches long? We can hardly think so. If we can’t measure the sides to the nearest tenth, then we can’t assume calculations based on that measurement are even more precise than that.

Notes and textbook references

K. **Explanation of Precision** In teaching and learning pure mathematics, we often ignore precision. We consider that 2.1 is the same as 2.10 or 2.100 or 2.1000. That is very true if our only concern is number equivalence. However, in the real world, numbers used in calculations are very often measurements, and when considering measurements, the numbers listed above do not mean the same thing. 2.1 means you measured something and the instrument was only reliable to the nearest tenth. However, 2.1000 means the instrument could be used to measure to the nearest ten thousandth and 2.1000 is a reflection of that measured value.

Precision in the writing of numbers has to do with how many decimals you can write down. For example, 9.13 is less precise than 9.134.

Precision is commonly confused with accuracy. They are not the same. Consider the diagram below. These are targets left after marksmen engaged in target practice. Accuracy has to do with how close to the bullseye they came. Precision has to do with how close each trial was to the others.



The most important concept to consider is that when we use measured values to do calculations, the precision of the calculated answer is limited by the precision of the measured numbers in the calculation.

Example: I want to measure the distance from my home to school. I measure the distance from my front door to my car with a yardstick and measure to the nearest inch. Then I drive from home to school and measure that distance with the car's odometer. When I get to school, I measure the distance from the car to school with a yardstick.

House door to car: 120 feet 3 inches = 120.25 feet

Home to School on the road: 5.2 miles = 27,456 feet

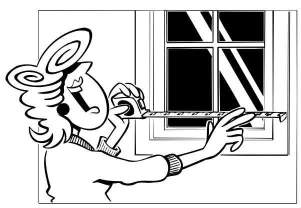
Parking lot to School: 250 feet 4 inches = 250.333 feet

Total distance? Is it 27,826.583 feet? Can we really trust this answer to the nearest thousandth of an inch? Of course not! The answer cannot be more precise than the least precise measurement. Even the 27,456 feet is questionable. How can I measure something to the nearest foot with a machine that can only measure to the nearest tenth of a mile?

We can let students gauge the best unit to use for a particular measurement. For example, medicine doses should be measured in milliliters while punch recipes use liters. We can insist that when measured values are used in calculations, the measured values should be taken from instruments with similar precision. We should expect students to recognize errors in calculations such as the one illustrated above.

Notes and textbook references

Notes and textbook references



2.02 Solve problems involving perimeter/ circumference and area of plane figures.

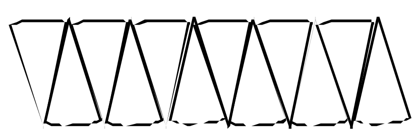
A. **Kepler's Laws** (Blackline Masters II - 2 and II - 3)
Sixth grade students are studying the solar system. Kepler's Laws relate area and time in the orbit of a comet or planet. Students will estimate irregular areas on a grid to solve the problems in this activity.

B. **Circumference Stumpers** (Blackline Master II - 4)
These diagrams show how unusual shapes can be the combination of circles and other basic geometric shapes. Students can use their knowledge of circles to find perimeters of these shaded shapes.

C. **Eyes on Space** (Blackline Master II - 5)
Sixth grade students are studying the solar system and technology of space exploration. In this activity, students are given information about various large telescopes in use. They use this information to determine radius and circumference and to arrange the sizes in order.

D. **Mini Review – Area** (Blackline Masters II - 23 and II - 24)
This mini review covers most of the area skills from this unit. Allow students to work in pairs to share strategies and skills.

E. **Slicing π** (Blackline Master II - 10)
Materials needed: Scissors.
Students cut the segments of a circle apart and rearrange them to form a "rectangle" as shown. The base of this "rectangle" is half the circumference of the circle, that is half of 2π x radius. The height of the "rectangle" is the radius. The area is π x radius squared.



Notes and textbook references

F. **Bean π** (Blackline Master II - 11)

Materials needed: Scissors, dried beans.
Students fill the circle with a layer of beans to cover it as completely as possible without overlapping. These beans are set aside to use in the next step. Then the squares are cut apart. Students should note that the area of each square is the radius squared. The squares are placed end to end to form a long rectangle. Now the beans are used to cover the squares that form the rectangle from one end to the other. It should be observed that the beans will cover slightly more than three of the rectangles. This provides evidence that the area of the circle is ~3.14 times the radius squared.

G. **Nearly π** (Blackline Master II - 12)

Students compare the area of a circle with the area of a polygon of nearly the same size. In the diagram, if the diameter of the circle is d, then the side length of each small square is $^1/_3$ the diameter, or $^2/_3$ the radius. The area of each small square is $4r^2/9$. The area of the polygon is equivalent to the area of seven of the small squares or $28r^2/9$. This value is $3.11r^2$, which is very close to πr^2.

H. **Shape Exploration** (Blackline Masters II - 13 and II - 14)

Materials needed: scissors, recording paper.
Procedure: Students are asked to cut out the shapes provided and find the area and perimeter of each one. Then the students should use the shapes in combinations to form parallelograms and larger triangles. The area of each of these can be found by adding the areas of the parts. These examples can be used to help generalize formulas for areas of triangles and parallelograms and even trapezoids.

I. **Pick-Up Area** (Blackline Masters II - 15 through II - 21)

Materials needed: Deck of area cards, spinner.
Procedure: The cards are shuffled and placed in a draw pile, face down. On a student’s turn, he may turn over one card and place it face up in the center of the table. He then spins the spinner. If he can pick up a card with the area shown on the spinner, he collects that card and may keep spinning. When he can no longer pick up a card with the correct area, play passes to the next player. Cards not picked up remain face up in the play area. Play continues until all cards have been picked up. The student with the most cards in his possession is the winner.

Notes and textbook references

J. **Area of a Polygon**

Materials needed: Scissors, rulers. Have students use rulers to construct polygons with five, six, and seven sides respectively.
Have the students estimate the area of each polygon by overlaying it with centimeter grid paper. (Blackline Master II - 14) Then have students dissect each polygon into triangles and measure the base and height for each one. They can then calculate the areas of the triangles and add to get the calculated area of each polygon. They should compare the estimated area to the calculated area and discuss possible errors in deriving the area in each of these ways.

K. **Finding Area** (Blackline Master II - 22)

Students use their knowledge of the area of squares and triangles to find the area of the space station figure shown.

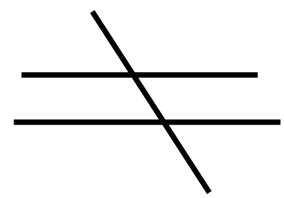
The learner will understand and use properties and relationships of geometric figures in the coordinate plane.

Notes and textbook references

3

3.01 Identify and describe the intersection of figures in a plane.

A. **Little House of Angles** This activity shows students how interior and exterior angles are formed when using a transversal to cross a set of parallel horizontal lines. Students should begin by drawing a set of parallel lines in the center of their paper. (Have the students use a piece of 8.5 by 11 paper oriented horizontally.) Have them draw a transversal through the parallel lines and then label the angles that are created, A-H. Explain to the students that the angles inside the two parallel lines are interior angles and that the angles outside the parallel lines are exterior angles. Students can complete their house design by using the lines as a framework.
Extension: Students can identify the follow angles: alternate interior, alternate exterior, corresponding, vertical and supplementary.



B. **Line Sketches** Ask students to draw three lines three times.

- three lines that do not intersect (students should realize that they must be parallel and label them)
- three lines that intersect without any right angles (label them intersecting)
- three lines that intersect with right angles (label them perpendicular)

Students should then label any exterior and interior angles (if there are any – there will not be for the first one.)
The class can have a discussion on why they can not draw three lines, with only two intersecting. (If they don't believe you, have them try it!)

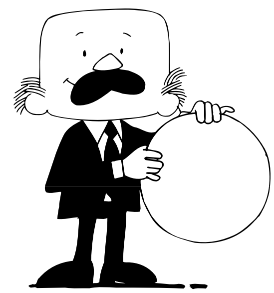
Notes and textbook references

C. **Line Search** This activity should be used after teaching the students the concepts of intersecting and parallel lines. Have the students work in pairs to find five examples of each type of lines: intersecting and parallel. Remind the students that a plane is a flat surface (for example, the front wall of their classroom). Examples of intersecting may be the top of the whiteboard and the side of the whiteboard, two pieces of paper that touch on their desk, etc.) Have the students classify the intersecting lines as perpendicular or not. Examples of parallel: horizontal line for concrete blocks on the wall, the mini-blinds, etc.)

3.02 Identify the radius, diameter, chord, center, and circumference of a circle; determine the relationships among them.

Notes and textbook references

A. **String Along** Have a display of cylindrical containers (jars, glasses, cans). Use a string to measure the circumference of the object and its diameter. Record your findings on cards, one measurement on the back and the other on the front. Have students use the information on one side of the card to predict the other measure, then check.



B. **Can It!** Ask each student to bring two or three different size empty cans. Working together, each pair should measure the diameter of a can using string. Record the length of the string in centimeters. Using the string again, measure the circumference of the can. Measure the string and record its length. Repeat the activity ten times: Ask students to write what they have observed about the relationships of the diameter of a circle to its circumference.

Circle Investigation

Can	Radius	Diameter	Circumference
A			
B			
C			
D			
E			

C. **Measuring Activity**

Materials needed: Tape measure, a variety of round lids. Have students measure the circumference and diameter of each lid. Record the results and calculate the ratio of circumference to diameter. Use these data to introduce the concept of π as a ratio. If the data are graphed, a nearly linear pattern should form.

D. **Sir Cumference and the First Round Table**

Sir Cumference and the First Round Table, by Cindy Neuschwander, is a tale about why and how King Arthur's round table became round. It highlights the characteristics of various shapes and gives meaning to the names radius, circumference, and diameter.

Notes and textbook references

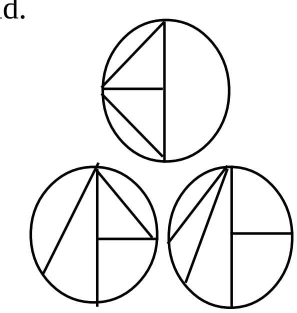
E. **Drawing Circles** Give the students opportunities to practice drawing circles with their compasses. Have them create a design of eight overlapping circles, each having a different radius. Create a stained glass effect by coloring the intersections.

F. **Circle Designs** Have the students construct circles on drawing paper using a compass. Set the compass at the length of the radius of the circle. Place the compass point on any point of the circle. Draw an arc from one point on the circle, through the center, to another point. Repeat the process to create a design. Vary this activity by using oral or written directions.

G. **Radius, Diameter, and Circumference** Have the students trace a circular object, marking the center on the circles. Have students measure the radius with one color of string, the diameter with another color, and the circumference with a third color. Use the strings to determine the relationships between the radius, diameter, and circumference. Because yarn stretches, use colored string if possible.

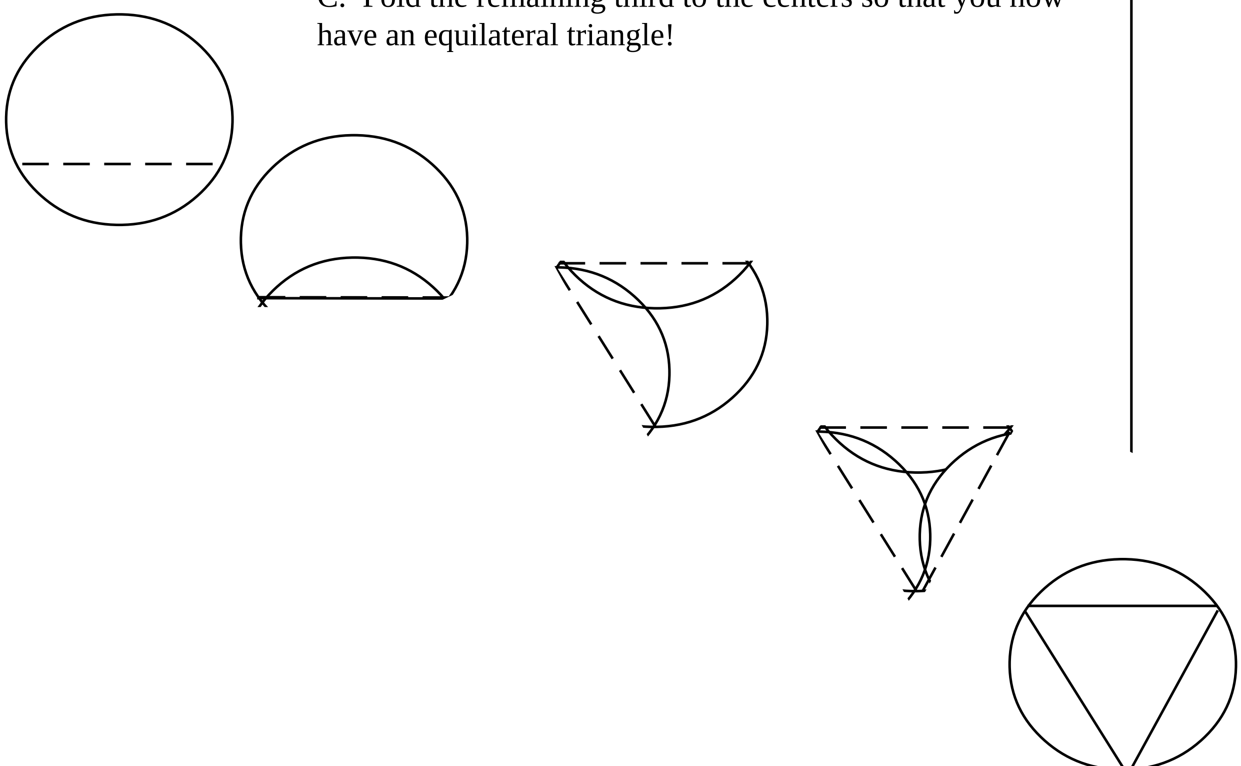
H. **Make Your Own Logo** Using a compass to draw a circle with a radius of 6 cm, create a logo for yourself. Make a border around the edge by drawing a second circle inside the original one. The circles should have the same center and the smaller circle should have a radius of 2 cm.

I. **Drawing Circles - Part II** Another activity might include giving oral directions such as "Draw a circle with a 2″ radius." "Draw a vertical diameter." "Draw two chords, each with an end point where the diameter intersects the circumference." "Draw a radius perpendicular to the diameter." Then have students compare their drawings. How are they alike? How are they different? Have students give oral directions while others draw. They might be asked to write out the directions first, in case there are any questions about what was said.



J. **Circles/Triangles** Have students, using their compasses, draw a circle whose radius is 3 inches. Cut out the circles then follow these steps:

1. Fold the circle in half. Trace the fold with a green crayon. What does this line represent? (diameter)
2. With the circle folded in half, fold it in half again. What does each of the straight edges represent? (a radius) Notice that the curved edge is an arc.
3. Unfold the circle. The intersection of the perpendicular lines represents what part of the circle? (center)
4. Color a radius red.
5. A. Pick any point along the circumference and fold to the center. Unfold and trace this line in blue. What does this line represent? (a chord)
   B. Do it again, using one end point if the first chord is an end point of the second.
   C. Fold the remaining third to the centers so that you now have an equilateral triangle!

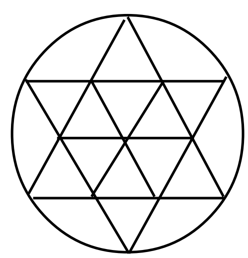


Notes and textbook references

Notes and textbook references

K. Several new kinds of compasses are available now with several advantages over the traditional "ball bearing compass". These "Safe-T™" or safe drawing compasses are made of plastic, so they don't rust, and don't have sharp points which dig into furniture and students. Most educational supply companies sell these compasses. Begin by modeling for students how to use a compass to draw an accurate circle. Also, model how to draw a diameter, radius, and chord. Then have them label these as well as the center and circumference. Then have students explore what kinds of "designs" can be made by using these various parts of a circle. Many of these designs begin by marking off the distance of the radius around the circumference. Ask students to think about and explain why the circumference can be divided into about 6 radii. Then various chords, diameters, and radii are drawn to connect these 6 points on the circumference. After exploring on their own, provide other designs and ask students to figure out how to replicate them. Ask students to write a process for creating a design using precise vocabulary.

For example: Draw a circle with a radius of 1.5″. Using the radius, mark off the circumference in step-off fashion, dividing the circumference into 6 sections. Using a straight edge, draw chords connecting every other point on the circumference. This should create two overlapping equilateral traingles and a hexagon in the center of the circle. Then draw line segments from the center of the circle to each intersecting point of the sides of the two triangles, or to the vertices of the hexagon. This divides the regular hexagon in the center of the circle into 6 smaller equilateral triangles.



L. **String Along!** Ask the students to choose a circular object. Have them measure the diameter and, using a compass, draw a circle that is congruent. Label a radius, a diameter, a chord, and the center of the circle. Measure the length of the circumference using a string.

3.03 Transform figures in the coordinate plane and describe the transformation.

Notes and textbook references

A. Slammin' Sammy (Blackline Masters III - 1 and III - 2)
Students explore transformations on the coordinate grid by letting Sammy run the bases. His finger, shoulder, back, toe, heel, and fist are the points used to map his journey around the diamond.

B. Draw it Again, Sam (Blackline Master III - 3)
Students begin by reproducing the figure of Sam in a different quadrant of the plane. The students will then draw a reflection of Sam in quadrant III. Students will list original and new coordinates of each point. Then students draw their own simple sketch and reproduce it as a translation in quadrant IV and as a reflection in quadrant III. Again, they will provide original and translated coordinates.

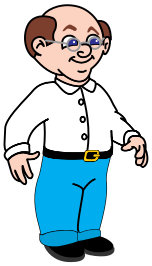
C. Mira™ Activity (Blackline Master III - 4)
Using a mirror or "Mira™", students will reflect figures across the x- or y-axis and draw the reflection (a congruent figure). They are to list the coordinates for the original figure and the reflected figure.

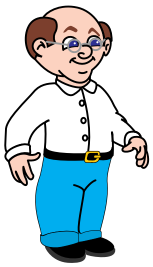
D. Quilter Challenge (**Tesselations**) (Blackline Master III - 5)
Students will use two shapes to create a design in a grid. After the completion of the design, they will list coordinates for each parallelogram and each triangle used.

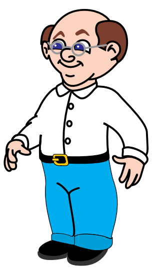
E. Review - Geometric Transformations (Blackline Masters III - 6 through III - 8) These sheets may be used to assess students' ability to create transformations involving reflections in all quadrants of the plane.

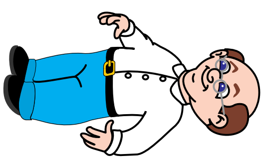
F. Transformations in the Coordinate Plane (Blackline Masters III - 9 through III - 15) Students will explore the effect addition and multiplication have on shapes drawn in the coordinate plane in the context of transformations. This activity is reprinted with permission from the *Woodrow Wilson Foundation - 1991 Mathematics Institute.*

Notes and textbook references









G. Body Rotations Using their bodies, students can demonstrate rotations. Stand in front of the room. Tell the students to imagine that the room is a clock and you are standing at the number twelve. Verbally give the students directions similar to the ones below. This activity allows you to quickly identify students who do not understand rotations, clockwise, counterclockwise, and/or 90 degree turns. At first, it is easier to have the students turn to face you before the next degree turn is announced.

Sample directions:

(1) 90° clockwise turn.
(2) 90° counterclockwise turn
(3) 180° clockwise turn
(4) 180° counterclockwise turn

After students master these turns, have them turn from the point at which they are standing after the last turn.

H. Table Top Transformations (Blackline Master III - 16 through III - 21)

<u>Materials</u>: Index card, ruler, inch grid paper, recording sheets, scissors

In this activity, students begin with a set of rigid shapes cut from index cards. Students physically slide, flip, and rotate these shapes on grid paper and record the resultling change in coordinates of the vertices. It is recommended that students work in pairs or small groups.

Students' visualization and spatial skills can be developed as they explore reflections and translations.

3.04 Solve problems involving geometric figures in the coordinate plane.

Notes and textbook references

A. Coordinating Change (Blackline Masters III - 22 through III - 25) Students construct a plane figure by plotting the coordinates of its vertices on grid paper. The students then determine the area and perimeter of the figure. Next, the students change the shape by making described changes in the coordinates. They describe the changes made in the shape as well as changes in area and perimeter.

Notation used in this activity shows what happens to vertex **A** in the original figure by naming it **A′** in each variation of the original figure. Vertex **B** becomes **B′**, etc.

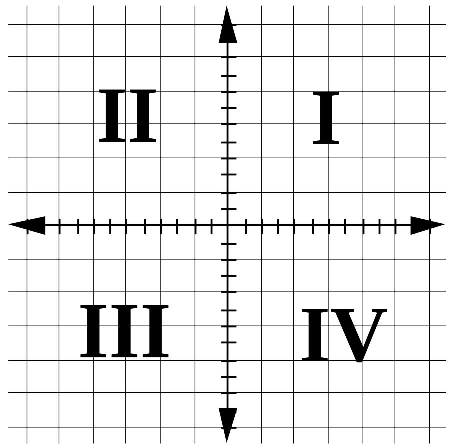
B. Rotations on the Coordinate Plane Provide students with a small equilateral triangle and a square. Have them trace each shape anywhere on a coordinate plane. Then find the images after rotations of 90 degrees and 180 degrees about the origin. Students can record the new coordinates using the notations of **A′** (the image of **A**) for the transformed figure.

C. Mapping Allow students to work in groups or pairs to create a map that show their school and surrounding buildings or students may choose to create a map of their community, neighborhood or town. Have students create a grid system locating major places. They could also make up situations of how to get from one place to another. For example, suppose Tom had a party at his house and he invited several of his friends. What would be the best route to take to get to Tom's house? As a class project you could create an imaginary neighborhood.

D. Transformations Have students make a map of the classroom on a coordinate plane. Then ask them to describe a translation from their desk to another desk. The teacher could pre-make the coordinate plane with the desk arrangements to save instructional time, and then allow the students to make the transformation.

Notes and textbook references

E. **Reflecting** Have students draw a parallelogram with the vertices of (-1,1), (-3,5), (-7, 5), and (-5, 1). Then have students reflect that parallelogram into the other three quadrants. Using a table of x and y values, have students list the new coordinates for the vertices that are in each quadrant.



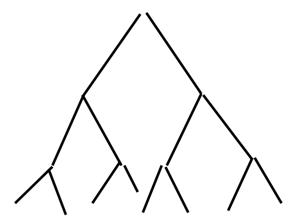
The learner will understand and determine probabilities.

4

4.01 Develop fluency with counting strategies to determine the sample space for an event. Include lists, tree diagrams, frequency distribution tables, permutations, combinations, and the Fundamental Counting Principle.

Notes and textbook references

A. **Permutations** Assign partners. Give each pair of students pattern blocks in different shapes. Students can challenge each other to make permutations of multiple shapes. Students can then draw the shapes to list all the different permutations that can be made.



B. **Tree Diagrams and the Fundamental Counting Principle** (Blackline Masters IV - 2 and IV - 3) This activity explains how the outcomes of a multi-step process can be found by the Fundamental Counting Principle and by a tree diagram. Teachers can point out that the the number of paths on a tree diagram comes from the number of branches created by the first decision multipled by the number of branches created by the second decision. This helps explain why the Fundamental Counting Principle works as it does.

Students are asked to create a new tree diagram for a second problem and then use it to answer probability questions.

C. **My Word** (Blackline Masters IV - 4 and IV - 5) This activity describes an experiment in which letters are generated by using a spinner and a coin. A tree diagram may be used to determine the possible outcomes. Once all the outcomes are discovered, the students can answer probability questions and compare theoretical results to experimental ones. .

Notes and textbook references

D. **Frequency Distribution** (Blackline Master IV - 6)

Materials: 20 - 25 strands of spaghetti pasta, metric ruler with measurements to nearest mm, recording sheet.

Students are asked to break each spaghetti strand into two pieces. They should not be encouraged to break them exactly in half. Then the students measure each piece to the nearest mm and record the length with a tally mark in the frequency table.

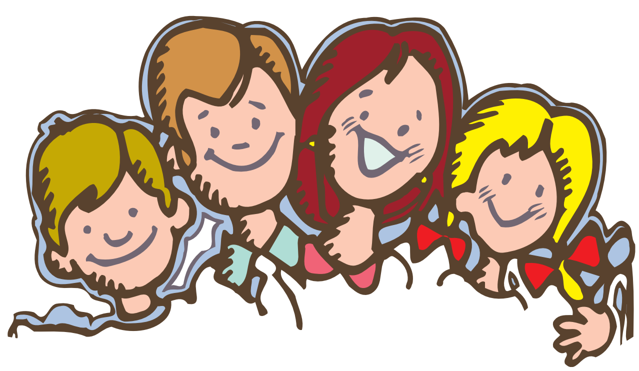
E. **Combinations** Arrange students in groups of four. Have groups do the following:

1. Predict how many different ways their group members can be arranged.

2. Form a line of your group members. Then form as many different lines as you can. How many could you form?

3. Simulate the problem. Represent each member with an object, such as a pencil, book, or a shape. Arrange the objects in as many different lines as you can. Do you get the same result as in Question 2?

4. Represent each group member with a letter or number. Make an organized list of all the possible arrangements.



4.02 Use a sample space to determine the probability of an event.

Notes and textbook references

A. **What's A Sample Space?** The teacher will use props to assist students in their understanding of sample space and probability.
The teacher can begin by explaining to students that the sample space is the set of all possible outcomes for an experiment.
Use a coin to explain that the sample space would be heads and tails, {H, T}. For a die, the sample space would be {1,2,3,4,5,6}.

Probability is written as the number of desired outcomes over the number of outcomes in the sample space. For example if the desired outcome on the throw of a die is a number great than 3, {4, 5, 6} then the probability would be $\frac{3}{6}$ or $\frac{1}{2}$.

Possible class activities for sample space.
Have the students determine the sample space and probability for the following situations or experiments.

1) Having someone from your math class selected to be 6th grade student of the month.

2) Look at a local menu and determine the probability of ordering a meal with chicken.

3) Your school is having a kickball tournament. Make a sample space of all the sixth grade classes you could compete with.

B. **What's the Probability?** (Blackline Masters IV - 11, IV - 30, and IV - 34)
Students will work in pairs to discover how increasing the sample space changes the probability of an event. The students will use two spinners, one with four numbers and one with eight numbers. The students will begin by identifying the sample space for each spinner. They will then chart the probability of the following outcomes; spinning a 1, spinning an even number, spinning a number greater than 5, spinning an odd number, spinning a prime number. After students have completed the chart, discuss how the sample size affected the probability.

Notes and textbook references

C. **High Rollers** (Blackline Master IV - 31)
Students will work in pairs to chart the sample space for two dice.
(1,1) (1,2) etc.,etc.
After completing the sample space (36 total), the students should chart the probability of the following outcomes:

1. The probability of rolling an even sum.
2. The probability of rolling a 2 on one die.
3. The probability of rolling the sum of 7.
4. The probability of rolling a sum that is a prime number.
5. The probability of rolling a sum less than ten.

D. **Go for the Gold. (** Blackline Master IV - 32 and Blackline Master IV - 33)
Students will practice using probability and sample space as they race for the gold in this game of probability. Students can play in groups of 2-4. Each student begins at start and goes to the first open space. The student reads the instructions on the space and chooses which spinner to use based on their understanding of sample and probability. Play progresses in a clockwise direction and the winner is the first one to reach the finish.

E. **Sweet Probability** Give students a small bag of M&M™s or Skittles™ candy. Have each student open their candy (please don't eat until after the lesson) and determine the sample space for their bag. Have a class discussion about the probability of choosing a certain color of candy.
Possible examples:

- The probability of choosing a red
- The probability of choosing an orange
- The probability of choosing a candy that is not green

Discuss why students sample spaces may differ and also why the probability differs from student to student.

Notes and textbook references

4.03 Conduct experiments involving simple and compound events.

A. **Color Cubes** Give each pair of students a paper lunch bag containing 15 unifix cubes, (5 white, 5 yellow and 5 blue). Have the students choose a cube 20 times and record the results on a piece of paper. Then have them determine their probability of selecting each color. Discuss the how students' findings differ and why.

B. **Paper Basketball** Students will work in small groups to conduct an experiment with free throws. Each student will use a notebook sheet to make a paper ball. Each student will have an opportunity to shoot their ball 10 times to try and hit the wastebasket. After each team completes their free throws, they will choose the player from their team that has the highest probability of beating other teams. The chosen player from each team will then compete against the other team representatives. The winner is the player who gets the most points in the final round.
Materials needed: waste basket for each group, paper for balls

C. **Sweet Success** Give each pair of students a paper bag with 10 mini lollipops or candies. Have the students list the sample space and then select one candy 15 times. Have them make a list of the candies that were chosen and then write the probability of choosing each type of candy. Discuss the differences in the probabilities.
(After you're done, they can choose a piece of candy and enjoy.)

D. **Spinner and Dice** Give each pair of students a coin and a spinner. Students should list the sample space of the spinner and coin. (Example: H,1; H, 2; H, 3; etc.) Have the students spin the spinner and toss the coin 25 times. They should chart their results and then list the probability of each outcome.

E. **The Messy Sock Drawer** Tory has a messy sock drawer. It contains 7 black socks, 4 blue socks and 9 white socks. On a particular morning he reaches in and picks out two socks without looking. What are his chances of getting a matching pair?
(Students can use color cubes or color paper cubes to represent the socks)
Have the students identify the sample space and then choose one sock and without replacing it choose a second to see how many times they have to choose before matching a pair. Have them chart what they pick each try until they get a matching pair. Discuss students findings as a class.

Notes and textbook references

4.04 Determine and compare experimental and theoretical probabilities for simple and compound events.

A. Making Spinners (Blackline Master IV - 11)
Give each student a circle divided into eighths. Ask the students to color their circles using three colors. Ask the students to record the probability of each color by counting it as a fraction. Using the circles, make a spinner, spin 20 times and record the results. On the back of their circles, ask the class to make a new circle using four colors, coloring one-fourth of each circle one color. Have each student (using a pencil and paper clip) spin the spinner 20 times. Compile the results and compare them to the expected results.

B. Free Throw Percentages Free throw percentages can be interpreted as a experimenal (empirical) probability. For instance, if a player hits 90% of his free throws, this means that a good estimate of his probability of being successful on his next shot is 90%. Have students keep data on a favorite basketball player. Does his free throw percentage actually equal his probability of being successful when attempting a free throw?

C. Space Race (Blackline Master IV - 7)
Materials : A pair of dice. Students follow instructions to bet on a space race. They should discover that space ship number one has no chance of progressing, and that it is much more likely that ships numbered six, seven, and eight will come in first. The table below illustrates why these numbers are rolled more often.

+	**1**	**2**	**3**	**4**	**5**	**6**
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Notes and textbook references

D. Application Contingency (Blackline Master IV - 8)
Students are provided with age and gender data for applicants to join a space colony. Students will apply the definition of simple probability to answer the questions about these applicants. Note: A contingency table displays data in a table that covers all possibilities, all contingencies. In this case, the applicants must be male or female, and their ages must fall into one of the categories. No applicants were allowed below the age of 20.

E. Mini Review – Probability (Blackline Masters IV – 9 and IV – 10) This mini review covers most of the concepts of probability from this section. Students should be allowed to work in pairs to share strategies.

F. Dice Probability How often does the number 1 come up when a number cube (die) is rolled? Compare data when a student rolls 10 times, when 6 students roll 10 times, and when everyone in class rolls 10 times. Which set gives probability closest to $\frac{1}{6}$?

G. Cube Probability Place 2 red cubes, 2 yellow cubes, and 2 brown cubes in a paper bag. Draw, without looking, one cube from the bag 12 times. (Be sure to place the cube back into the bag after every draw.) Record results. Compare results when four students' draws are combined; 8 students' draws are combined; and the entire class.

Notes and textbook references

H. **Sample Size** Place six plastic colored eggs in a large brown bag. Have students draw eggs out of bag one at a time and record result (do this a total of 20 times). Be sure to put the egg back into the bag after each draw. Next, place students in groups of five to six and repeat the above procedure. Be sure to record results. As a whole class, examine data collected. Predict what the results might be as the sample size increases. For example: "What do you think the results would be if each sixth grade class were involved?" Compile the report data. Make an "official" presentation with charts and overheads to another class, principal, etc.

I. **Family of Probability** Suppose a family has four children. What are the possible birth orders?
What are the chances that a girl will be the oldest?
If there are three or five children, what is the probability that a boy will be the middle child? Explore the probabilities of the families in your class.

J. **Are Spinners Really Random?** (Blackline Master IV - 12) Use the blackline master provided to test spinners for randomness. Use a paper clip as a spinner arrow. The spinner provided can be used to test for four, five, or six outcomes. Students should select which dial on the spinner they will test and then work in pairs to spin the spinner 120 times. They will record the actual outcomes and compare with the expected outcome. Students should discuss any differences and brainstorm as to why those discrepancies may have occurred. Were the outcomes drastically different throughout the class? Is the average of all class outcomes closer to the expected outcomes?

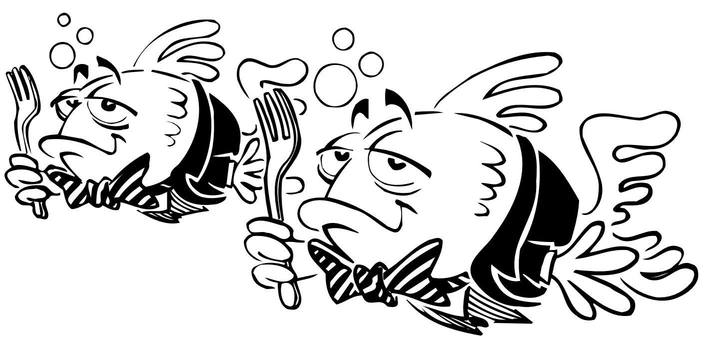
K. **Estimating Wildlife Populations** (Blackline Master IV - 13)

Materials: Paper bags, marbles, cubes, or candies of the same shape and size in two colors. Halloween taffy in black and orange wrappers works well.

Directions: Prepare a paper bag for each group with a number of marbles or candies inside. The students should not know how many items are in the bag. These represent the number of trout in a pond. Have the students add a known number of similar items to the bag. For example, the bag may have been prepared with 72 (unknown to student) red marbles and they can add 20 blue marbles. This process represents the wildlife manager putting tagged fish into the pond. The students should close the bag and mix the items. They then do several trials of taking a random sample from the bag by dipping a half-cup measure into the bag and removing the marbles they "catch." This corresponds to the wildlife manager catching a sample of fish. On each trial the students calculate the percentage of tagged fish in the sample. They should conduct several trials and average the results. This average serves as an experimental probability of finding a tagged animal.

$$P(\text{catching a tagged fish}) = \frac{\text{Number of tagged fish in the pond}}{\text{Total number of fish in the pond}}$$

Since the students have values for the probability of catching a tagged fish and the number of tagged fish, they can calculate the number of total fish in the pond.



Notes and textbook references

Notes and textbook references

L. **Spin to Win!** (Blackline Masters IV - 14 and IV - 15)

In playing this game, students compare expected to experimental outcomes in three different ways. They calculate the outcomes and probabilities of a single spin, they calculate the probabilities of spinning more than, less than, or equal to 50 cents, and they predict the outcome of playing a carnival game. The expected value of playing this game is the average of all 12 outcomes, a bit more than 58 cents. In spite of the fact that students will win more than 55 cents less than 25% of the time, the expectation is for the player to win in the long run. This is a good activity to bring out the law of large numbers.

HINT: An easy way to make the pie chart is to use a Hefty™ plastic plate. These plates have 36 dimples around the rim to correspond to the 36 trials in this game.

4.05. Determine and compare experimental and theoretical probabilities for independent and dependent events.

Notes and textbook references

A. Losing Your Marbles (Blackline Master IV - 16)
Students use coins to simulate marbles falling through a maze. They use probabilities of independent coin tosses to determine a theoretical result for the experiment.

For a marble to fall into the far right slot, the marble must fall right each time. There are four choice points and at each one, the marble has a probability of 0.5 to fall right. The probability of falling into the far right slot is $(0.5)^4 = \frac{1}{16}$

B. Oops! (Blackline Masters IV - 17 through IV - 24)
Materials: Playing cards printed on transparency film, cut apart, and placed in a bag, a playing piece for each team, paper clip for a spinner, game board printed on transparency film, overhead projector.

Directions: The leader divides the class into two teams and decides which team will go first. On a team's turn, the leader places one of the playing cards on the game board. If the team can answer correctly, the leader spins the spinner to find out how much the team advances. The arrows on the board indicate that a team will slide forward or go backward in the direction of the arrow. The first team to reach the finish wins. Note: As students become more proficient in calculating these probabilities, you may wish to allow the students to play in small groups. In this case, the playing cards will need to be printed on card stock. Answers are provided for use in this situation.

Notes and textbook references

C. **Fraction Cubes and Probability** (Blackline Masters IV - 25 through IV - 27)

Materials : unmarked wooden cubes (or spinners), pens, recording sheet. A chart is provided in which fractions are generated with a cube that produces numerators and one that produces denominators. The resulting possible fractions are shown in the table. Students use the results of the table to answer probability questions.

Directions: Students mark the blank cubes so that the numerator cube contains numbers 5 - 10, and the denominator cube contains numbers 5, 8, 10, 12, 17, 20. Students complete the table to produce the possible fractions. They answer theoretical probability questions based on the data in the table. Then the students actually roll the dice and record the resulting fractions. They compare the experimental results with the predicted probabilities.

D. **Modeling Dependent and Independent Events**

Materials: Five white marbles, one red marble and a paper bag.
Activity: (Your part) Suppose you put five white marbles and one red marble in a paper bag. You reach in without looking to draw a marble, look at it, and put it back in the bag. A second person draws a marble. The probability that the second person will draw the red marble is the same as it was for you because the bag contains the same five white and one red marble. The two draws are independent events. However, if you keep your marble when you draw it, the probability that the second person will draw the red marble is different because there is one fewer marble in the bag. The two draws now are dependent events.

(Students part) Organize students into groups. Give each group a coin, a bag of marbles, a number cube, a stack of cards, and a blank spinner. Have the students use any of these items to create two problems: one that involves two independent events and one that involves two dependent events.

4.06 Design and conduct experiments or surveys to solve problems, report and analyze results.

Notes and textbook references

A. **Planet Collector Cards** (Blackline Master IV – 28 and IV – 29) Students use the spinner to simulate buying Captain Krypton Cereal in the attempt to get an entire collection of Planet Collector Cards. Each student should conduct the experiment three times. Then data from the entire class can be gathered to determine how many boxes of cereal one might expect to buy to get the entire set.

B. **Counters and Cups**

Materials: 3 two-colored counters and a cup for each group

Activity: Use cups and counters to explore the experimental probability that at least two of three children in a family are girls.

Step 1: Place the three counters in a cup and toss them onto your desk.

Step 2: Count the number of red counters. This represents the number of boys. The number of yellow counters represents the number of girls.

Step 3: Record the results in a table like the one shown.

Trial	Outcome
1	B B G
2	B G G
3	
50	

Step 4: Repeat steps 1-3 for 50 trials.

Using a class chart report results and discuss the results. Students then could explore the experimental probability that two of five children in a family are boys.

Notes and textbook references

C. **Lottery Pick** This activity will divide the class into three groups. Each group will perform their activity and record the results.

Lottery — Pick 3

Purpose: To understand the probability of independent events.

Activity: Three containers each contain 10 balls. The balls in each container are numbered from 1 to 10. A person draws one ball from each container to determine the winner. Group discussion: 1) What is the probability of the number 111 being drawn? 2) If the first number drawn is 1, what is the probability of the next two numbers also being 1? 3) If the first two numbers drawn are 1, what is the probability of the third number also being drawn?

Lottery — Pick 4

Purpose: To understand the probability of independent events.

Activity: Four containers each contain 10 balls. The balls in each container are numbered from 1 to 10. A person draws one ball from each container to determine the winner. Group discussion: 1) What is the probability of the number 9876 being drawn? 2) If the first number drawn is 9, what is the probability of the next three numbers being 876? 3) If the first two numbers drawn are 9 and 8, what is the probability of the next numbers being 7 and 6?

Lottery — Pick 6

Purpose: To gain an understanding of the probability of dependent events.

Activity: A can contains 20 balls numbered from 1 to 20. A person draws six numbers without putting the number back. Group discussion: What is the probability of the numbers 2, 4, 6, 8, 10, and 12 being drawn?

Come together as a class and discuss the difference between independent and dependent events. Allow the groups to share their results. Ask: Which lottery, Pick 3, Pick 4, or Pick 6 would they play first and why?

D. Rolling Number Cubes

Notes and textbook references

Materials: Enough number cubes for your groups to have 2 each.

Activity: This game involves rolling the two number cubes as often as you want. After each roll, the two numbers on the number cubes are added. The purpose of the game is to come closest to the number 25 without going over. You must always roll both number cubes and add the numbers. Have groups record their results in a table.

Roll	Numbers rolled	Sum
1		
2		
3		
4		
5		

You have rolled three times. As a group discuss:

1) Improving your score (remember, scores over 25 are losers).

2) Rolling exactly 25.

3) Exceeding 25.

Come together as a class and discuss results.

Notes and textbook references

E. Draw it Out

Materials: A bag, hat, or box and 4 black beads and 3 red beads for each group.
Activity: In a hat, bag, or box there are 4 black beads and 3 red beads. One bead is drawn and replaced. Then a second bead is drawn.

What is the probability of drawing:

1. 2 black beads?

2. 2 red beads?

3. A black and a red bead?

Students should record and discuss results as a class.

F. Decimal Drop (Blackline Master IV - 1)

Materials : Meter stick, tag board strip 50 centimeters long, marker.
Procedure: Each group should mark their strip in decimeters showing the positions of 1 – 5 decimeters. Have one student stand on a chair and hold the strip vertically. Another student holds his thumb and forefinger at the bottom of the strip. His fingers are not touching the strip, but should be in position to try to catch it. The student on the chair will drop the strip and at the same time, the student on the floor will attempt to catch it using only his thumb and forefinger. The group will estimate where the point of capture occurred. This process is repeated three times for each person in the group. It will probably occur that most students capture within the same decimeter range. They will now mark off these intervals to the nearest tenth of a decimeter (centimeter) and repeat the process recording the results to the nearest centimeter. Class data can be used to determine the mean and the median.

The learner will demonstrate an understanding of simple algebraic expressions.

5

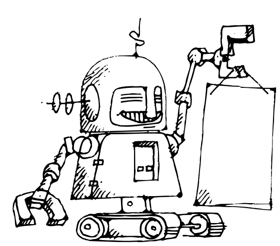
Notes and textbook references

5.01 Simplify algebraic expressions and verify the results using the basic properties of rational numbers.

a) Identity.
b) Commutative.
c) Associative.
d) Distributive.
e) Order of Operations.

A. Mental Math Using Properties (Blackline Master V - 10 throughV - 16) Make transparencies of each of these sheets. Tape paper on the back of the transparency to cover up the answer and property side. Use other paper to mask all but the question in play.

Divide the class into two or more teams. On a team's turn, display the top line only of one of the problems. The team's task is to give the answer using only mental math. If they need help, show the second line of the problem. A team scores two points if they answer the problem without a hint, one point if they answer it with the hint showing. If you wish, you can also add a third point if the student is able to tell you the property illustrated that allows changing the first line to the second line. Note: In addition to simplifying expressions, additional properties may be required to obtain the given answers.



B. Alien Math (Blackline Master V - 17)
Allow students to explore the addition and multiplication tables to answer the questions on the worksheet, an enrichment activity. NOTE: The math used in this example is Modulo 5 arithmetic.

Notes and textbook references

C. **Matching Game** (Blackline Masters V - 18 though V - 21)
Materials: Each group needs a deck of cards.
Directions: The dealer shuffles the deck and distributes eight cards to each player. The remaining cards are placed face down in a draw pile. The top card is turned over and placed beside the draw pile to start a discard pile. On a player's turn, he may choose either the top discard or draw a card. He then discards one card into the discard pile. Play moves around the table. The game is over when a player can display two complete sets of matching cards. A matching set contains three cards, one card with a property stated and two cards with illustrations of that property.

D. **Properties Vocabulary** When explaining the commutative, associative, and distributive properties, give examples of other uses of the words. For example, a "commuter" goes back and forth to work. "Commuting" is moving from one place to another. Whom you "associate" with is the same as saying who is in your group. When a teacher "distributes" papers, she gives one to each member of the class. The paperboy "distributes" a paper to every house on his route.

Notes and textbook references

E. **Order of Operations Square Puzzle** (Blackline Master V - 22) Students fit the small squares together to form the larger square. Where edges touch, a problem and its solution must match. Note: It would be best to cut out the small squares and place them in an envelope before giving the puzzle to the students, as the blackline gives the “answer”.

F. **Four Fours** Have the students create problems using only four 4’s. They may combine them with any operation and grouping symbols. Their task is to create problems with the answers 1-20. You may wish to keep this as an ongoing activity, or challenge the students to find as many problems as they can in a fixed time period.

G. **Dice Game**

Materials : Dice

Procedure: Divide the students into groups. Within the groups, the students will form two teams. On a team’s turn, they will toss four of the dice (or one die four times). Then the opposing team will toss the die once. The challenge is for the team in play to use the numbers rolled to create a problem with the answer of the number rolled by their opponent. An additional rule may be added that allows the opposing team to capture the point by finding a solution before the team in play does. One point is awarded for each correct solution.

Notes and textbook references

H. **Math Bowling** (Blackline Master V - 23)

Materials: For this activity you will need a game board, markers to cover numbers on the board, three number cubes or three sets of cards numbered 1- 6, and paper and pencil. Students can play in groups of two - four. Each student tosses the cubes or draws three cards. The object of the game is to “knock down” as many pins as possible with a “ball”. The “ball” is the three number set the student has drawn or tossed.

For example if student **A** has the numbers 5, 5, 4, he/she might write the following number sentences:

5 + 5 = 10
5 + 4 = 9
5 + 5 - 4 = 6
5 - 4 = 1
5 - 5 + 4 = 4
4 + 5 ÷ 5 = 5

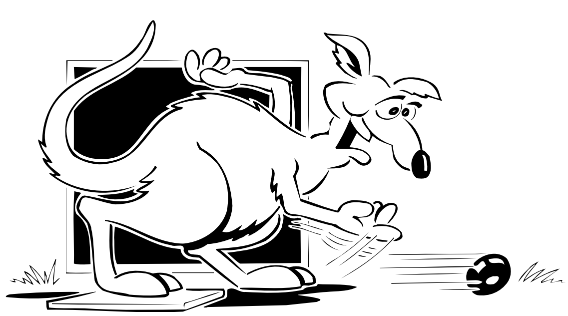
And thus the pins 1, 4, 5, 6, 9, and 10 are knocked down. Score for round one is 6.

Student **B** might start with the numbers 2, 3, 6 and write these sentences:

2 + 3 = 5
3 - 2 + 6 = 7
$(6 - 3)^2 = 9$
6 + 2 = 8
3 - 2 = 1
6 ÷ 3 = 2
6 ÷ 2 = 3
3 x 2 = 6
6 - 2 = 4

and knock down all but the 10 pin for a score of 9.

When students have written their number sentences they can exchange papers to check for accuracy, record their scores and play a second round. After ten rounds the scores are totaled and the high score wins.



5.02 Use and evaluate algebraic expressions.

Notes and textbook references

A. **Ordered Pairs and Patterns** (Blackline Master V - 1)

Students are presented with various problem situations in which patterns can be used to solve the problem.

B. **Using Models** (Blackline Masters V - 3 through V - 9)

There are multiple models that can be used to represent algebraic expressions. Many of them share some common characteristics:

one icon represents one or more variables.
one icon represents numbers (constants).

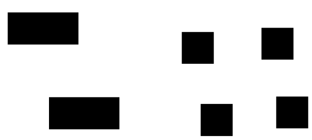
This section will use two models. One model is called **Rods and Squares**. In problems using this model, the following representations are used.

y-rod  = y

x-rod  = x

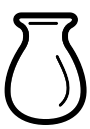
square  = 1

<u>Using Rods and Squares</u>
This arrangement represents the quantity 2x + 4



A second model is called **Bags and Balls**. In problems using this model, the following representations are used.

bag (named with any variable name; variable stands for the number of balls in the bag)

 = variable

 = one

Notes and textbook references

C. **Function War** (Blackline Master V - 24)

Materials needed: Paper clip spinner, a die. Students work in teams of two. On a team's turn, they spin the spinner to determine a function and roll the die to find the value of ***x*** in that function. The team calculates the function value. Then the opposing team spins the spinner and uses the same die number as the first team. If the opposing team generates a higher function value, they win the point. If the team in play has the higher function value, the point goes to that team. If the two teams generate the same function value, no point is scored.

D. **Star Travel** (Blackline Master V - 25)

Students use space travel to examine and interpret patterns.

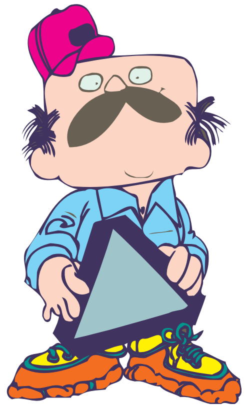
E. **Perimeter and Area Patterns** (Blackline Masters V - 26 and V - 27) Students examine some geometric patterns to discover number patterns relating to perimeter and area. They then use these patterns to find formulas to predict perimeter and area for larger figures.

The patterns created from these figures are each linear. It is fairly easy to use the repetitive pattern to find the answers required. Students may notice (or you may point this out) that patterns which increase by 2 every time n increases by 1 will have a formula of the form "$2n + 1$" If the formula value increases by 4 each time n increases by 1, the formula will be of the form "$4n + ?$" If you study the concept of slope, remind students of this example and explain how this ties in with slope.

Students should also be reminded of the geometric meaning of the variables. For instance in the first pattern, n represents the length of figure. Each figure has a top and bottom of equal length and ends of length 1. Pointing out this pattern, and then having students imagine what the 100th figure will look like, can help them find the formula. Show how this connects with the formula $2n + 2$ for perimeter.

Some students may be able to solve the problems by the iterative pattern only, others may know and use the rule about equal increment changes, others may see the pattern geometrically. Expose students to all three ways of viewing the problem and help them understand how they connect.

Notes and textbook references



F. **Block Patterns** (Blackline Masters V - 28 and V - 29)
Students examine geometric patterns to determine how they grow and to determine perimeter of the shapes formed. After completing a data table that shows pattern figure number and perimeter, the students should be able to find a formula to predict the perimeter of the n^{th} figure.

G. ***X* in the Mix** (Blackline Master V - 30)
Variables are used to represent the ingredients in a recipe for chocolate brownies. Students will use computation with fractions as they solve the puzzle.

H. **Mini Review – Patterns** (Blackline Master V - 31)
This mini review covers most of the skills from this unit. Allow students to work in pairs to share strategies and skills.

I. **Four in a Row** (Blackline Master V - 33)
The class is divided into two teams. To start play, the teacher puts an algebraic expression on the overhead. On a team's turn, they will give coordinates for a point they wish to capture. That point is circled. If the team can then give the correct answer for substituting the coordinates into the expression, the team captures that point, and the circle is filled in with the the color chosen for that team. If the team in play cannot provide a correct answer, the opposing team gets an opportunity to fill in the circle. Teams alternate playing until one team has captured four points in a row either horizontally, diagonally, or vertically.

If the leader wishes to direct students toward negative numbers, he/she may circle a point in the 2nd, 3rd, or 4th quadrant that may be used by either team as a free spot. Each round of the game lasts only a few minutes, thus making this game an excellent time filler. You may wish to play several rounds with your students to determine a winner.

Notes and textbook references

J. **X-Racing** (Blackline Master V - 34)

Materials needed: Pawns for the players (two each of two colors), scissors, a paper bag, a die, calculator (for challenges). To prepare for the game, the students cut apart the numbered squares and place them in a paper bag. Three of these numbered squares are drawn. The first square is the value for x, the second the value for y, and the third is the value for z. Each player places a pawn in the start square. Students work in teams of two to compete as they race around a track. Turns alternate between the two teams.

On a player's turn, he rolls the die and moves forward that number of spaces. When he arrives, he evaluates the expression on the space using the values of x, y, and z determined at the beginning of the game. If the player answers correctly, he remains where he is. If he answers incorrectly, the other team may challenge. If the opposing team can provide the correct answer, the challenged player moves back one, and the challenging player moves forward one. If a player challenges a player who has answered correctly, the false challenger moves back 2 spaces. Calculators may be used to resolve challenge situations.

The first team to get all pawns to the finish line wins.

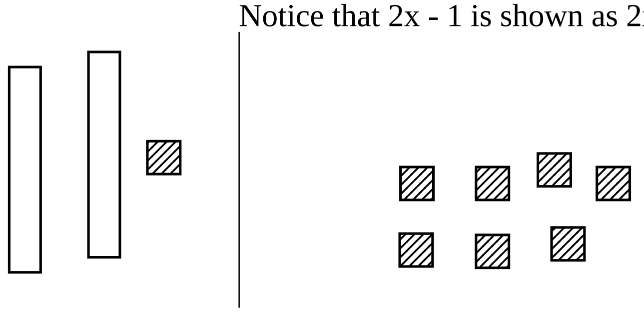
5.03 Solve simple (one- and two-step) equations or inequalities.

A. Using Algebra Tiles to Solve Two-Step Equations

Students may confuse the different kinds of algebra tiles and what they represent. Remind the students that the algebra tile's area is the value it represents. The length of the small square is one unit, so its area is one unit square. The x-bar is one unit wide and an unknown value for its length, so its area is x square units. The red tiles represent negative numbers and the yellow represent positive numbers. You may need to suggest students make a key so they won't forget the values. If you do not have access to algebra tiles you can draw a vertical rectangle to represent the bar and a square to represent a square. Demonstrate solving a two-step equation using algebra tiles, one is done for you below.

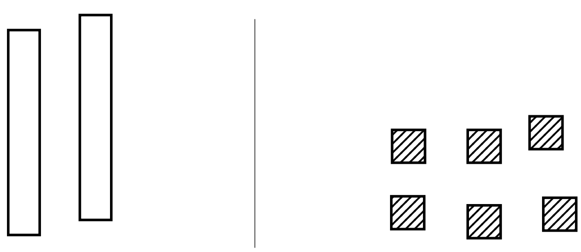
- ***Model the equation 2x - 1 = -7***

Notice that 2x - 1 is shown as 2x + (-1)

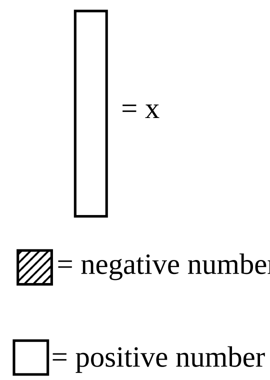


- ***Make zero pairs to get the x-tiles alone on one side of the equation***

- ***Simplify each side. You now have a one-step equation, 2x = -6***

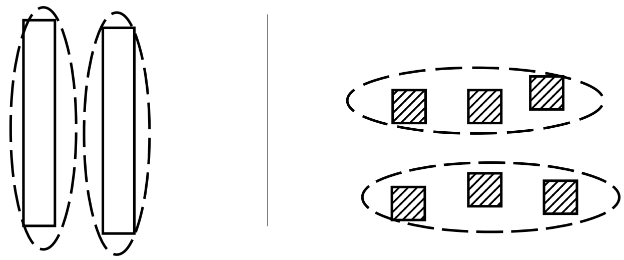


Notes and textbook references

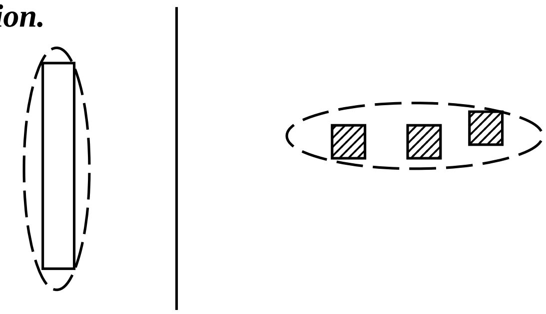


Notes and textbook references

- ***Divide each side of the equation into 2 equal parts***



- ***Find the solution.***



*The solution to 2x - 1 = -7 is: x=-3***.***

<u>Activity</u>: Pair students. Have one partner solve an equation using algebra tiles while the other partner observes. The observing student should only give suggestions or feedback when prompted by their partner. Have students change roles with another set of equations.

B. Using Students to Model the Solution to One-Step Equations Ask students to model -8 - (-6). Have 8 students stand at the front of the room. Give each student a red piece of construction paper to represent a negative number. Ask 6 of the 8 students to sit down on the floor to represent the negative amount being removed from the starting negative integer. Then ask: What is -8 - (-6)? Students can clearly see that the answer is -2. Model other equations using the subtraction of negative numbers.

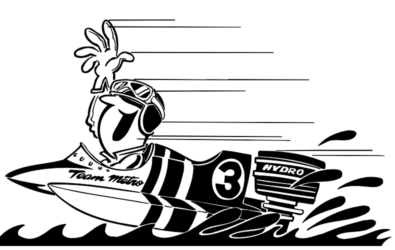
Notes and textbook references

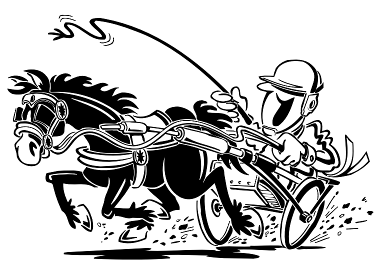
C. Modeling equations Give students twenty paperclips, rubber bands, or other small manipulatives. Ask them how they would share them equally among four people (*Make four groups of five*). Have them write an expression that represents the activity (4 x 5 = 20). Ask students how they would write the expression before they know how many items are in each pile (4x = 20). Discuss how you solve each solution (*By dividing*). Allow students to work in groups to solve other equations.

D. Inequality Race (Blackline Master V - 35)

Materials: Paper clip for spinners, pawns for players. Players start with their pawns in the start space. On a player's turn, he will spin both spinners to produce an inequality and a number. If the number is a solution to the inequality, the player moves forward two squares. If the number is not a solution, the player does not advance. If a player claims the number is a solution, but is challenged and found incorrect, that player will move back one space from his original position before the turn.

When encountering the situation where the equation has a negative coefficient, such as in $-x > 5$, students have an opportunity to think of that in terms of the concrete number presented as a solution. For example, when considering the statement $-x > 5$ and the number -6, students can be encouraged to think of the statement as it can be stated in words. Is the opposite of x greater than five? Is $-(-6) > 5$?. After considering several such cases, students may be ready to understand why $-x > 5$ is equivalent to $x < -5$.





Notes and textbook references

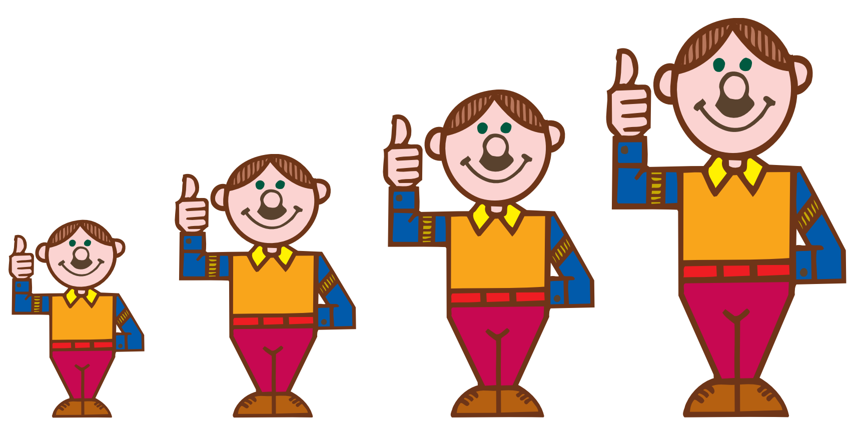
5.04 Use graphs, tables, and symbols to model and solve problems involving rates of change and ratios.

A. Mascot Painting (Blackline Master V - 2) Students will use a grid to enlarge a picture of a Panda mascot. Once the figure is drawn on the larger grid, have the students find ratios of several corresponding measurements from the figures. For example, have the students compare the heights, widths, foot lengths, etc. They should find the same ratio for all linear measurements.

B. Pattern Problem Discussion Cards (Blackline Master V - 32) Students work in groups to discuss these problems. After the problems are solved, students should share their results with the entire class.

C. He Grew and He Grew! (Blackline Masters V - 36 and V - 37)

Materials: Graph paper, This activity could be completed in several ways. You could organize the class into groups and assign each group the complete task or you could assign each group an exercise number and allow number 6 to be homework. The exercises that follow allow students to investigate rate of change using a real-life situation.



Grade Six

Classroom

Strategies

Blackline Masters

A Problem Solving Guide

1. **Read the problem <u>twice</u>.**
2. **Draw a picture.**
3. **Decide what the problem is asking.**
4. **Write a number sentence.**
5. **Does the picture match the number sentence?**
6. **Solve the problem.**
7. **Does the answer make sense?**
8. **Read the problem one more time.**

A Problem Solving Guide

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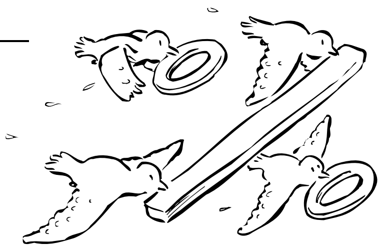
Name____Date____________



Mini Review - Percents

Put the numbers in order from smallest to largest.

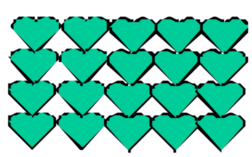
1. 50% $^{3}/_{5}$ $^{1}/_{12}$ $^{3}/_{8}$ 0.52 10% 0.7489 75% 0.1

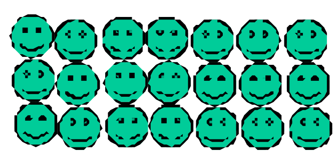
2. 0.58 $^{6}/_{25}$ 30% 60% 0.265 0.33 $^{7}/_{10}$ 25% $^{1}/_{3}$

Complete the chart below.

Fraction	Decimal	Percent
3. $^{1}/_{5}$	________	__________
4. ________	0.25	__________
5. _________	_________	33 $^{1}/_{3}$%
6. $^{2}/_{3}$	__________	____________
7. __________	0.8	____________
8. _________	___________	40%
9. $^{3}/_{4}$	___________	____________
10. _________	0.9	____________

Solve each problem below.



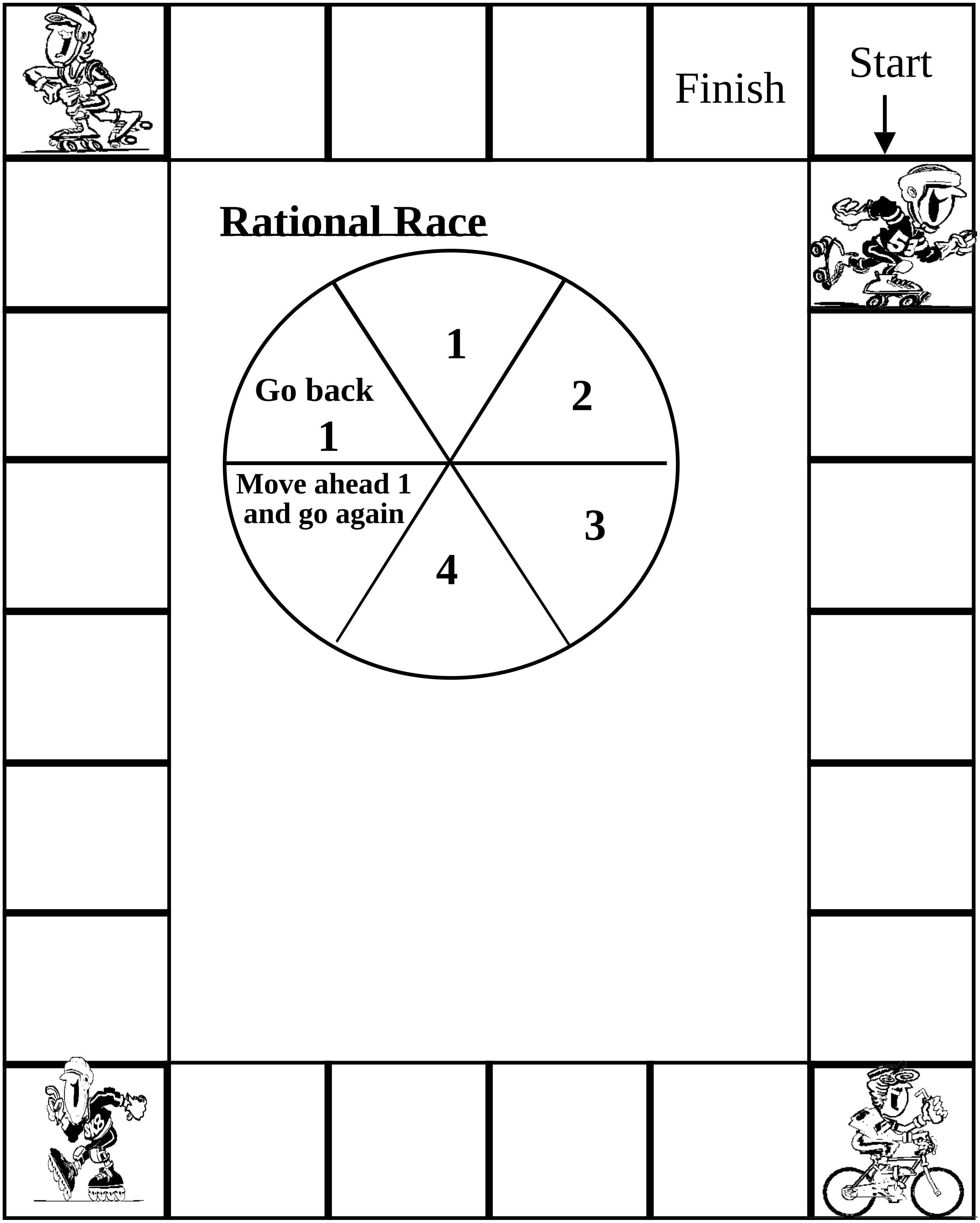


11. How many hearts would be 50% of the hearts above?

12. How many stars would be 75% of the stars above?

13. If the smiley faces shown are only 25% of all the ones on a chart, how many are on the chart?

14. The stars shown above are only 30% of the ones on a flag. How many are on the flag?


Start
Finish
Rational Race
1
2
3
4
Go back 1
Move ahead 1 and go again

$^{1}/_{3}$ of 24 8	$^{3}/_{5} + ^{4}/_{5}$ 1 $^{2}/_{5}$	$^{3}/_{5} \times ^{5}/_{7}$ $^{3}/_{7}$
10% of 75 7.5	$^{1}/_{2}$ of $^{2}/_{5}$ $^{1}/_{5}$	$\frac{16}{.4}$ 40
1.2×4 4.8	$^{2}/_{3}$ of 24 16	$16 \div ^{1}/_{2}$ 32

$^{6}/_{17}$

$12 \div {}^{1}/_{3}$ 36	${}^{1}/_{4}$ of 36 9	${}^{3}/_{7} + {}^{5}/_{7}$ $1\ {}^{1}/_{7}$
${}^{1}/_{2} + {}^{3}/_{4}$ $1\ {}^{1}/_{4}$	${}^{2}/_{5} \times {}^{1}/_{6}$ ${}^{1}/_{15}$	25% of 16 4
${}^{1}/_{2}$ of ${}^{12}/_{17}$ ${}^{6}/_{17}$	$\frac{24}{1.2}$ 20	$1.2 \times .4$ .48

$.2 \times .4$ .08	$^3/_4$ of 44 33	$^1/_8$ of 40 5
$^7/_9 + {}^6/_9$ $1\ ^4/_9$	$^1/_2 + {}^5/_6$ $1\ ^1/_3$	$^3/_4 \times {}^1/_6$ $^1/_8$
50% of 8.8 4.4	$^1/_3$ of $^{12}/_{17}$ $^4/_{17}$	$\dfrac{24}{.12}$ 200

$.2 \times .8$ .16	$^5/_6$ of 12 10	$22 \div {^1/_3}$ 66
$^1/_9$ of 63 7	$^5/_{12} + {^{11}/_{12}}$ $1\ ^1/_3$	$^1/_3 + {^5/_6}$ $1\ ^1/_6$
$^2/_3 \times {^9/_{14}}$ $^3/_7$	15% of 40 6	$^1/_5$ of $^{45}/_{79}$ $^9/_{79}$

$\frac{30}{.5}$ 60	$.3 \times .7$ .21	$^{5}/_{8}$ of 32 20
$14 \div {}^{1}/_{2}$ 28	$^{1}/_{7}$ of 42 6	$^{4}/_{5} + {}^{2}/_{5}$ $1\ {}^{1}/_{5}$
$^{1}/_{3} + {}^{4}/_{9}$ $^{7}/_{9}$	$^{2}/_{5} \times {}^{15}/_{26}$ $^{3}/_{13}$	75% of 40 30

$^{1}/_{7}$ of $^{35}/_{37}$ $^{5}/_{37}$	$\dfrac{48}{.4}$ 120	$.03 \times .7$ .021
$^{7}/_{9}$ of 45 35	$60 \div {}^{1}/_{5}$ 300	$^{1}/_{12}$ of 48 4
$^{5}/_{6} + {}^{5}/_{6}$ $1\ ^{2}/_{3}$	$^{2}/_{3} - {}^{1}/_{9}$ $^{5}/_{9}$	$^{2}/_{3} \times {}^{9}/_{10}$ $^{3}/_{5}$

30% of 20 6	**$^{1}/_{4}$ of $^{28}/_{37}$** $^{7}/_{37}$	$\mathbf{\dfrac{21}{.7}}$ 30
$.5 \times 1.2$ .6	**$^{2}/_{5}$ of 45** 18	**$42 \div {}^{1}/_{2}$** 84
$^{1}/_{5}$ of 45 9	**$^{3}/_{8} + {}^{7}/_{8}$** $1\ ^{1}/_{4}$	**$^{5}/_{8} + {}^{1}/_{4}$** $^{3}/_{8}$

Four friends order pizza. The bill comes to $24.36. How much should Joe pay for his share of the bill? $6.09	**Bill buys 7 movie tickets for him and his friends. The total cost is $35.70. How much will his six friends reimburse him for their tickets?** $30.60	**John and his brother Joe agree to buy a bicycle together. Joe agrees to pay $^5/_8$ of the price, $^1/_2$ now and $^1/_2$ later. If the bike costs $240, how much will Joe pay now?** $75
When buying a stereo on credit, Ralph has to pay 10% down. How much is his down payment if the total price is $352? $35.20	**A pizza is divided into 8 slices. Rose eats three of them. Her friends agree to pay for the amount they eat. Rose has only half enough money to pay for her share. If the pizza costs $16, how much money does Rose have?** $3	**Ralph likes to play video games. If each game costs a quarter and he has $12.50, how times can he play?** 50
In Sam's town, a movie ticket used to cost $4.50. The price of a ticket just went up 20%, How much does it cost now? $5.40	**Lois wants to buy a book that costs $36.90. She has saved only $^2/_3$ of the price. How much has she saved?** $24.60	**Mary promises herself to walk 15 miles while on summer vacation. If she has time only to walk $^1/_2$ mile per day, how many days will this take?** 30

At a park, ten tickets cost $8.00. It takes five tickets to ride the roller coaster and three to ride the ferris wheel. What is the cost of these two rides? $6.40	**At a pizza parlor, a large pizza costs $16. John orders $^3/_4$ of a pizza and his date orders $^1/_2$ of one. If John pays for both, how much does he owe?** $20	**Doug's father agrees to buy a stereo for Doug, if he will pay for $^2/_5$ of it. Doug can pay his share in six equal payments. If the stereo costs $300, how much is Doug's first payment?** $20
When buying a bicycle on credit, Ralph has to pay 25% down. How much is his down payment if the total price is $368? $92	**Mary needs to buy a lot of plastic hearts for a project she is working on. If each heart costs 40 cents and she has a total of $12, how many can she buy?** 30	**Ralph wants to buy special patches for the 15 members in his motorcross club. If the patches cost $1.20 each, how much will 15 cost?** $18
In Sam's town, sales tax is 6%. How much is the tax on a $30 item? $5.40	**Lois wants to leave a 15% tip on a restaurant bill of $18. How much is the tip?** $2.70	**Two sisters buy a book for $12.50 and a CD for $8.50. How much is each sister's half of the total?** $10.50

Name____Date____________

Mini Review - Fractions

Use these numbers to answer questions 1 - 4.

$\mathbf{2^1/_{10}}$ $\mathbf{1^4/_5}$ $\mathbf{2^1/_2}$ $\mathbf{1^9/_{20}}$ $\mathbf{1^1/_3}$ $\mathbf{2^1/_3}$

1. Which number above is largest?

2. Which is smallest?

3. Which is closest to the number 2?

4. Which is closest to the number $1\,^1/_2$?

Find the answers to the problems below.

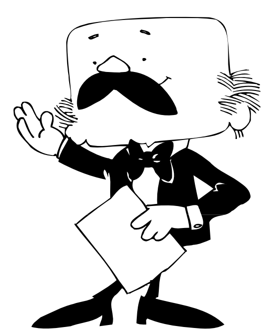
5. $^3/_7 + {}^2/_7$ 6. $^1/_5 + {}^3/_5$ 7. $5\,^1/_3 + 2^1/_3$

8. $^3/_8 + {}^7/_8$ 9. $1^7/_{12} + 3^{11}/_{12}$ 10. $^{19}/_{30} - {}^9/_{30}$

11. $3^1/_4 - 1^3/_4$ 12. $^5/_6 + {}^2/_3$ 13. $^3/_5 + {}^7/_8$

14. $3^7/_{12} + 2^3/_8$ 15. $^{11}/_{12} - {}^5/_6$

16. $3^1/_4 - 1^2/_5$



Name____Date__________

Mini Review – Fractions (cont.)

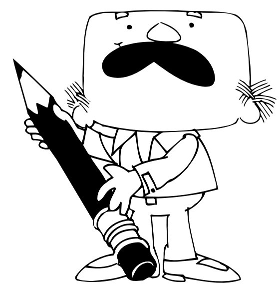
17. $^{3}/_{8} \times {}^{2}/_{5}$ 18. $^{1}/_{4} \times {}^{3}/_{7}$ 19. $^{2}/_{5} \times {}^{1}/_{4}$

20. $^{4}/_{5} \div {}^{4}/_{3}$ 21. $2^{5}/_{8} \div 2^{1}/_{4}$

Estimate each answer to the nearest whole number. Explain your estimation technique.

22. $2^{7}/_{8} + 7^{1}/_{12} + 5\,^{5}/_{8} + 3\,^{9}/_{20}$

23. $12^{1}/_{15} \times 2^{19}/_{20} \div 8^{8}/_{9}$



Problem Solving. Be sure to explain your work.

24. Marcia has seven packages of peanuts; each contains $^{2}/_{3}$ cups. Marcia needs six cups of peanuts to make peanut brittle. How many more cups does she need?

25. Linda has $6^{2}/_{3}$ yards of ribbon which she has cut into four equal pieces. From one of these pieces she cuts a strip that is 18 inches long. How much is left in that piece?

Name____Date__________

Mini Review - Decimals

Use the numbers below to answer questions 1-4.

3.5002 3.51 3.5047 3.198 3.21

1. Circle the largest number.
2. Underline the smallest number.
3. Which number is closest to 3 1/2?
4. Which number is closest to 3.2?

Give the answer to each problem below. Show your work.

5. 6.02 + 3.015 + 8

6. 0.014 + 2.3 + 17

7. 6 - 4.26

8. 13.8 - 12.43

9. 25.4 - 0.045

10. 75 x 0.13

11. 0.25 x 6.4

12. 13.2 x 1.25

13. 6.4 ÷ 4

14. 3.25 ÷ 0.5

15. 21.3 ÷ 0.71

16. 6.4 ÷ 32

Name____Date____________

Mini Review – Decimals (cont.)

Estimate the answer to each problem below to the nearest whole number. Explain your estimation technique.

17. 25.0003 + 34.48 + 6.5111111 + 17.901

18. 12.75 - 7.67 + 8.25 + 5.67

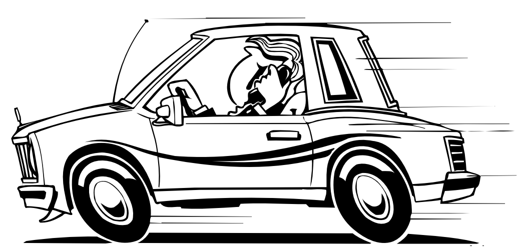
19. 49.98 x 2.004 ÷ 9.99111

20. 36 x 0.249 + 25 x 0.200003

Estimate the answer to each problem below. Explain your work.

26. The cost of gasoline is $1.249 per gallon. If Mark buys four gallons, about how much will this cost?

27. When John drives to work, he follows a route that is 12.1 miles long. He likes to return over a different route that is 13.4 miles long. About what distance does he drive, to and from work, over a period of 12 days?



Name____Date__________

Bode's Number Patterns

A man named Bode had an interesting scale for measuring the distance from each planet to the sun. In 1772, he wrote about the pattern shown below. When he presented this pattern, only six planets were known. They are marked with an *.

Planet	Bode's Number	Actual Distance in AU's
Mercury*	0 + 0.4 = 0.4	0.39
Venus*	0.3 + 0.4 = 0.7	0.7
Earth*	0.6 + 0.4 = 1.0	1.0
Mars*	1.2 + 0.4 = 1.6	1.52
??	2.4 + 0.4 = 2.8	2.8
Jupiter*	____________	5.2
Saturn*	___________	9.5
Uranus	____________	19.2
Neptune	____________	30.1
Pluto	___________	39.3

What do you think the Bode's numbers are for the remaining planets? Complete the chart.

2. Did Bode's law fit pretty well with the six known planets?

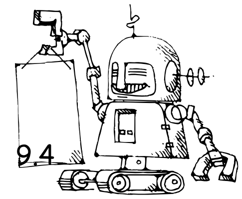
   How did it do predicting the next three planets?

3. What does the number 2.8 represent in the solar system?

Names____Date___________

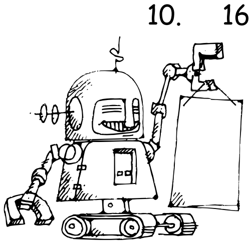
Alien Test Taking

On the planet Nomarc, students take tests without pencils. They mark their answers with small dots or rings. See whether you and a partner can make 100% on this test. No pencils or calculators allowed. Use only the rings or dots provided by your teacher to mark the test.



Find each correct answer.

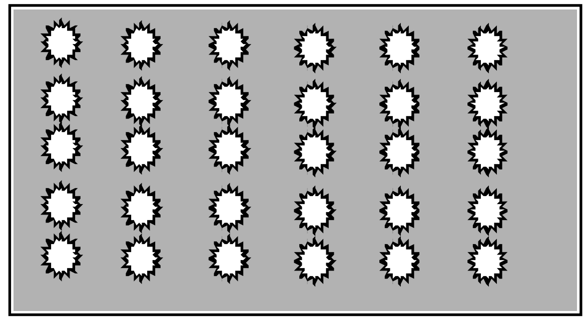
	a)	b)	c)	d)
1. 9 - 0.4	0.5	8.6	8.4	9.4
2. 2.4 + 7.2 + 24	1.60	16.0	23.6	33.6
3. $\frac{11}{12} + \frac{5}{12}$	$\frac{1}{2}$	$\frac{2}{3}$	$1\frac{1}{12}$	$1\frac{1}{3}$
4. $\frac{8}{9} + \frac{2}{9}$	$\frac{16}{81}$	$\frac{5}{9}$	$1\frac{1}{9}$	$1\frac{5}{9}$
5. $\frac{7}{12} - \frac{4}{12}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{5}{8}$	$\frac{5}{4}$
6. 103 x 3.5	36.05	359.2	360.5	3592
7. 0.347 + 1.56	.00503	0.503	1.907	3.626
8. 72.1 x 1.2	73.3	86.52	733.0	865.2
9. 5.2 + 0.045 + 17	7.35	11.4	12.245	22.245
10. 16 + 4.05 - 0.61	4.82	11.75	19.44	20.66



Name____Date____________

Alien Flags

Flag of the Zleepadeeps



Flag of the Humongons

The Zleepadeeps and the Humongons have decided to merge their colonies on a new planet. They would like a new flag, but the Zleepadeeps have stars on their flag while the Humongons prefer comets.

Proposals

1. Use half the stars of the Zleepadeeps and half the comets of the Humongons. How many of each would there be?

2. The Zleepadeeps are not happy with the arrangement above. Instead they say "Use $^1/_2$ of our stars and $^1/_3$ of your comets." How many of each would this be?

3. Now the Humongons are unhappy. How about $^1/_2$ of our comets and $^1/_3$ of your stars? How many of each is this?

4. One ambassador suggests to use 6 stars and 6 comets. What fraction of the stars is this? What fraction of the comets?

5. It is finally decided that $^1/_4$ of the stars will be used together with $^3/_{10}$ of the comets. How many of each is this?

6. Sketch a nice arrangement for the new flag below.

Name____Date___________

Space Weights

Your mass, the stuff you are made of, is the same no matter where you go. However, your weight is affected by gravity. Objects with more mass have more weight, and objects with less mass have less weight. The force of gravity is also affected by how far you are from another object.

Here are some facts …

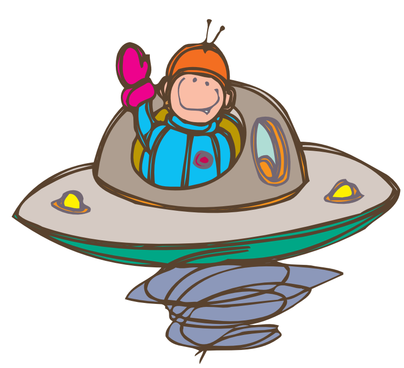
Gravity on _________ is about	________ times as much as it is on Earth.
the moon	$^{1}/_{6}$
Mercury	0.4
Venus	0.9
Jupiter	2.5
Saturn	a little more than it is on Earth
Uranus	a little less than it is on Earth
Neptune	a little more than it is on Earth
Pluto	$^{1}/_{10}$

Gravity on __________ is more exactly	________ times as much as it is on Earth.
the moon	0.17
Mercury	0.38
Venus	0.9
Jupiter	2.5
Saturn	1.2
Uranus	0.93
Neptune	1.2
Pluto	.08

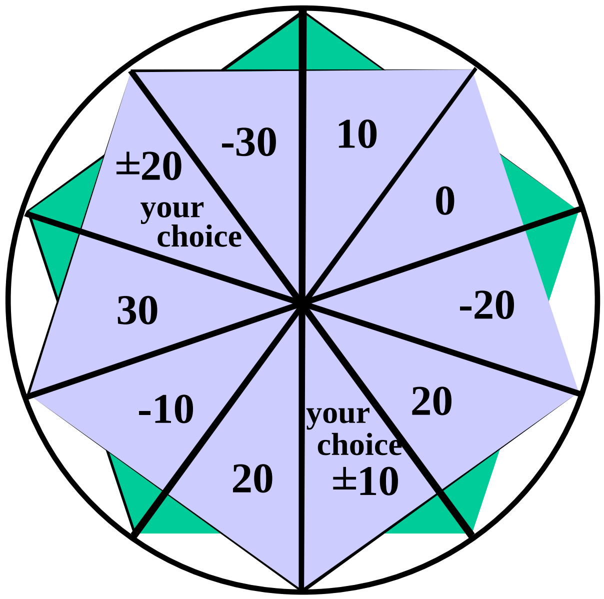
This means that if you weigh 120 pounds on earth, you would weigh only about 20 pounds on the moon. Naturally you could jump higher. Things you can't lift on Earth (because they are too heavy) you could lift on the surface of the moon. For example, a 300-pound bar bell would weigh only 50 pounds on the moon.

Use the approximate values. Find the weight of a 150 pound man on each planetary body.

	approximate	more exact
the moon	_______	________
Mercury	_______	________
Venus	_______	________
Jupiter	_______	________
Saturn	_______	________
Uranus	_______	________
Neptune	_______	________
Pluto	_______	________



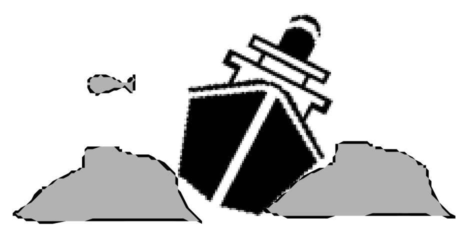
James Bond Game



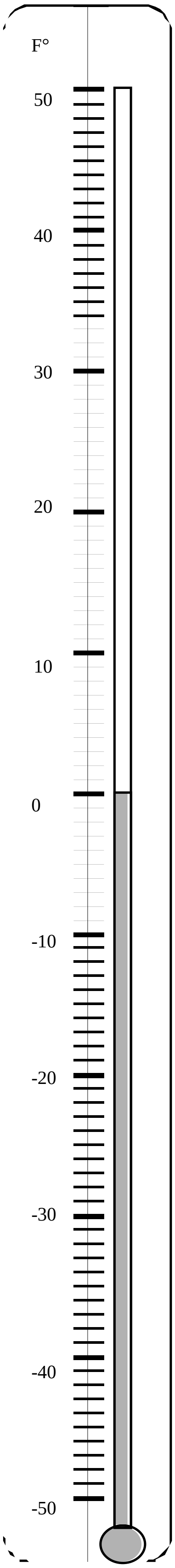
James Bond and his arch enemy are in a race for nothing less than the safety of the whole world!

First they must reach a shipwreck at the bottom of the sea, 80 feet below sea level. Then they must race to the top of a cliff, 100 feet above sea level to helicopter away to safety. Strong currents, high winds, slippery rocks, sea creatures, and pot shots from the enemy will hinder them along the way. The spinner tells you how much you go up or down on each turn. Of course, you will never go below the bottom of the sea or higher than your fortress. Good luck achieving your mission!

And one more thing … if a player ends a turn exactly opposite his opponent, he has a clear shot at jamming his equipment. The result is the player moves up 10 and the opponent moves down ten.



Name____Date____________



A Cold Day in Fairbanks

In March in Fairbanks, Alaska, the temperature can vary from 40° F to -40° F with the average not far from 0° F.

1. At noon the temperature is 6° F, but the afternoon temperature drops 2 degrees per hour for the next few hours. What is the temperature at 4:00 pm? _______

2. Just before dawn the temperature is -20° F, but as the sun rises, the temperature climbs 3 degrees per hour. What is the temperature 2 hours later? _______

3. One day the temperature is 5° F, but the wind is blowing so that the wind chill reduces the temperature 12 degrees. What does the temperature feel like with the wind chill factored in? ________

4. The average high temperature in March is -8° F, but the record high is 53 degrees above this. What is the record high? _______

5. The average low temperature in March is -7° F, but the record low is 35 degrees less than that. What is the record low? _______

6. The record low for winter is about -60° F, but the record high in summer is about 152 degrees higher than that. What is the record high for summer? _______

7. In March the record low is -45° F, but for July the record low is 87 degrees higher. What is the record low in July? ______

8. In January, the average low is about -60° F, but for the next two months, the average low increases by 10° F each month. What is the average low in March? ______

9. In October, the average low is about 30° F, but the average low decreases by 20 degrees per month over the next few months. What is the average low in December? _______

10. In March, the record low is -45° F, but this measurement increases by 20 degrees the next month, then increases 40 degrees by May, increases again 20 degrees by June, increases another 3 degrees by July, has no change by August, decreases 12 degrees in September, decreases 20 degrees in October, and decreases another 20 degrees by November. What is the record low for November? ______

Name____Date___________

Temperature on the Beach

Four friends at the beach each has something to drink. One has hot coffee in a cup, one has hot coffee in a thermos bottle. One has a cold Coke in a plain can, while another has a Coke can in an insulated holder.

•The Cokes start at a temperature of 40 degrees, but the plain can heats up at five degrees per minute.
•The can in the insulated holder warms up by gaining 10% of the difference between its temperature and the temperature of the surrounding air each minute.
•The coffee in the cup starts at 200 degrees but loses 10 degrees per minute.
•The coffee in the thermos starts at 200 degrees but loses 10% of the temperature difference (between itself and the surrounding air) each minute.

The temperature on the beach that day is 100° F.

Complete the chart below. When calculating temperature changes, round to the nearest degree.

Beach Temperature = 100° F

	Coffee Cup (200° F)	**Coffee Thermos (200° F)**	**Coke Can (40° F)**	**Coke Holder (40° F)**
Time passed/	**Differences:**			
0 min	**+100° F**	**+100° F**	**-60° F**	**-60° F**
1	________	________	________	________
2	________	________	________	________
3	________	________	________	________
4	________	________	________	________
5	________	________	________	________
6	________	________	________	________
7	________	________	________	________
8	________	________	________	________
9	________	________	________	________
10	________	________	________	________

1. What is the temperature of each of these drinks after three minutes? Coffee cup_____, coffee thermos _____, Coke can _____, Coke holder _____.

2. When is the first time there is at least a ten degree difference between the coffee in the cup and the coffee in the thermos? ________

3. When is the first time there is at least a ten degree difference between the Coke in the plain can and the Coke in the can inside the insulated holder? __________

4. If a human can detect a temperature difference of 2 degrees, when is there first a detectable difference between the two coffees?_________ the two Cokes? _________

5. Why is it easier to complete the chart above using temperature differences than using the actual temperatures? (Try it.) Explain.

Name____Date__________

Secret Message

Write the following integers in numerical order from smallest to largest. Then decode the message.

-101	R	-90	E
-700	S	-5	-
-55	H	-909	T
-800	G	-20	U
-7	D	900	I
-77	-	25	O
1	W	-699	-
100	F	-9	N
-990	N	-799	E
880	L	-15	S
990	E	4	N
1000	!	-100	U
-2	D	0	O
-99	L	-1000	I
15	S	909	F
-19	P	-50	E
-850	E	850	-
19	-	-720	R
-45	-	-12	-
-10	A	-70	T

____ ____ ____ ____ ____ ____ ____ ____

____ ____ ____ ____ ____ ____ ____ ____

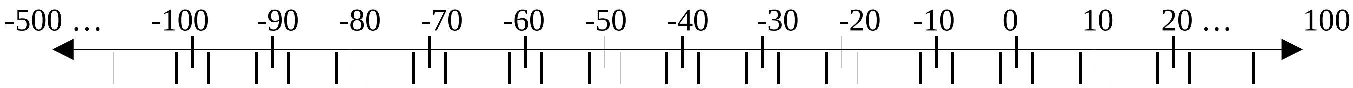
____ ____ ____ ____ ____ ____ ____ ____

____ ____ ____ ____ ____ ____ ____ ____

____ ____ ____ ____ ____ ____ ____ ____

Name____Date___________

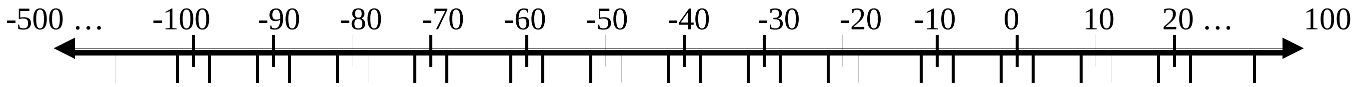
Integer War



-500	**-250**	**-105**
-100	**-98**	**-91**
-90	**-89**	**-84**
-80	**-79**	**-72**
-70	**-68**	**-63**
-60	**-59**	**-51**
-50	**-47**	**-42**

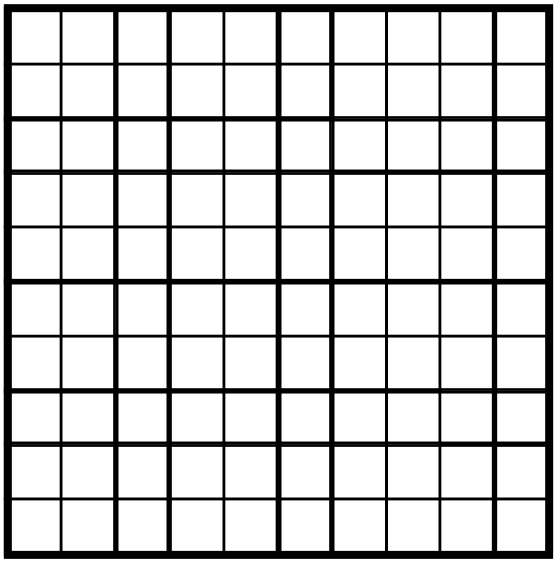
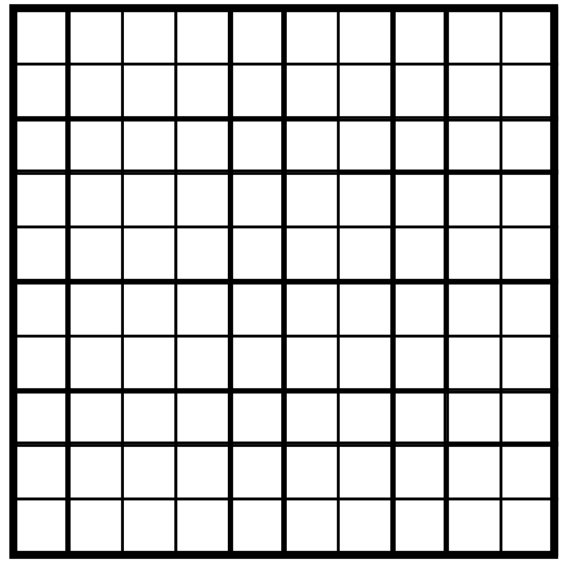
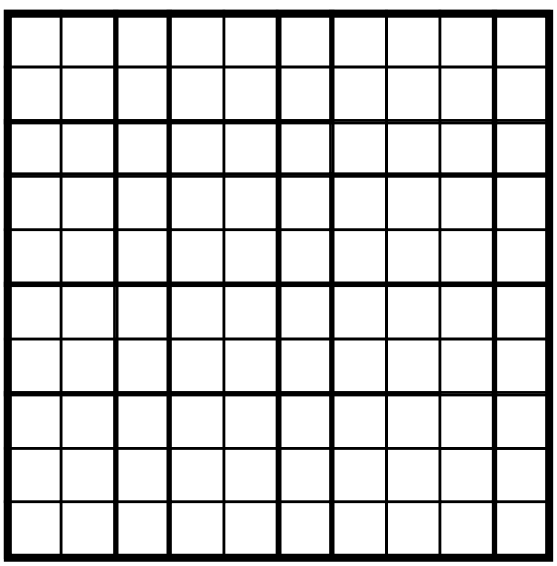
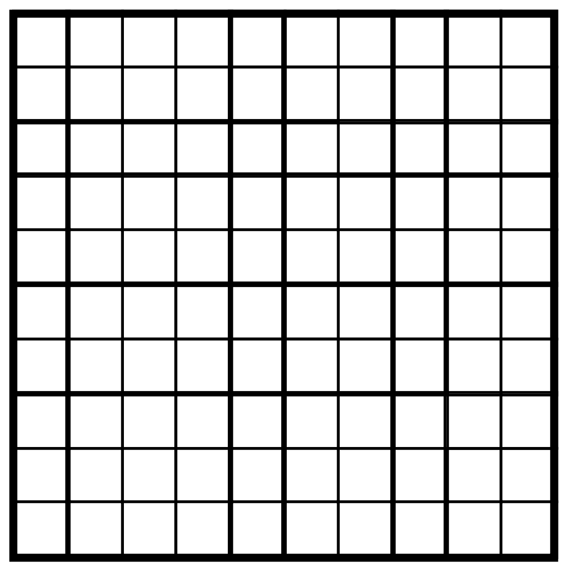
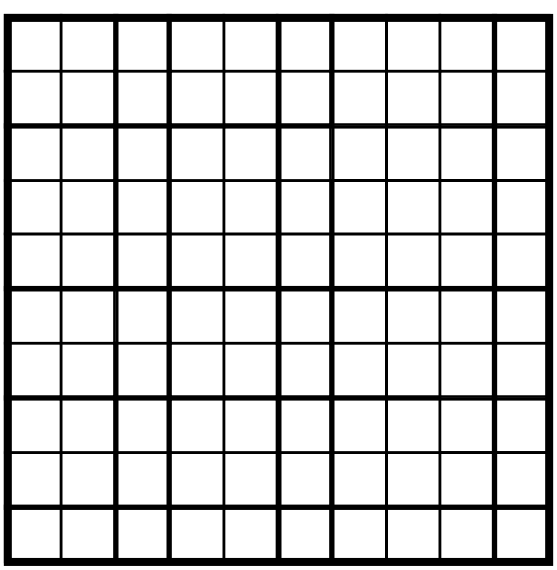
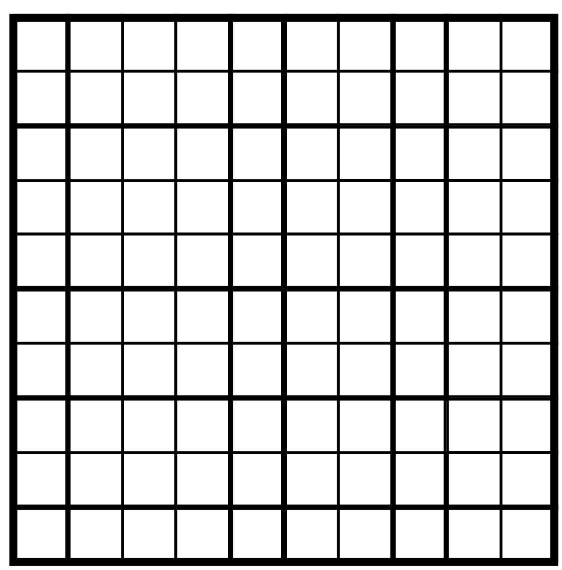
Name____Date__________

Integer War



-40	**-38**	**-32**
-30	**-29**	**-21**
-20	**-19**	**-12**
-10	**-9**	**-1**
0	**1**	**8**
10	**12**	**18**
20	**22**	**100**

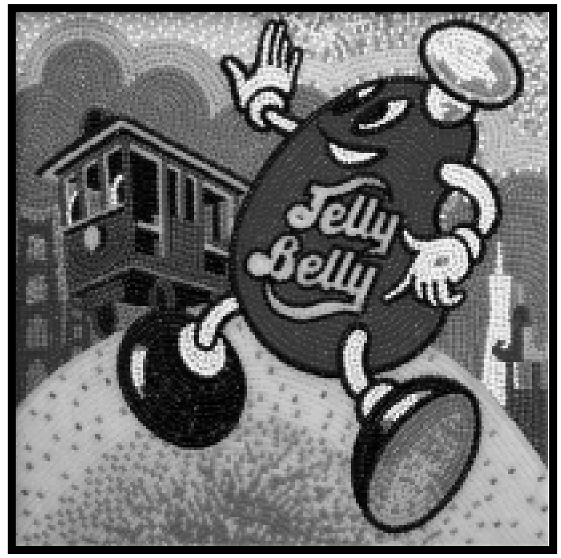
Percent Models – Transparency Master

Name____Date__________

Percent Models

Trolley Mosaic
1%______ 100% ______

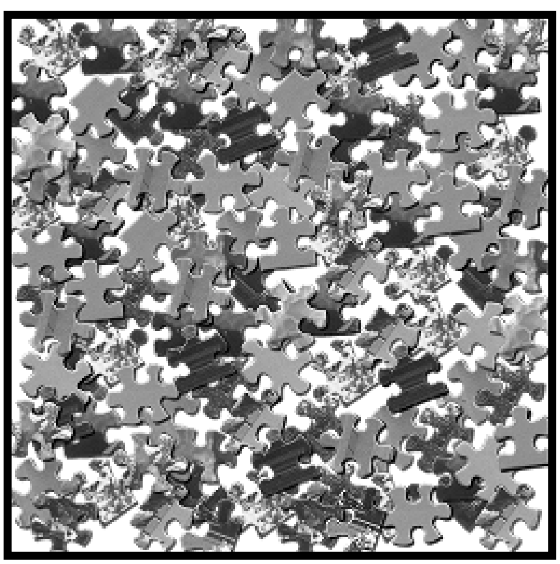


Jelly Belly Mosaic
How many beans?_______

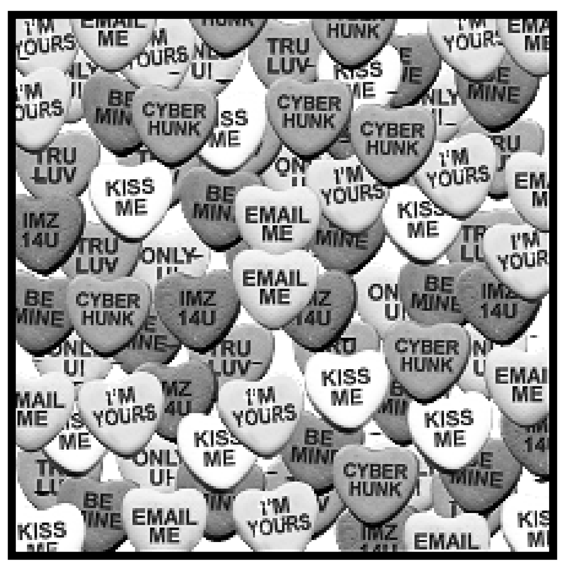
1. In the trolley mosaic above, find three different areas that represent 1% of the picture. Count the number of jelly beans in 1% of the picture. Now use that count to estimate the number of jelly beans in the entire trolley mosaic.

2. Estimate the percentage of the entire Jelly Belly mosaic that is represented by the trolley mosaic. Use that figure to estimate the number of jelly beans in the entire Jelly Belly mosaic.

3-4. In each figure below, count the number of pieces in 25% of the picture. Estimate the number of pieces in the entire figure.



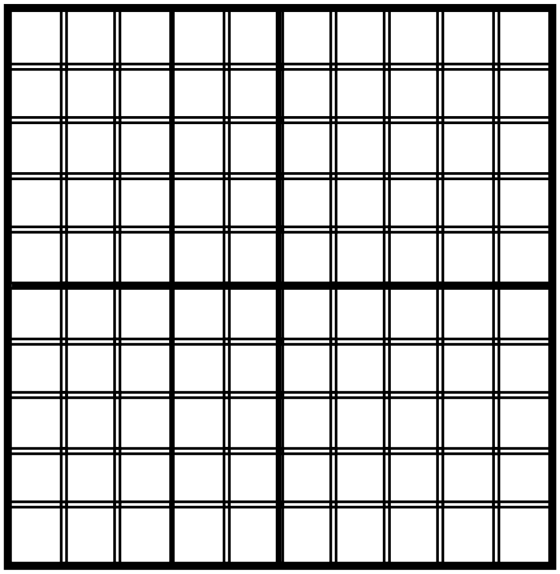
25%_____ 100%_____



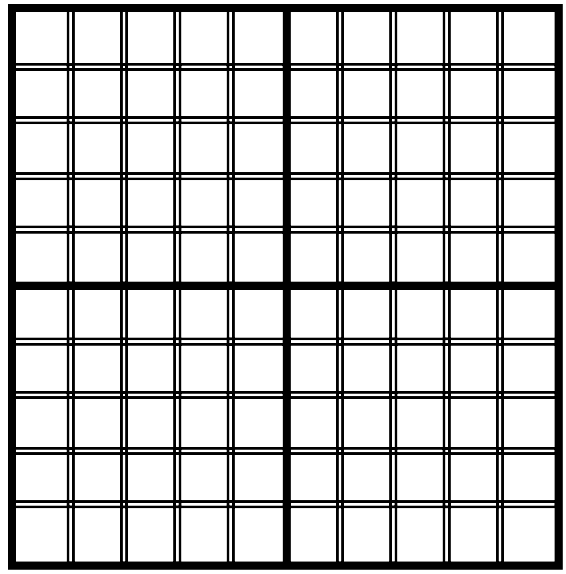
25%_____ 100%_____

Name____Date____________

Fill a Grid

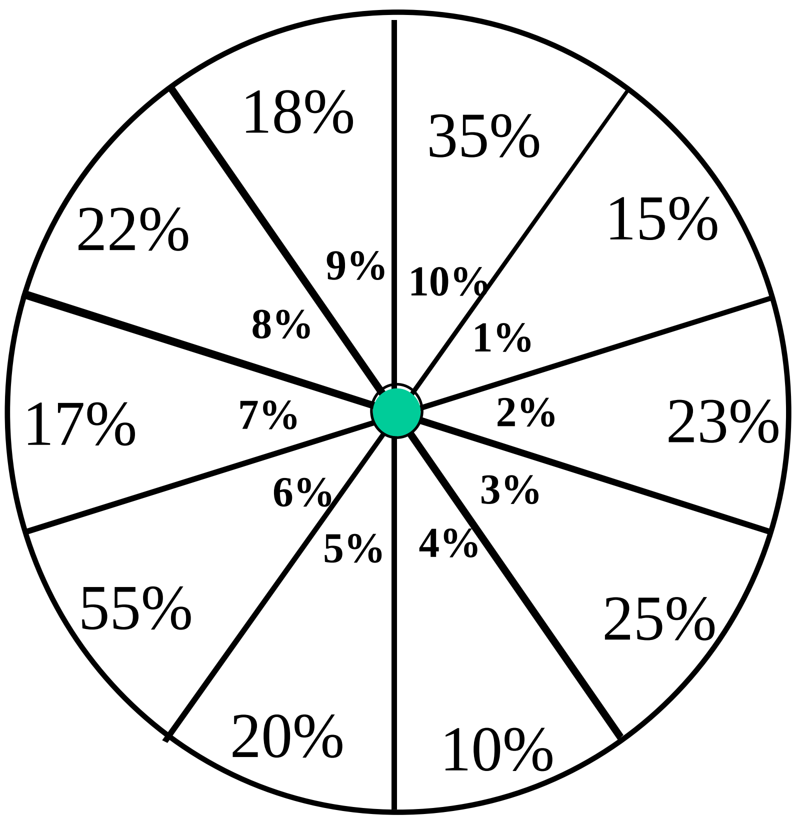


Player 1



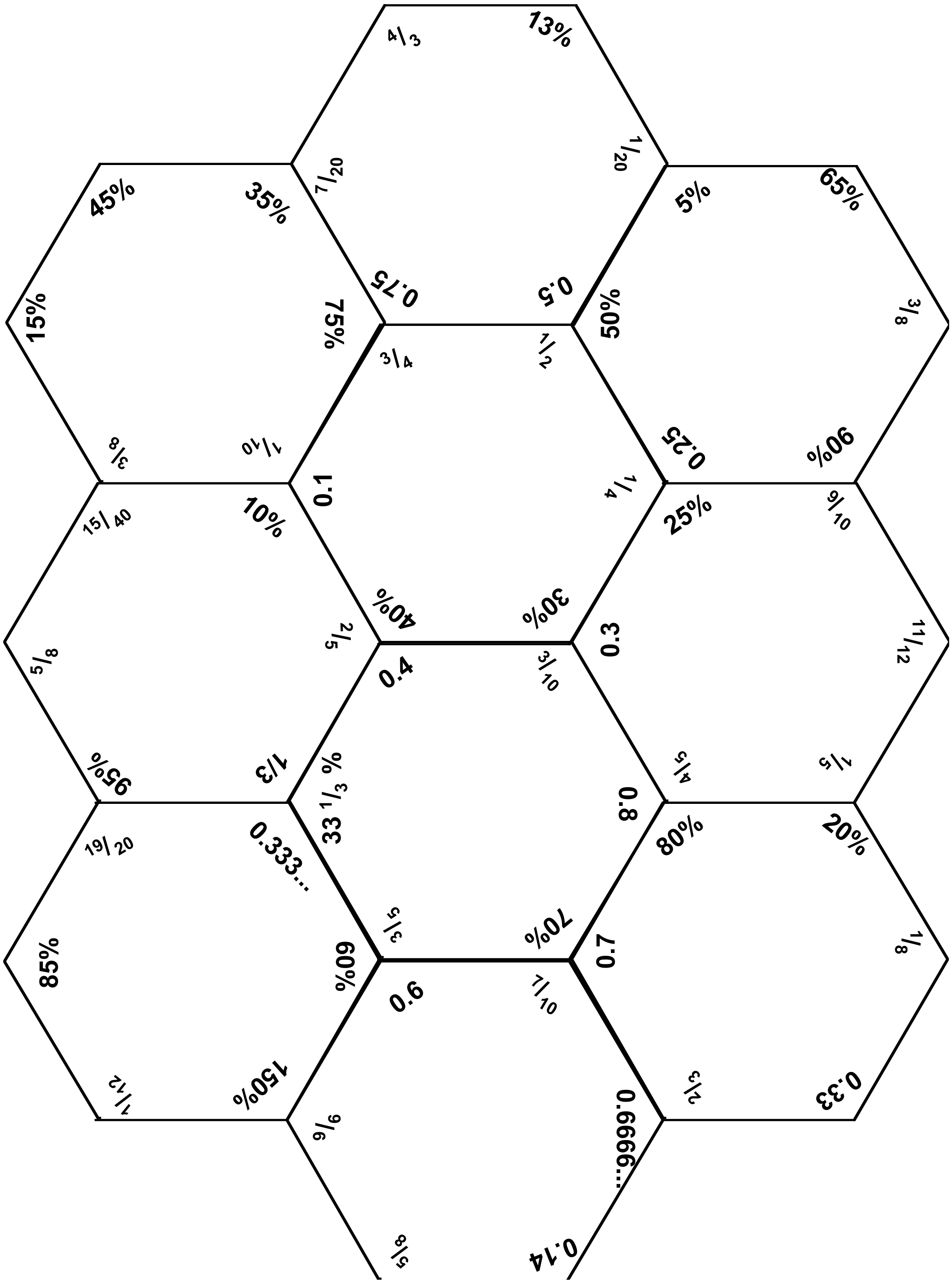
Player 2

Score
Player 1
1
2
3
4
5



Score
Player 2
1
2
3
4
5

Fractions, Decimals, Percent Hexagon Puzzle



0.001	$\frac{1}{100}$
1.01%	0.049
$\frac{1}{20}$	5.5%

9.5%	$\frac{1}{10}$
0.12	0.195
$\frac{1}{5}$	21%

24.5%	$\frac{1}{4}$
0.26	0.2999
$\frac{3}{10}$	31.5%

32%	$\frac{1}{3}$
0.34	0.3902
$\frac{1}{5}$	40.5%

49.5%	$\frac{1}{2}$
0.51	**0.57**
$\frac{3}{5}$	**61%**

66%	$\frac{2}{3}$
0.67	**0.69**
$\frac{7}{10}$	**72.1%**

72.2%	$\frac{3}{4}$
0.7624	0.79
$\frac{4}{5}$	85%

87%	$\frac{9}{10}$
0.9624	0.97
1	103%

Name____Date__________

Mathematical Message

Place the numbers below in numerical order. If you wish, you may change the numbers to decimal form for easy comparison. When the numbers are in order, the code letters will spell out a message.

Number List	Code Letter	Decimal Form	Numerical Order	Message
$^1/_5$	M	________	________	______
0.6	E	________	________	______
$^9/_{11}$	I	________	________	______
$^5/_4$	A	________	________	______
$^{10}/_6$	N	________	________	______
$^9/_4$	N	________	________	______
$^4/_3$	T	________	________	______
$^1/_{10}$	C	________	________	______
$^3/_4$	space	________	________	______
$^1/_{20}$	E	________	________	______
1.0	space	________	________	______
1.75	A	________	________	______
$^6/_5$	R	________	________	______
2.0	T	________	________	______
$^{15}/_6$	N	________	________	______
$^{42}/_{20}$	H	________	________	______
0.9	H	________	________	______
$^3/_{10}$	L	________	________	______
$^2/_3$	L	________	________	______
$^8/_9$	T	________	________	______
0.4	space	________	________	______
$^1/_{100}$	D	________	________	______
$^4/_5$	W	________	________	______
1.4	I	________	________	______
$^9/_5$	L	________	________	______
$^8/_3$	G	________	________	______
$^1/_2$	H	________	________	______
0.7	P	________	________	______
$^3/_2$	O	________	________	______
$^7/_3$	K	________	________	______
1.9	space	________	________	______
$^{12}/_5$	I	________	________	______
$^1/_8$	I	________	________	______
2.2	I	________	________	______
$^1/_4$	A	________	________	______
$^1/_3$	S	________	________	______
1.0	space	________	________	______

Name____Date___________

Patterns for Repeating Decimals

I. Use your calculator to change each fraction below to a decimal form.

1. $\frac{1}{9}$ ____________________ 2. $\frac{2}{9}$ ____________________

3. $\frac{4}{9}$ ____________________ 4. $\frac{17}{99}$ ____________________

5. $\frac{25}{99}$ ____________________ 6. $\frac{32}{99}$ ____________________

7. $\frac{422}{999}$ ____________________ 8. $\frac{535}{999}$ ____________________

9. $\frac{683}{999}$ ____________________

Use the pattern you see to determine which fraction is equivalent to the decimals below.
Check your answer with the calculator.

10.	.555	_________	11.	$.7\overline{7}$	_________
12.	.8383	_________	13.	.2626	_________
14.	.137	_________	15.	.184	_________

16. How would you explain this pattern to someone else?

II. Examine the equivalent fractions and decimals below. Look for a pattern.

$0.23\overline{3} = \frac{21}{90}$ $0.41\overline{1} = \frac{37}{90}$ $0.577\overline{7} = \frac{52}{90}$

$0.844\overline{4} = \frac{76}{90}$ $0.412\overline{12} = \frac{408}{990}$ $0.735\overline{35} = \frac{728}{990}$

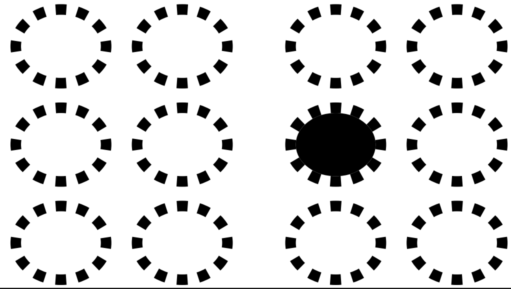
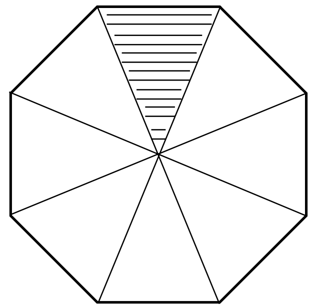
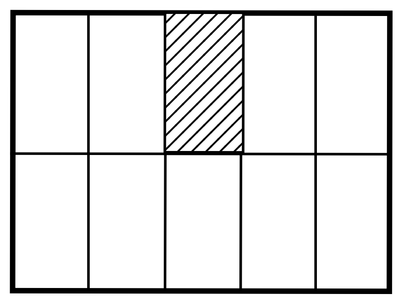
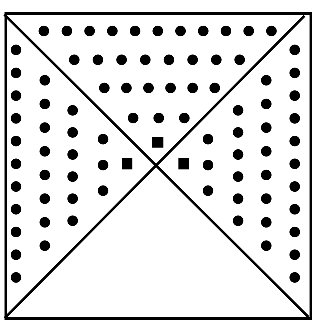
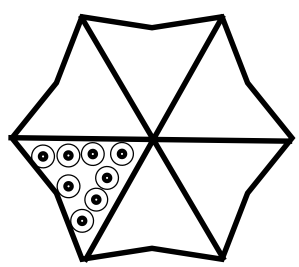
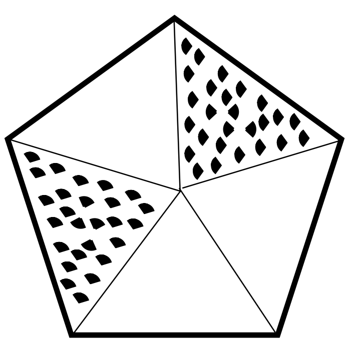
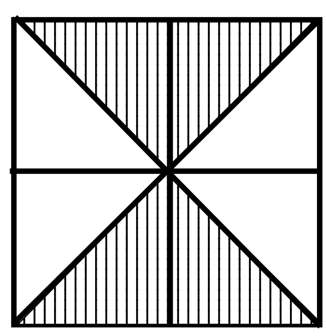
$0.391\overline{91} = \frac{388}{990}$ $0.562\overline{62} = \frac{557}{990}$

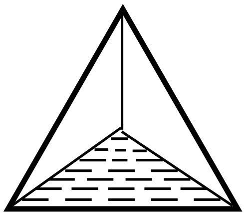
17. Use the pattern to determine the ratio equivalent to:

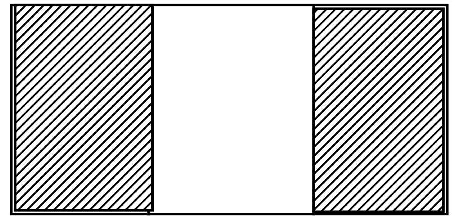
$0.62222\overline{2} =$ _______ $0.37171\overline{71}\ldots =$ _______

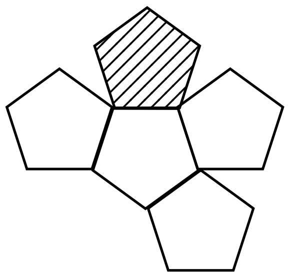
18. Can you determine a ratio equivalent to $0.4315\overline{315}$? _______________

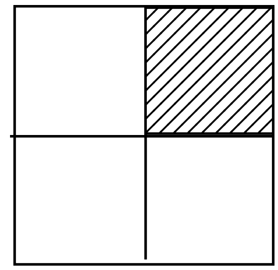
$\frac{1}{12}$	$\frac{1}{2}$
$\frac{1}{10}$	$\frac{1}{3}$
$\frac{5}{8}$	$\frac{1}{4}$
$\frac{1}{8}$	$\frac{2}{3}$
$\frac{3}{4}$	$\frac{1}{5}$

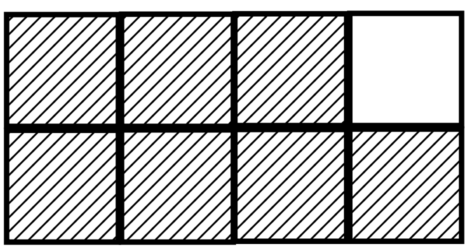
$\frac{2}{5}$	
$\frac{1}{6}$	
$\frac{7}{8}$	
	
	

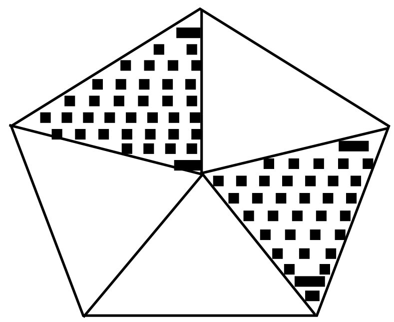












$$\frac{2}{16}$$

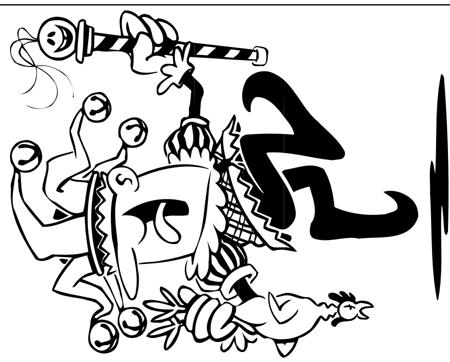
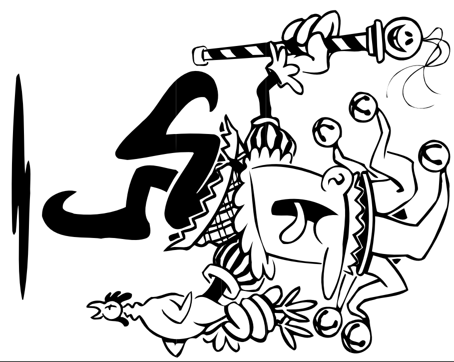
$$\frac{3}{24}$$

$$\frac{6}{8}$$

$$\frac{9}{12}$$

$\frac{8}{12}$	$\frac{4}{20}$
$\frac{4}{6}$	$\frac{2}{10}$
$\frac{6}{12}$	$\frac{5}{10}$
$\frac{3}{12}$	$\frac{4}{12}$
$\frac{2}{8}$	$\frac{2}{6}$

$\frac{2}{12}$	$\frac{3}{18}$
$\frac{21}{24}$	$\frac{14}{16}$
$\frac{15}{24}$	$\frac{10}{16}$
$\frac{3}{36}$	$\frac{3}{30}$
$\frac{2}{24}$	$\frac{2}{20}$

10 %	**25 %**
$\frac{4}{10}$	$\frac{6}{15}$
	
60 %	**30 %**
75 %	**40 %**

70 %	$33\frac{1}{3}$%
80 %	33 %
.1 %	66 %
.10 %	$66\frac{2}{3}$%
.40 %	.50 %

Understand the problem.

Is there enough information?
Read the problem again.
Draw a picture.
What do I know.
What am I looking for?
Read the problem again.

Devise a plan.

Have I ever seen a problem like this before?
Can I simplify the problem?
Is there a pattern?
Can I make a table? draw a picture? workbackward?
What about guess and check? make a list?
Can I write a number sentence?
Read the problem again.

Carry out the plan.

Remember what I'm looking for.
Is this plan taking me where I need to go?
Read the problem again.
Do I need a new plan?

Look back.

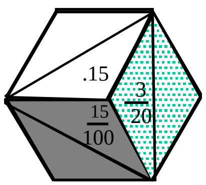
Did I answer the question?
Does my answer make sense?
Can I solve this problem any other way?
Read the problem again.

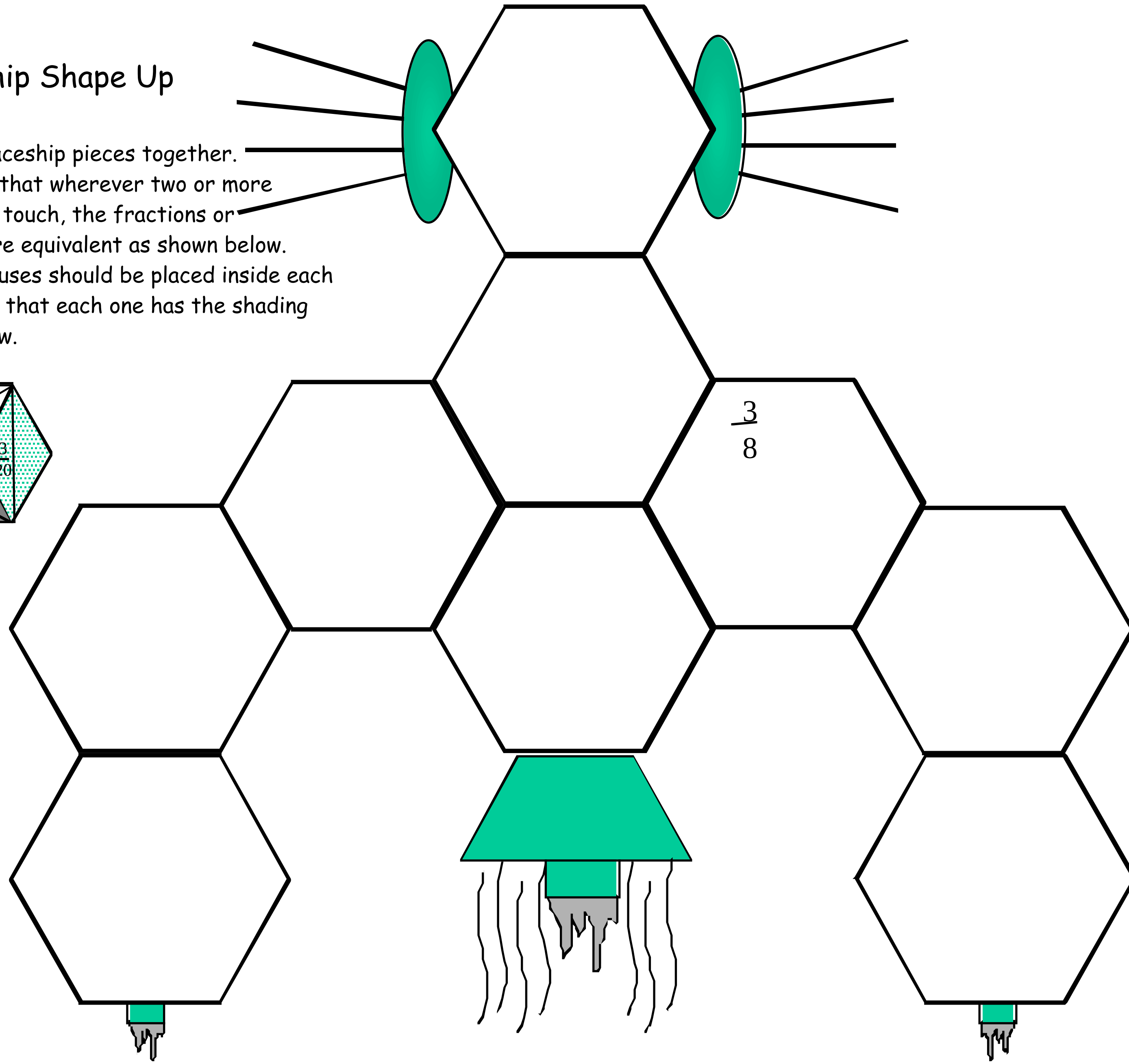
Name ______________ Date ______________

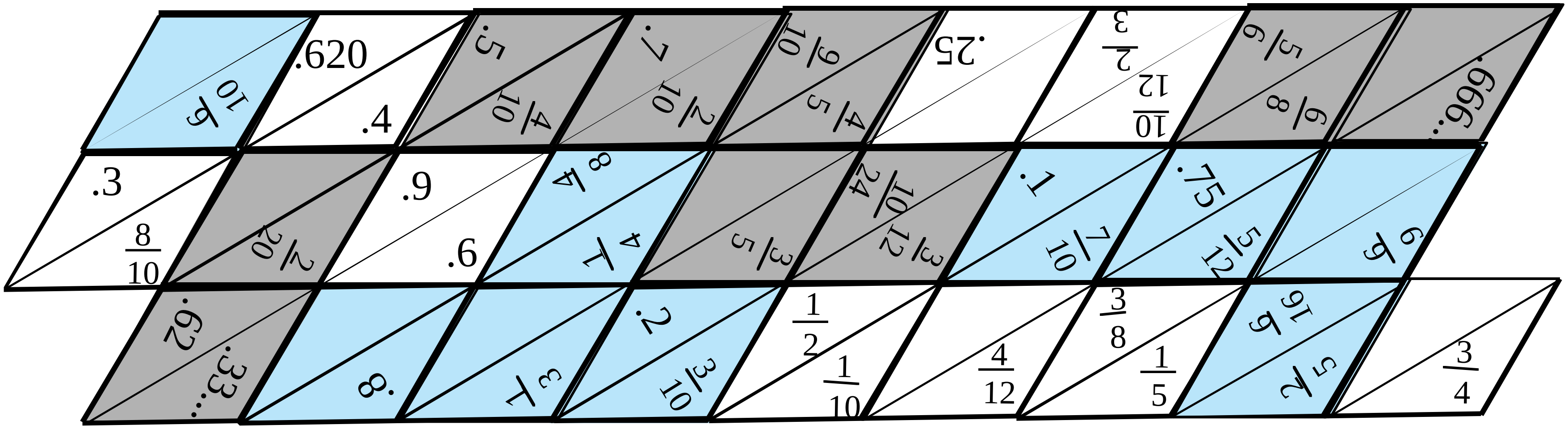
Space Ship Shape Up

Spaceship Shape Up

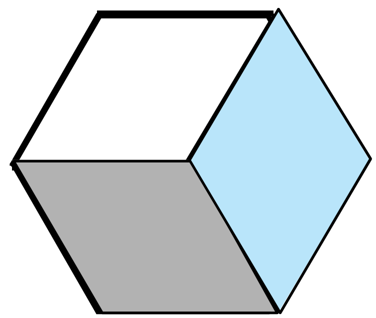
Put the spaceship pieces together. Make sure that wherever two or more rhombuses touch, the fractions or decimals are equivalent as shown below. The rhombuses should be placed inside each hexagon so that each one has the shading shown below.



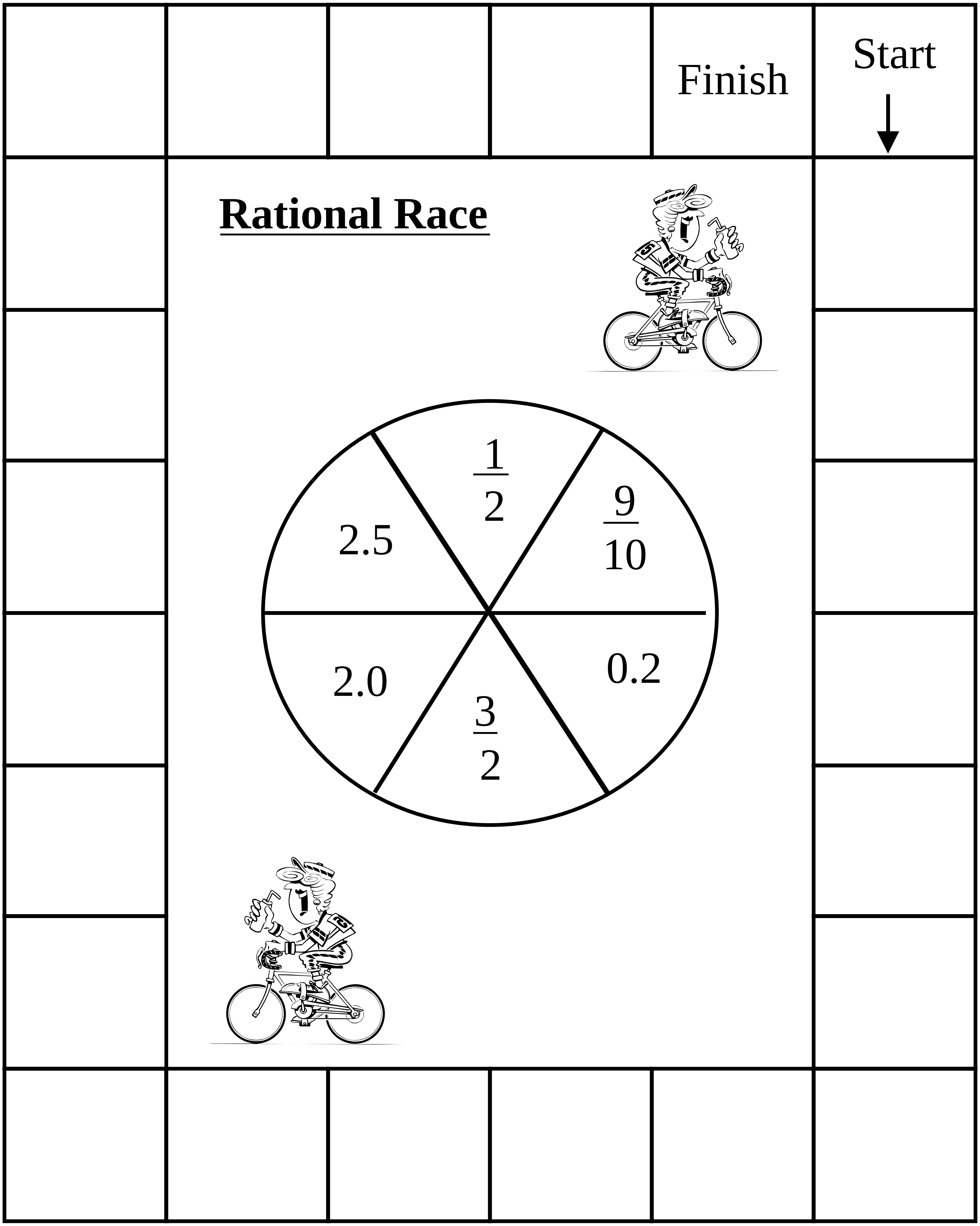




Each completed hexagon should have the shading shown here. That is, white at the top, darker shade at the bottom, and medium shade at the right side.



Rational Race



Rational Number Cards

0.01	$\frac{1}{20}$	$\frac{1}{10}$
$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$
0.3	$\frac{1}{3}$	$\frac{2}{5}$
0.5	$\frac{3}{5}$	$\frac{2}{3}$

Rational Number Cards

$\frac{7}{10}$	$\frac{3}{4}$	$\frac{4}{5}$
$\frac{9}{11}$	$\frac{8}{9}$	0.9
1.0	$\frac{6}{5}$	$\frac{5}{4}$
$\frac{4}{3}$	$\frac{7}{5}$	$\frac{3}{2}$

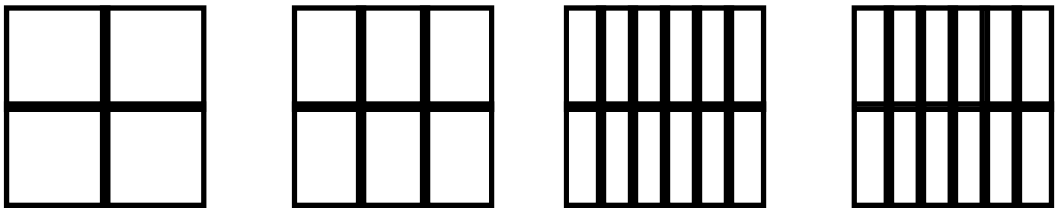
Rational Number Cards

$\frac{5}{3}$	$\frac{7}{4}$	$\frac{9}{5}$
1.9	$\frac{12}{6}$	2.1
$\frac{11}{5}$	$\frac{9}{4}$	$\frac{7}{3}$
2.4	$\frac{5}{2}$	$\frac{8}{3}$

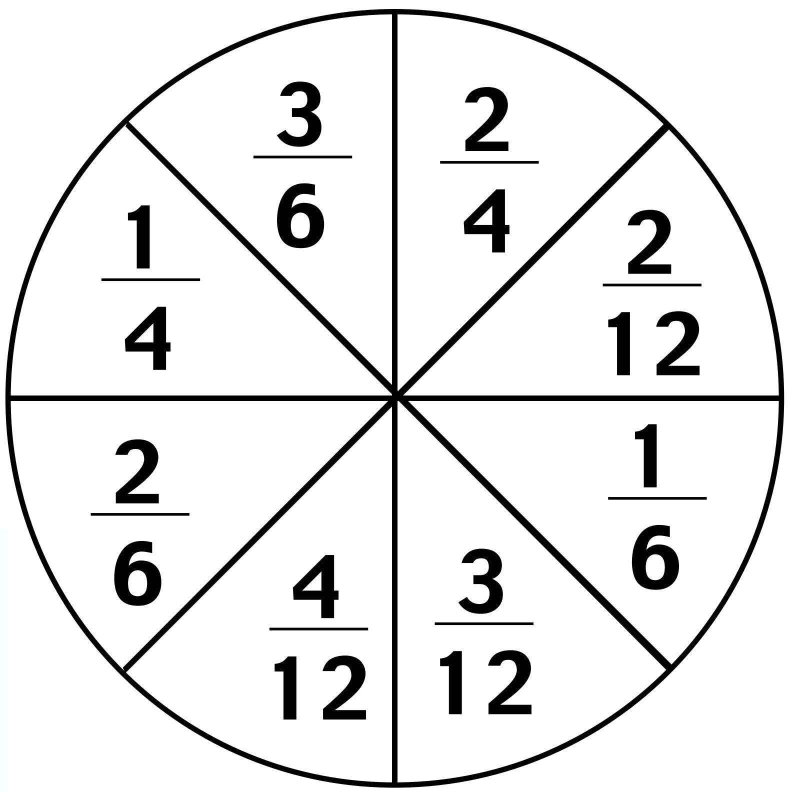
Name____Date__________

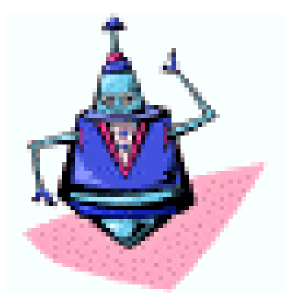
Robot Packing Company

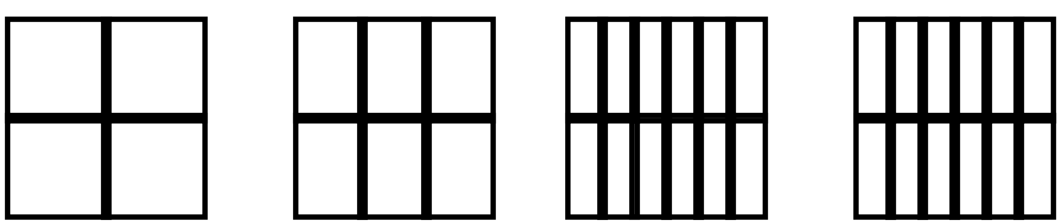
The robots are racing to see who can finish packing first. They have four cartons to fill. One is divided into four parts, one into 6, and two of them are divided into twelve parts. On his turn, each robot spins the spinner and fills a crate with the amount of packing material specified. The robots take turns until one of them can't pack the fractional amount on the spinner. At the end of the game, the robot with the most packed is the winner.



Amount packed ____________ **Amount empty** ____________________________

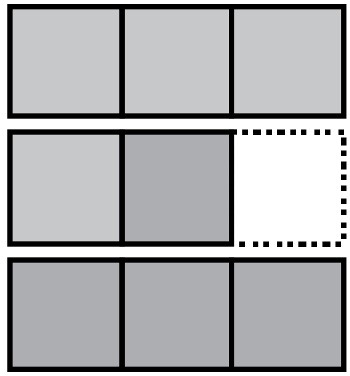
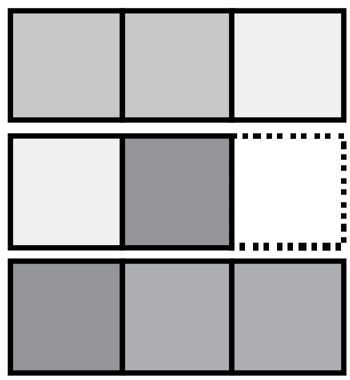
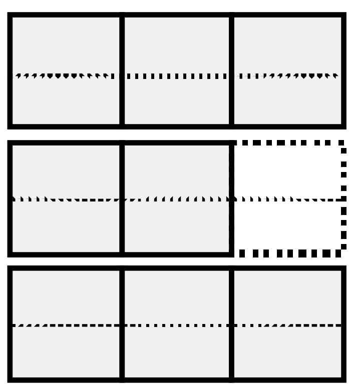




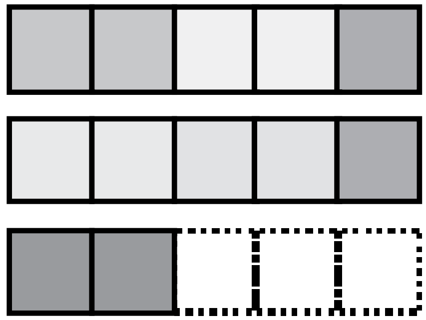
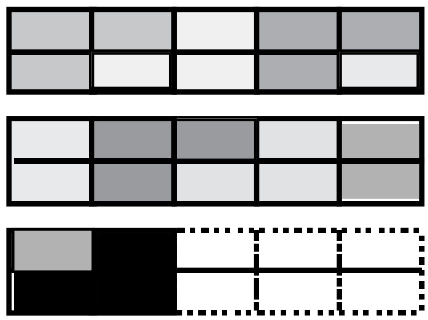
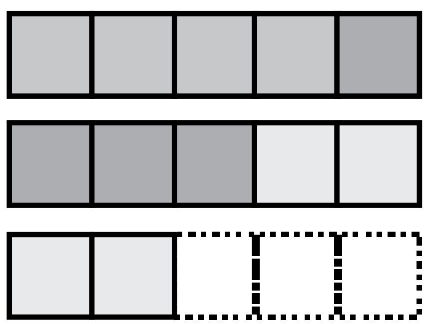


Amount packed ____________ **Amount empty** ____________________________

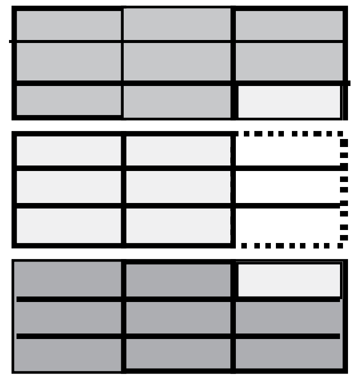
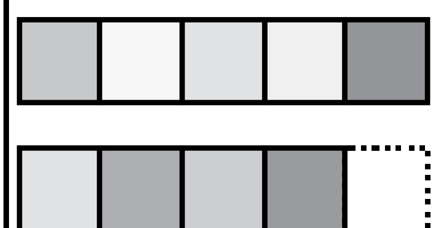
Division of Mixed Numbers with Models

$2\ ^{2}/_{3} \div\ 2$		$1\ ^{1}/_{3}$
$2\ ^{2}/_{3} \div\ 4$		$^{2}/_{3}$
$2\ ^{2}/_{3} \div\ ^{1}/_{6}$		16

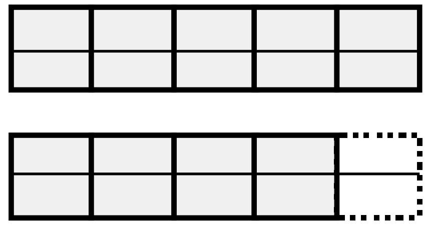
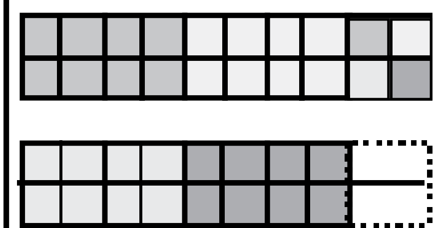
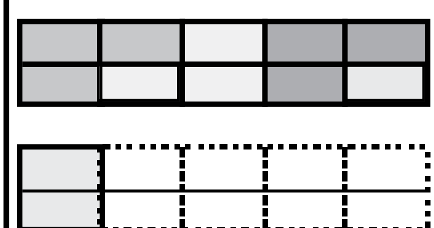
Division of Mixed Numbers with Models

$2\,{}^{2}/_{5} \div 6$		${}^{2}/_{5}$
$2\,{}^{2}/_{5} \div {}^{3}/_{10}$		8
$2\,{}^{2}/_{5} \div 3$		${}^{4}/_{5}$

Division of Mixed Numbers with Models

$2\,{}^{2}/_{3} \div 3$		${}^{8}/_{9}$
$1\,{}^{4}/_{5} \div 3$		${}^{3}/_{5}$
$1\,{}^{4}/_{5} \div 9$		${}^{1}/_{5}$

Division of Mixed Numbers with Models

$1\frac{4}{5} \div \frac{1}{10}$		18
$1\frac{4}{5} \div 4$		$\frac{9}{20}$
$1\frac{1}{5} \div \frac{3}{10}$		4

Multiplication and Division of Fractions Square Puzzle

Top: $3/4$ Left: $7/12$ Right: $5/12$ Bottom: $1/2 \times 3/4$	Top: $3/7$ Left: $5/9 \times 3/4$ Right: $3/8 \div 3/4$ Bottom: $5/18$	Top: $5/6$ Left: $1/2$ Right: $1/8 \div 3/5$ Bottom: $1/3 \div 3/4$	Top: $3/10$ Left: $5/24$ Right: $3/5$ Bottom: $5/12 \times 3/4$
Top: $3/8$ Left: $7/8$ Right: $3/5 \div 3/4$ Bottom: $5/12 \div 2/3$	Top: $5/12 \times 2/3$ Left: $4/5$ Right: $3/32$ Bottom: $1/6 \div 3/4$	Top: $4/9$ Left: $1/8 \times 3/4$ Right: $3/10 \div 3/4$ Bottom: $1/3$	Top: $5/16$ Left: $2/5$ Right: $4/13$ Bottom: $1/3 \times 3/4$
Top: $5/8$ Left: $1/9$ Right: $1/8 \times 3/5$ Bottom: $1/8$	Top: $2/9$ Left: $3/40$ Right: $3/5 \times 3/4$ Bottom: $5/12 \div 3/4$	Top: $5/12 \times 4/5$ Left: $9/20$ Right: $9/40$ Bottom: $1/2 \div 3/4$	Top: $1/4$ Left: $3/10 \times 3/4$ Right: $7/13$ Bottom: $25/48$
Top: $1/6 \times 3/4$ Left: $7/9$ Right: $1/6$ Bottom: $8/13$	Top: $5/9$ Left: $1/8 \div 3/4$ Right: $5/6 \div 3/4$ Bottom: $7/15$	Top: $2/3$ Left: $20/27$ Right: $3/8 \times 3/4$ Bottom: $7/11$	Top: $5/12 \div 4/5$ Left: $9/32$ Right: $9/17$ Bottom: $4/7$

Dominos for Multiplication and Division of Mixed Numbers

Instructions: When matching dominos, match stars to stars.

$1\frac{1}{3} \times 3\frac{1}{2}$	$1\frac{1}{2} \times 3\frac{1}{2}$	$4\frac{2}{3}$ $1\frac{1}{6}$	$3\frac{1}{6}$	$6\frac{1}{3} \div 2$	$\frac{20}{33}$
$2\frac{4}{9}$	$2\frac{1}{3} \div 2$	$1\frac{1}{3} \div 2\frac{1}{5}$	$2\frac{1}{3} \div 1\frac{1}{3}$	$1\frac{3}{4}$	$3\frac{1}{2} \div 1\frac{1}{3}$
$2\frac{5}{8}$	$1\frac{4}{5} \times 2\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{3} \times 1\frac{3}{8}$	$2\frac{1}{3} \div 1\frac{3}{8}$	$1\frac{5}{6}$
$6\frac{1}{3} \div 1\frac{2}{3}$	$1\frac{23}{33}$	$2\frac{1}{5}$ $3\frac{5}{7}$	$3\frac{4}{5}$	5	$1\frac{6}{7} \times 2$
$\frac{7}{9}$	$2\frac{3}{4} \div 1\frac{1}{4}$	$3\frac{2}{9}$	$1\frac{3}{4} \div 2\frac{1}{4}$	$8\frac{2}{3}$	$7\frac{1}{4} \div 2\frac{1}{4}$
$1\frac{2}{3} \times 2\frac{3}{8}$	$4\frac{1}{3} \div \frac{1}{2}$	$5\frac{1}{4} \div 1\frac{1}{2}$	$3\frac{23}{24}$	$3\frac{1}{2}$	$3\frac{2}{3} \div 1\frac{1}{2}$

Name____Date__________

Decimal Dice

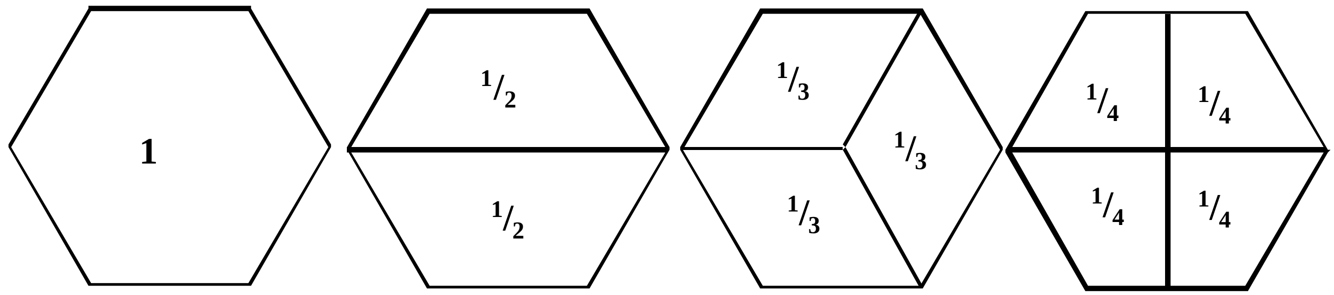
Targets Team 1			Targets Team 2		
Target	**Problem**	**Value**	**Target**	**Problem**	**Value**
0.1			**0.1**		
0.2			**0.2**		
1			**1**		
2			**2**		
10			**10**		
20			**20**		
100			**100**		
200			**200**		
BigBoy			**BigBoy**		

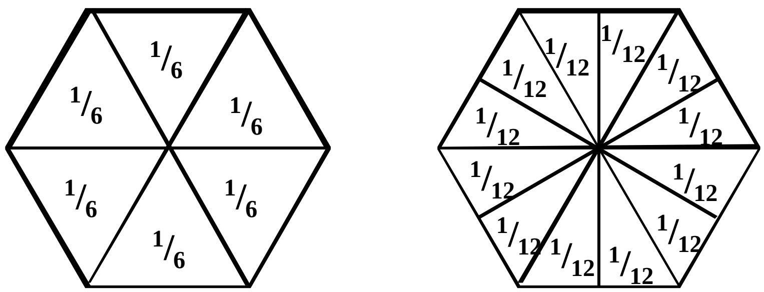
Addition and Subtraction of Fractions Square Puzzle

$\frac{5}{12}$ $\frac{1}{2}$ $\frac{1}{9}$ $\frac{13}{15} - \frac{1}{3}$	$\frac{7}{10}$ $\frac{7}{9} - \frac{2}{3}$ $\frac{3}{8} - \frac{1}{3}$ $1\frac{1}{12}$	$\frac{4}{10}$ $\frac{1}{24}$ $\frac{1}{8} + \frac{1}{5}$ $\frac{1}{3} - \frac{1}{9}$	$\frac{3}{10}$ $\frac{13}{40}$ $\frac{4}{5}$ $\frac{5}{12} + \frac{3}{4}$
$\frac{8}{15}$ $\frac{2}{5}$ $\frac{3}{5} - \frac{2}{9}$ $\frac{11}{12} - \frac{2}{3}$	$\frac{5}{12} + \frac{2}{3}$ $\frac{17}{45}$ $\frac{19}{45}$ $\frac{5}{6} - \frac{1}{2}$	$\frac{1}{6}$ $\frac{1}{5} + \frac{2}{9}$ $\frac{3}{10} - \frac{1}{5}$ $\frac{2}{3}$	$1\frac{1}{6}$ $\frac{1}{10}$ $\frac{1}{5}$ $\frac{7}{8} - \frac{3}{4}$
$\frac{1}{4}$ $\frac{5}{6}$ $\frac{1}{8} + \frac{3}{5}$ $\frac{11}{12}$	$\frac{1}{3}$ $\frac{29}{40}$ $\frac{3}{5} - \frac{1}{3}$ $\frac{5}{12} - \frac{1}{3}$	$\frac{11}{12} - \frac{1}{4}$ $\frac{4}{15}$ $\frac{9}{10}$ $\frac{1}{2} + \frac{3}{4}$	$\frac{1}{8}$ $\frac{3}{10} + \frac{3}{5}$ $\frac{7}{9}$ $\frac{3}{4}$
$\frac{1}{6} + \frac{3}{4}$ $\frac{3}{8}$ $\frac{14}{15}$ $\frac{4}{9}$	$\frac{1}{12}$ $\frac{1}{3} + \frac{3}{5}$ $\frac{5}{6} - \frac{1}{3}$ $\frac{5}{8}$	$1\frac{1}{4}$ $\frac{2}{9}$ $\frac{3}{5} + \frac{11}{15}$ $\frac{7}{8}$	$\frac{7}{12} + \frac{1}{6}$ $1\frac{1}{3}$ $\frac{5}{9}$ $\frac{3}{5}$

Name____Date____________

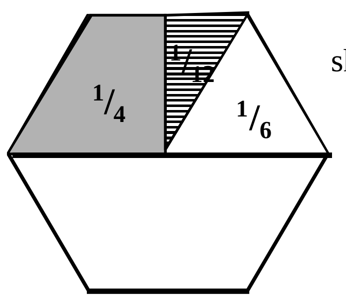
Fraction Blocks





Cut out these fraction pieces to help you find answers to the problems below.

I. This diagram



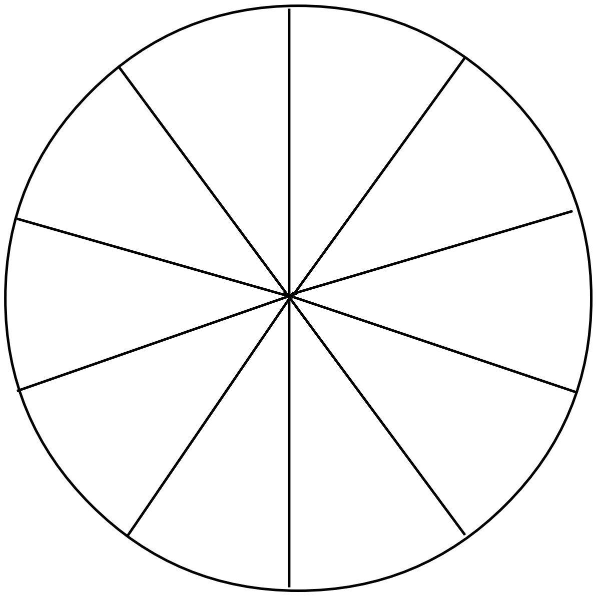
shows one way to make $^1/_2$. The number sentence is $^1/_{12} + {}^1/_6 + {}^1/_4 = {}^1/_2$.

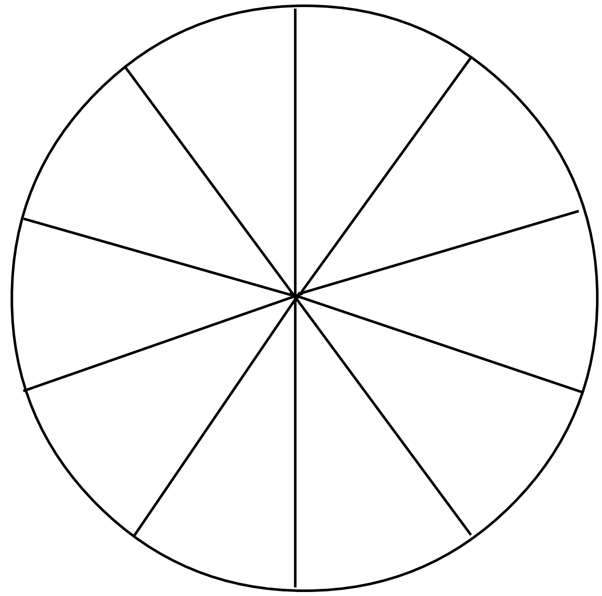
Find as many ways as possible to make $^1/_2$. Write the number sentences.

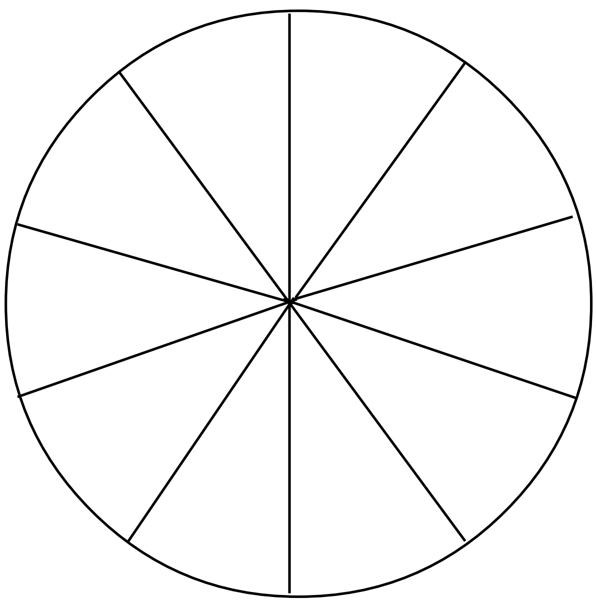
II. Use your pieces to solve these problems involving subtraction of fractions. Complete the subtraction table below.

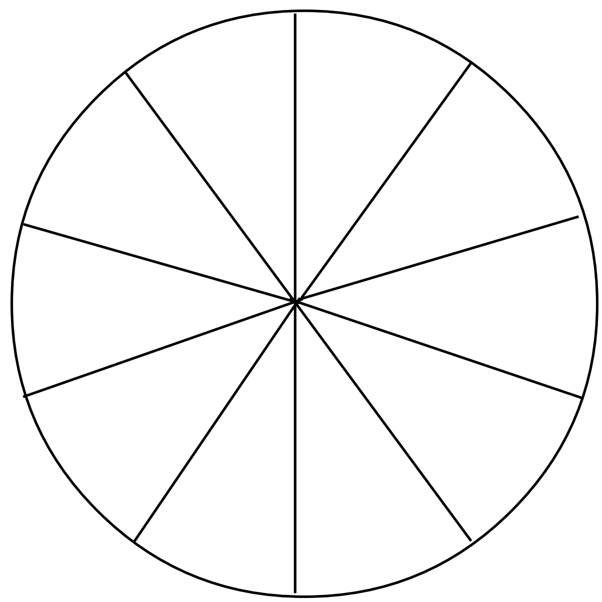
-	1	$^1/_2$	$^1/_3$	$^1/_4$	$^1/_6$	$^1/_{12}$
1						
$^1/_2$						
$^1/_3$						
$^1/_4$						
$^1/_6$						
$^1/_{12}$						

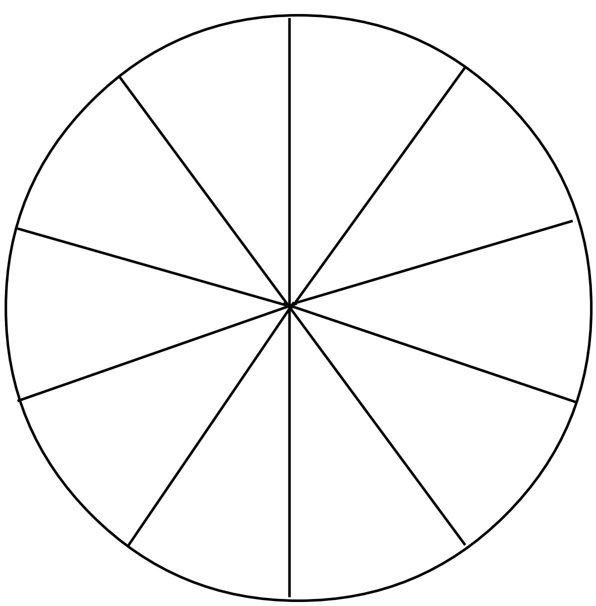
Tenths Recording Sheet

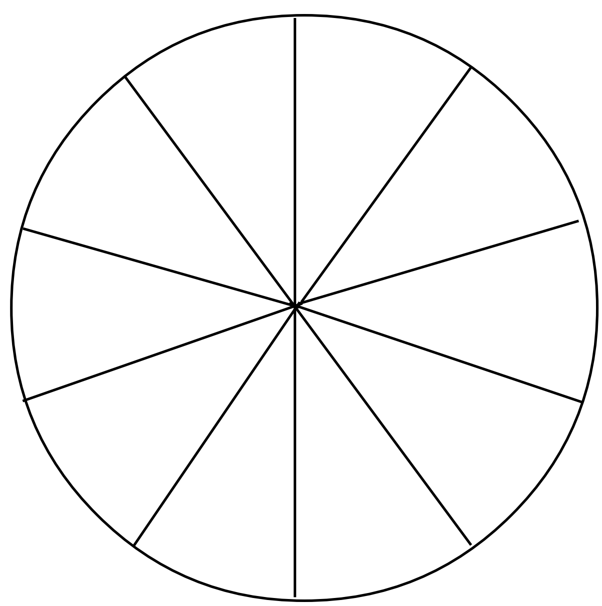




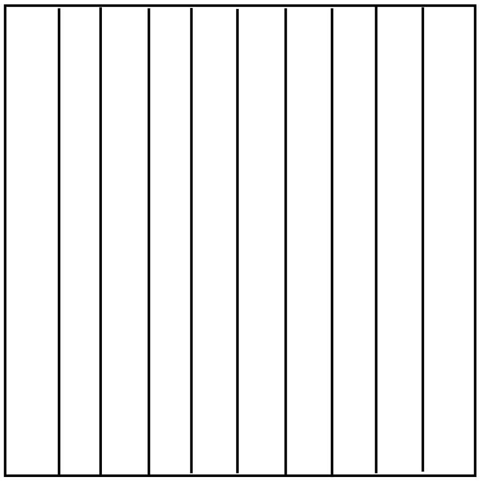


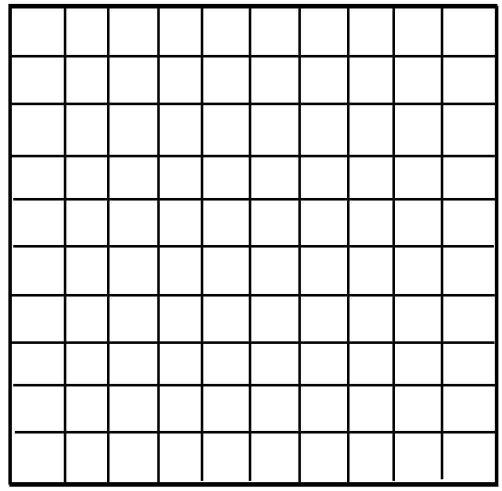


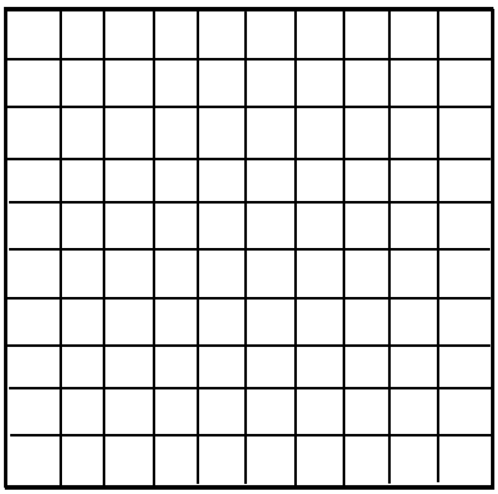


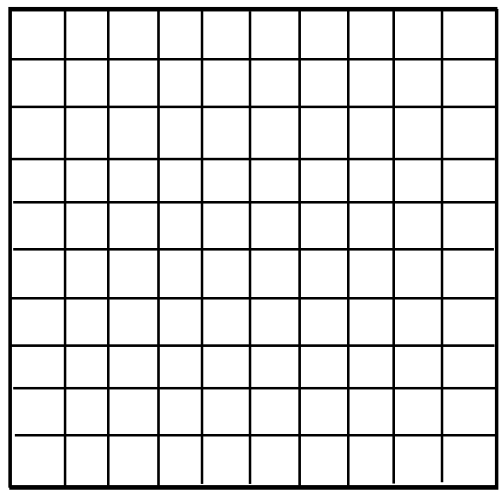


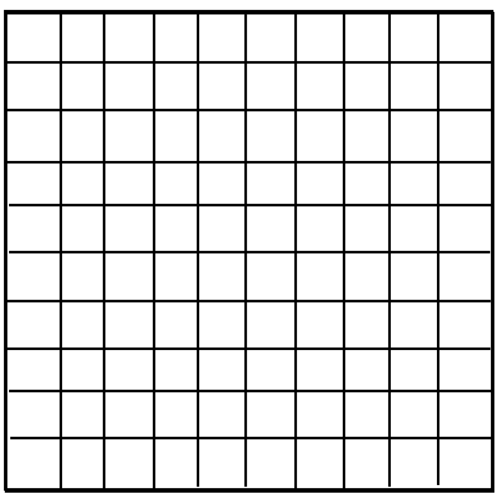
Tenths and Hundredths Recording Sheet

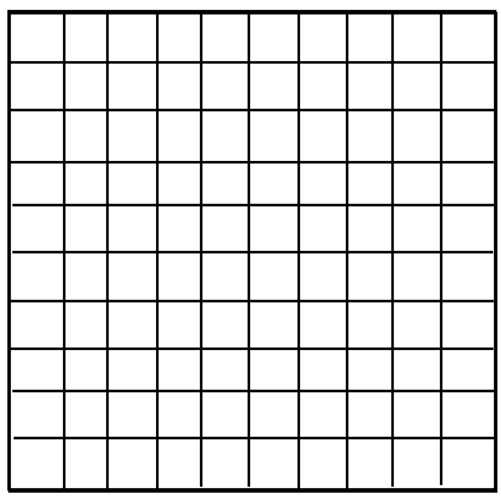












Name____Date____________

Recipe Workout

Complete the charts to reduce or increase the number of servings.

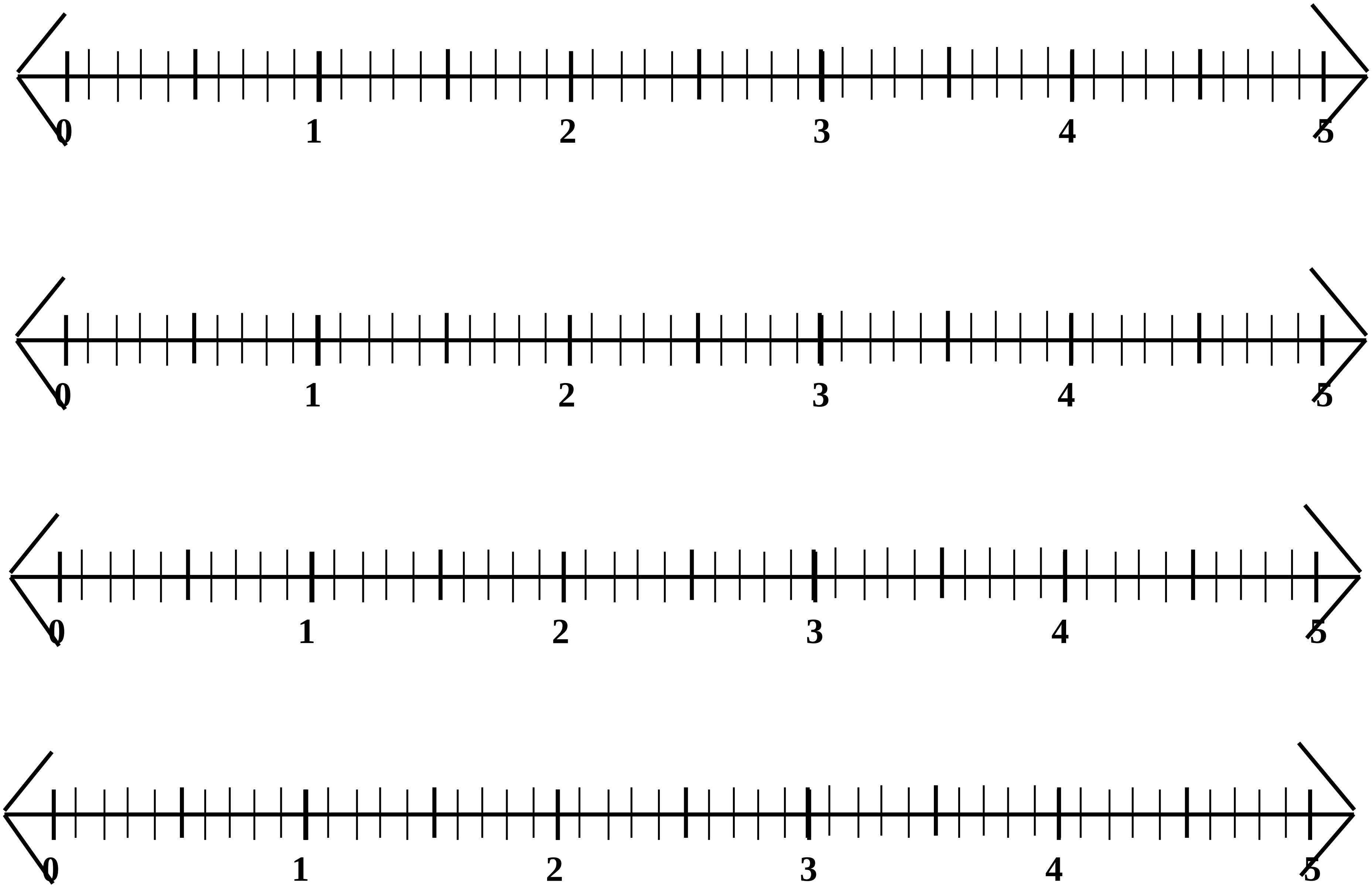
Chicken and Tortilla Casserole

Number of Servings	8	16	4	20	28
Number of boneless chicken breast halves	8				
Jars of salsa verde	1				
Cups of light sour cream	1				
Cups of half and half	1/2				
Corn tortillas	2				
Cups of shredded cheddar cheese	4				
Cups of grated parmesan cheese	1/3				

Chocolate Chip Cookies

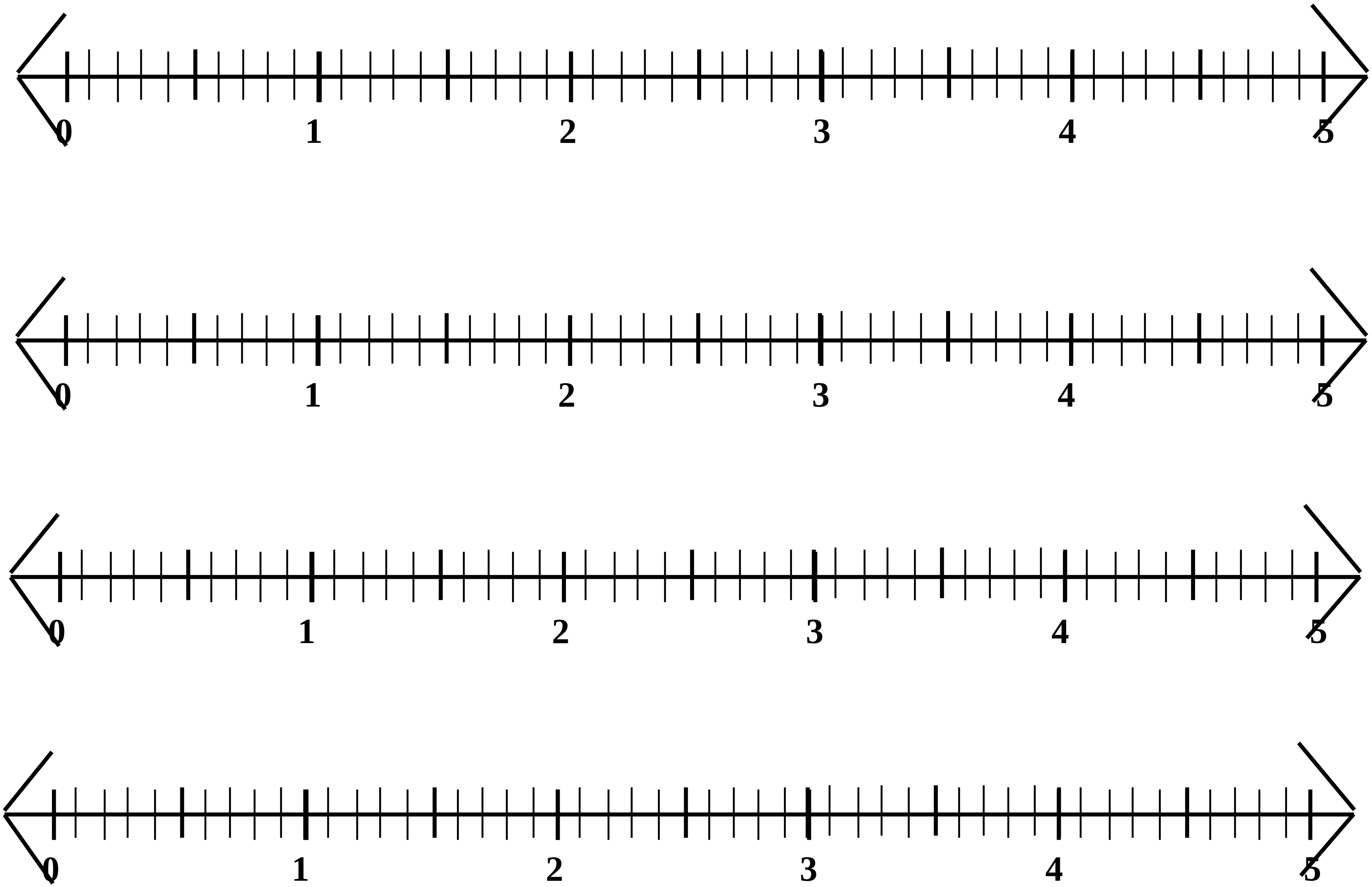
Dozens	5	2.5	15	7.5	12.5
Sticks of Butter	2				
Cups of granulated sugar	3/4				
Cups of brown sugar	3/4				
Eggs	2				
Teaspoons of vanilla	1				
Teaspoons of salt	1/2				
Teaspoons of baking soda	1				
Cups of flour	2 1/4				
Cups of chocolate chips	2				

Number Line Math Name____________________

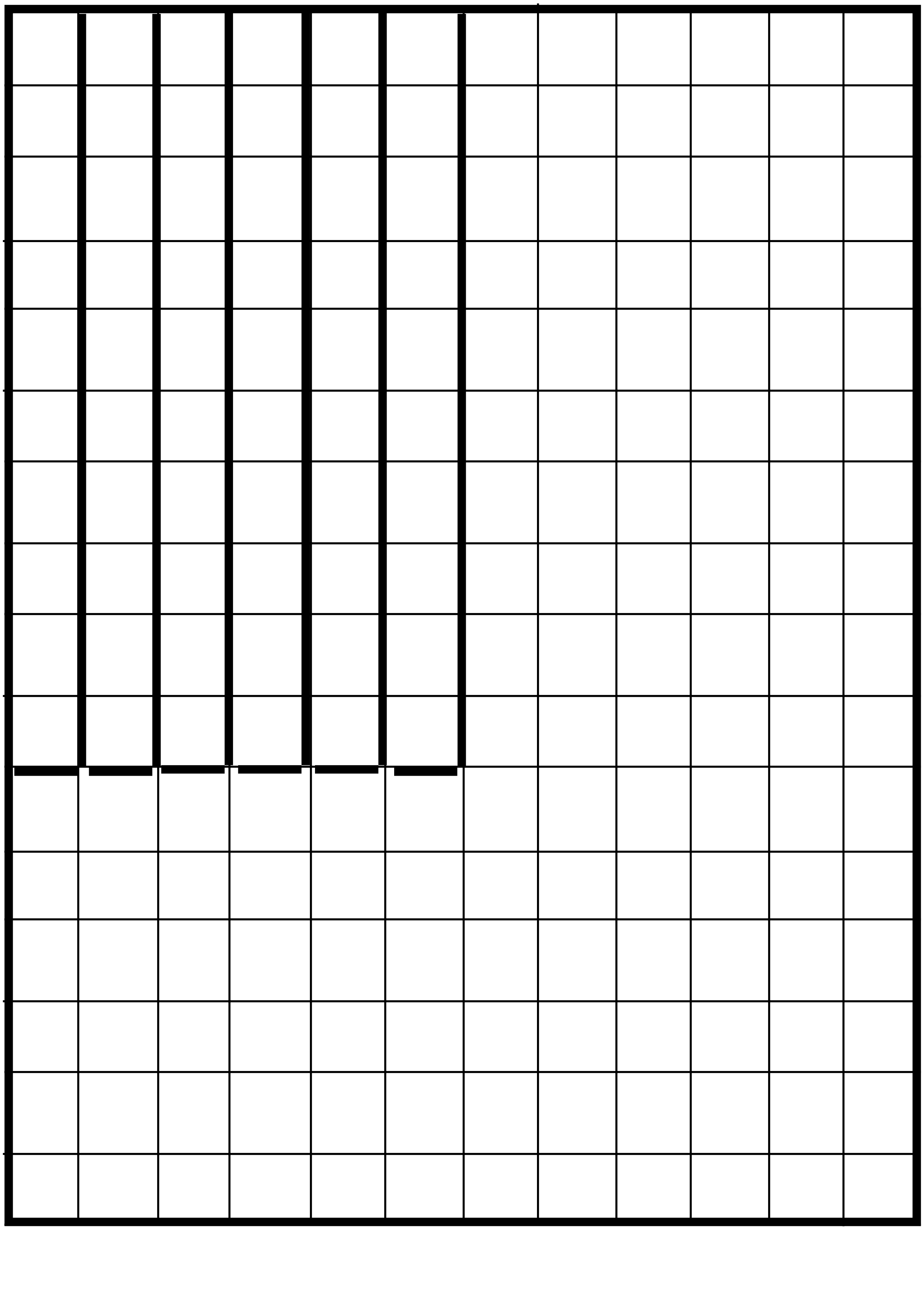


Number Line Math

Name________________________________



0.2	**3.6**
1.2	**0.3**
2.1	**1.5**
0.8	**1.9**
3.2	**2.6**



Problem Discussion Cards

Problem 1

Ralph and his brother are at a carnival. They separate from each other at the ferris wheel at 1:00 pm, and they agree that they will each check back at the ferris wheel from time to time to see whether the other is ready to leave. Ralph checks the ferris wheel every 15 minutes, and his brother, Joe, checks in every 24 minutes. At what time will they meet at the ferris wheel again?

Would it have been better if Joe had checked in every 25 minutes? When would they have met again? Explain.

Problem 2

The managers of a refreshment stand are going to buy hotdogs and buns. The buns come in packages of 24 or 30. The hotdogs come in packages of 18 or 40.

The owners want to buy enough of each so that there is exactly one bun for every hotdog with none left over. They have to order enough to make at least 400 hotdogs.

No matter which size package they buy, the buns cost ten cents each and the hotdogs cost 25 cents each. Which size package and how many of each should they buy to meet all their conditions?

Problem 3

Susan and Jim collect baseball cards. Susan has her cards in an album with two rows of five cards on each page. Jim's album has three rows of four cards on each page. They have the same number of cards, and neither of them has any empty spaces on a page. They have at least 400 cards. What is the smallest number of pages possible in each book?

Problem 4

A set of 100 open lockers is numbered from 1-100. Sarah comes by and closes all the lockers with even numbers. Then, Sarah walks past the lockers again and checks the ones numbered with multiples of 3. If the locker is closed, she opens it, if it is open, she closes it. She repeats this with the multiples of 4, 5, 6, … and so on to 100. When she has finished, which lockers will be open? Explain how you know.

Tax Collector

The object of this activity is to amass a greater sum than the tax collector's. Each student needs a gameboard and a set of number tiles called **Paychecks**. For each Paycheck selected, the student pays taxes in the form of the <u>factors</u> of the Paycheck. If no factors are available, the tax collector gets the whole Paycheck! Action continues until all number tiles or Paychecks are used. The tiles for the student and the tax collector are totaled and the greater sum wins.
Example: Student selects 10 and pays 1, 2, and 5 in taxes. Student selects 9 and pays 3 in taxes (1 is used). Student selects 6 and the tax collector gets it since 1, 2 and 3 are used. Play proceeds until all paychecks are gone.

Taxpayer	Tax Collector
	

<u>Totals</u>

	Taxpayer	Tax Collector
Round 1:	----------------	----------------
Round 2:	----------------	----------------
Round 3:	----------------	----------------
Round 4:	----------------	----------------

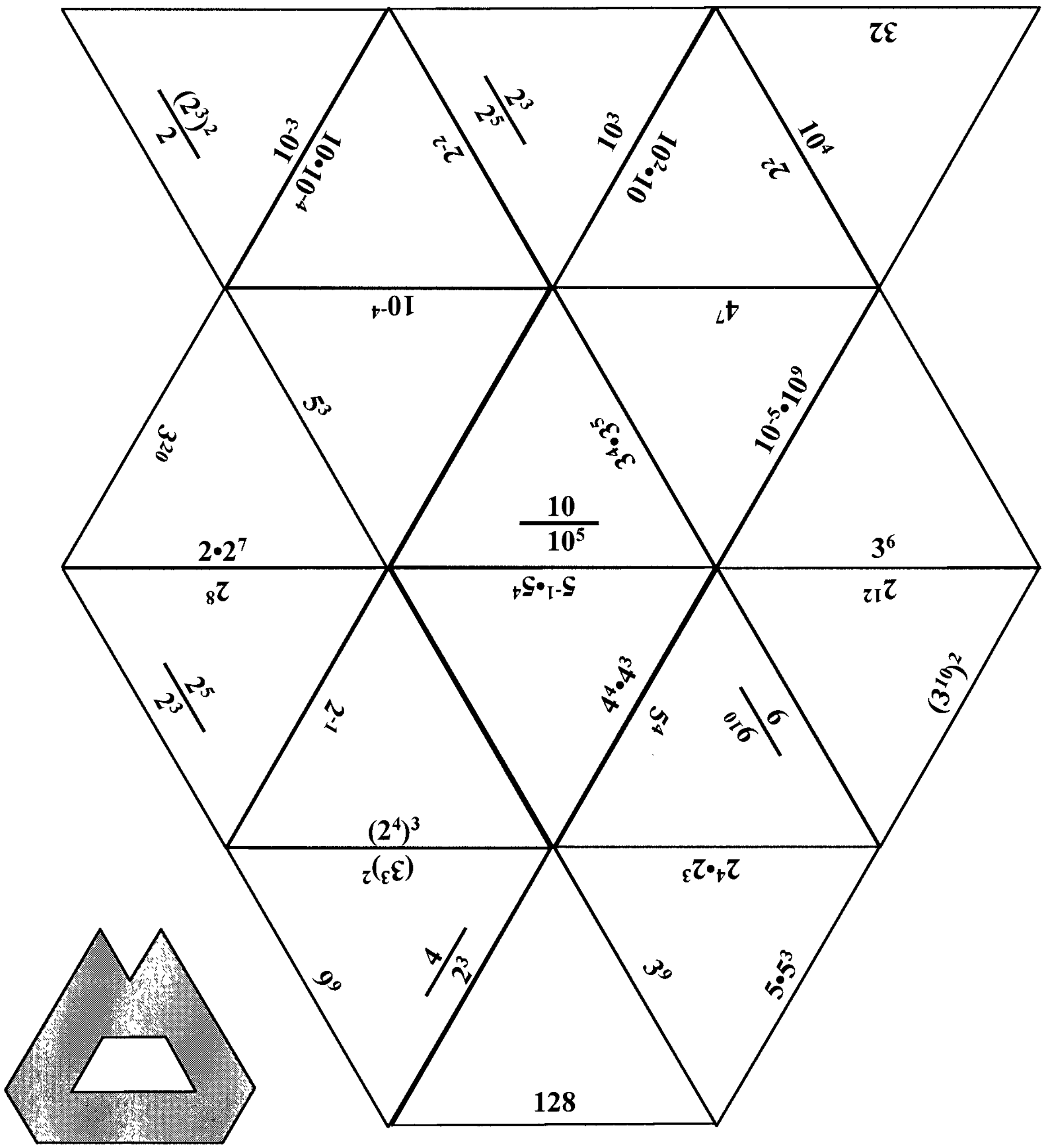
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24

25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

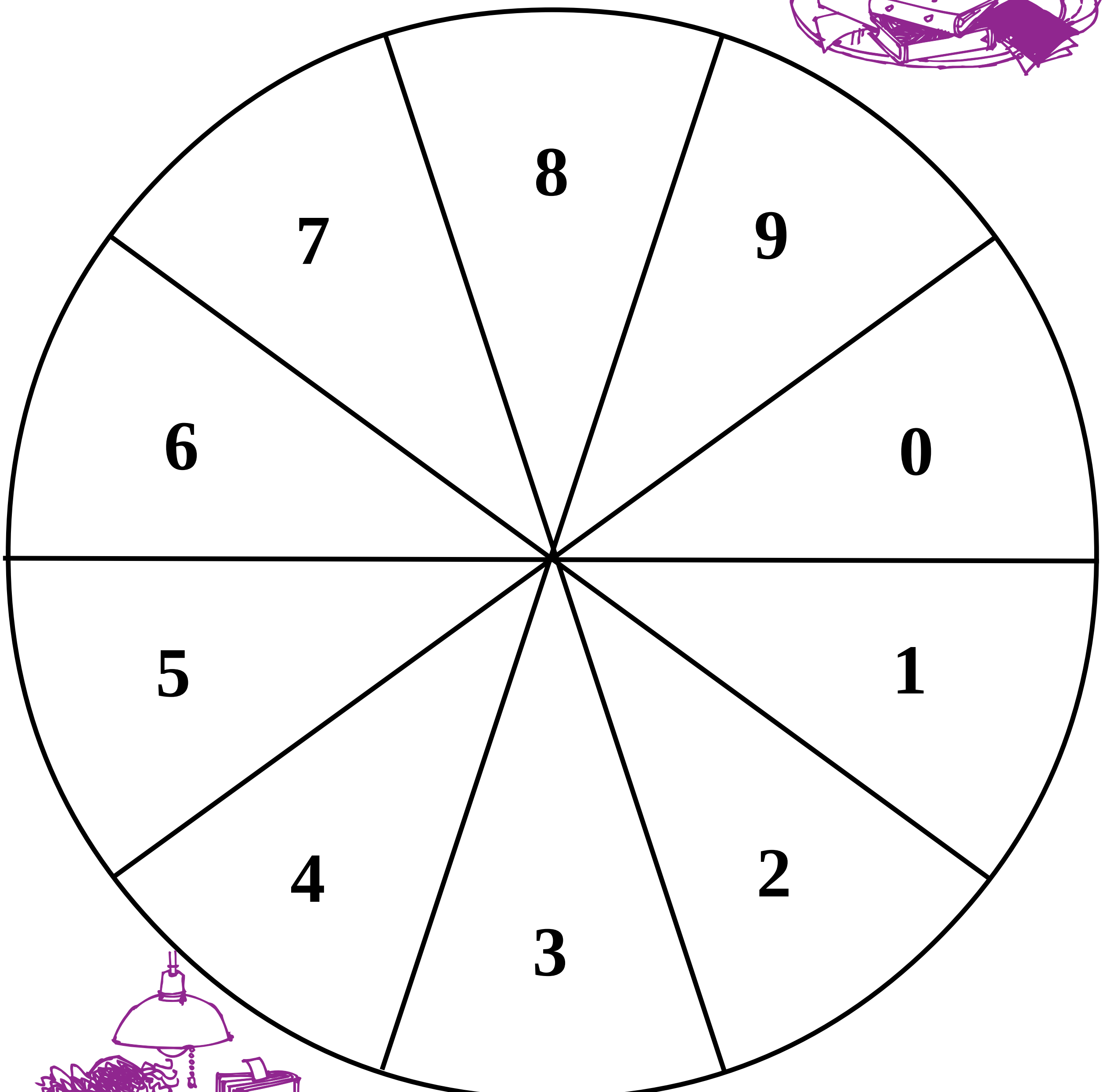
Rules of Exponents Triangle Puzzle

Cut the triangles apart. Reassemble the puzzle so that touching edges have equivalent expressions. The result should be the shape shown in miniature below.



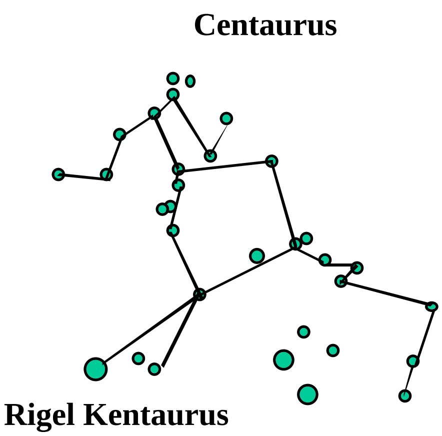
$3x^2$	$n^3 - n^2$	n^2
$\frac{n^4}{5}$	$a^2 - a$	$2x^2 + 1$
$x^2 + x$	$x^2 + 4$	$\frac{r^2 + 5}{2}$
$\frac{h^3 + h^2}{4}$	$w^3 + 8$	x^4
$5x^3$	$2x^2 + 10$	x^3
$-2x^2$	$2m^2 + 4.9$	$n^3 - 0.9$

EXPONENT EXPERTS



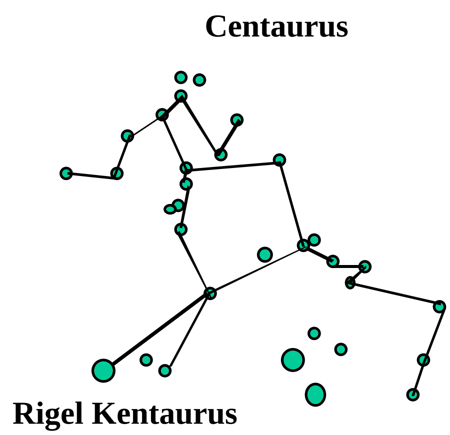
Kronos wants to travel from
Rigel Kentaurus to Earth.

The distance is 4.3 light years.

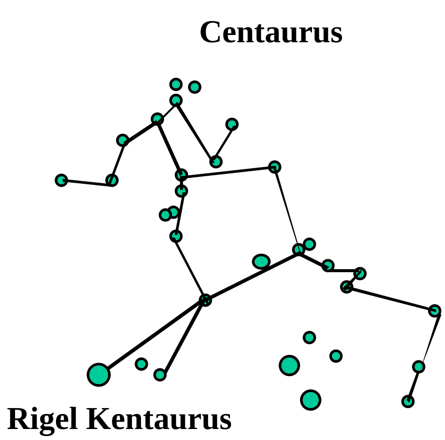


A light year is 5.9×10^{12} miles.

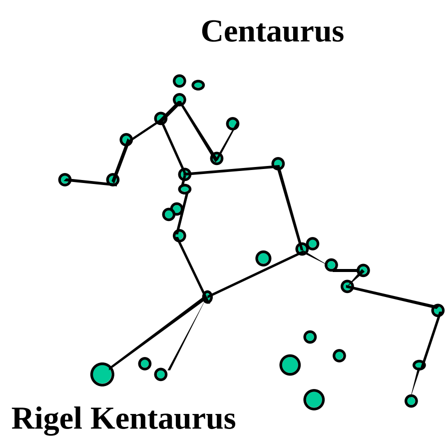
This is the distance light travels in one year.



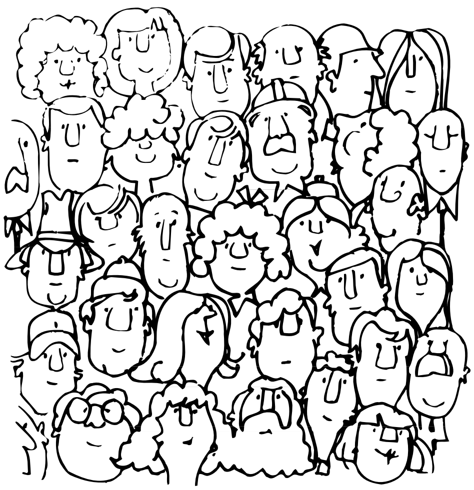
Kronos can travel at 1,000,000 miles per hour.



If he is 500 years old when he leaves Rigel Kentaurus, how old will he be when he reaches Earth?



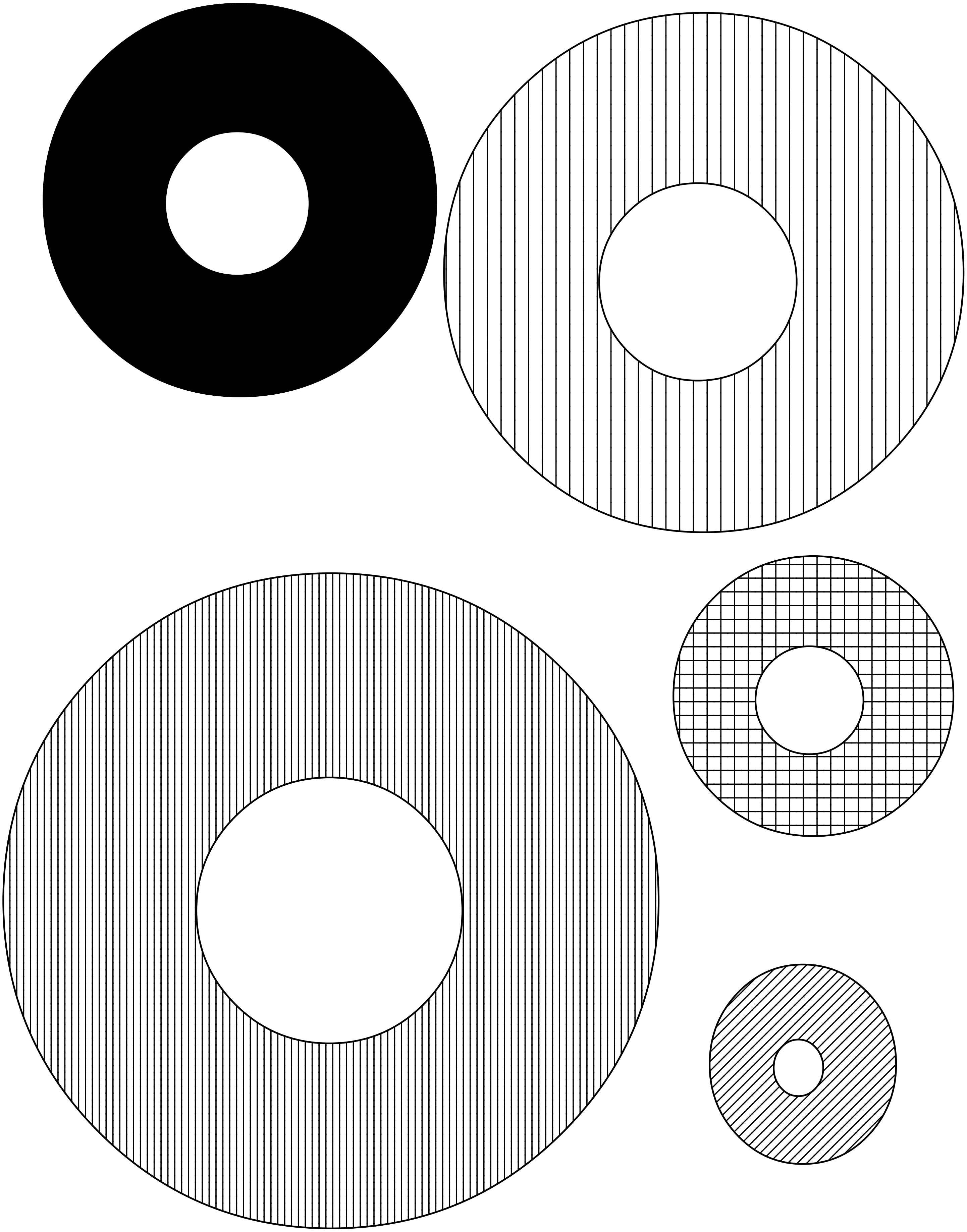
There are 2.6×10^8 people in the USA.

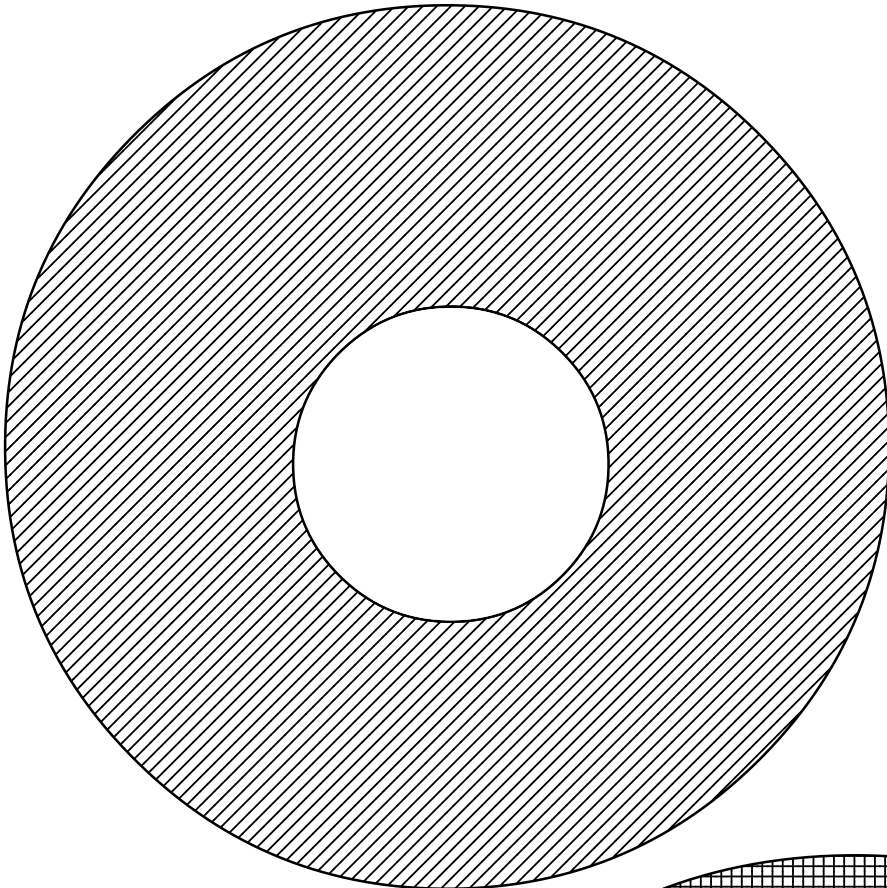


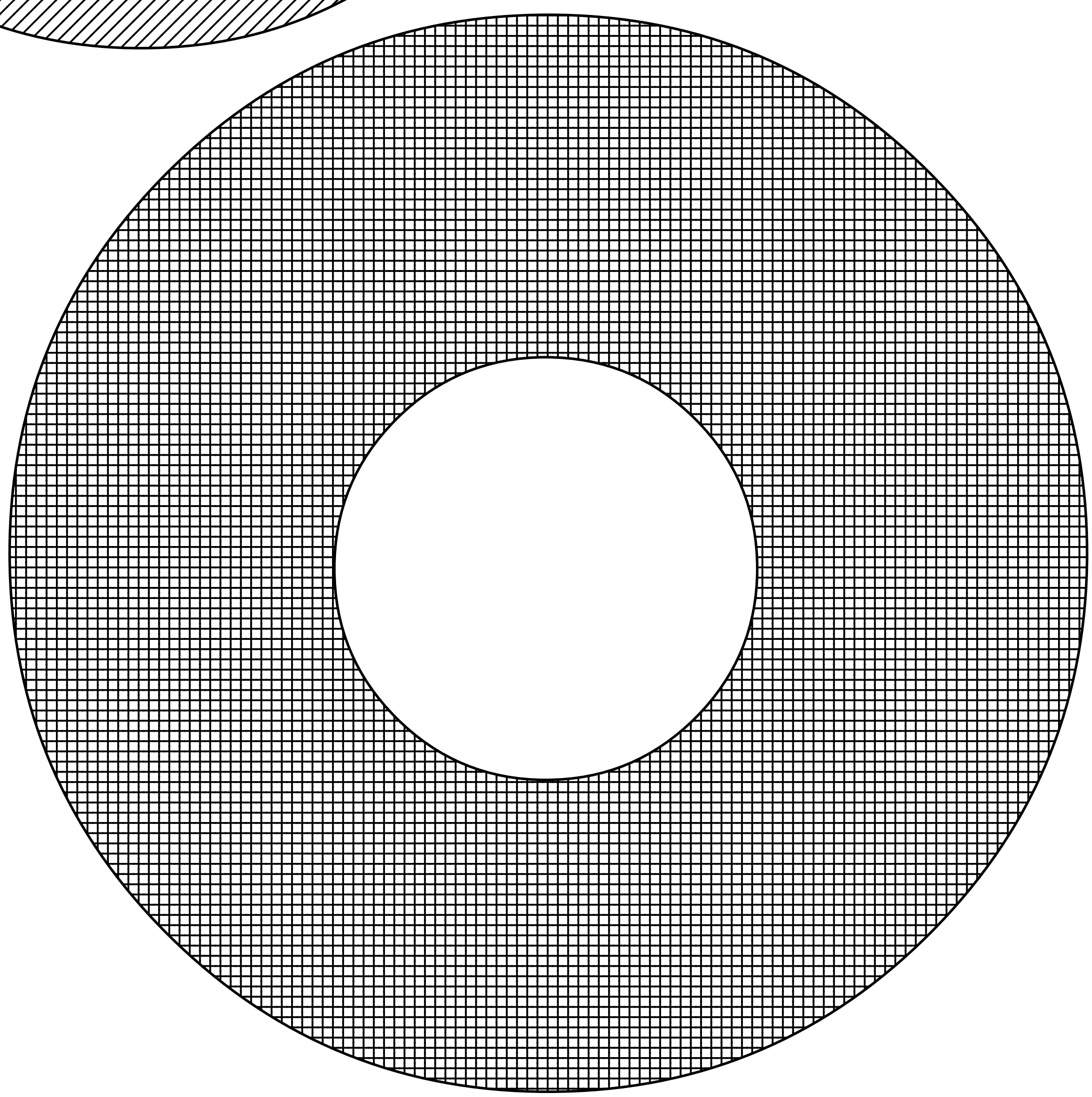
The average amount of soft drinks consumed per person in the United States is 44.1 gallons.

China has 1.3×10^9 people.

If we gave our yearly consumption of soft drinks to China, how much would there be for each person?

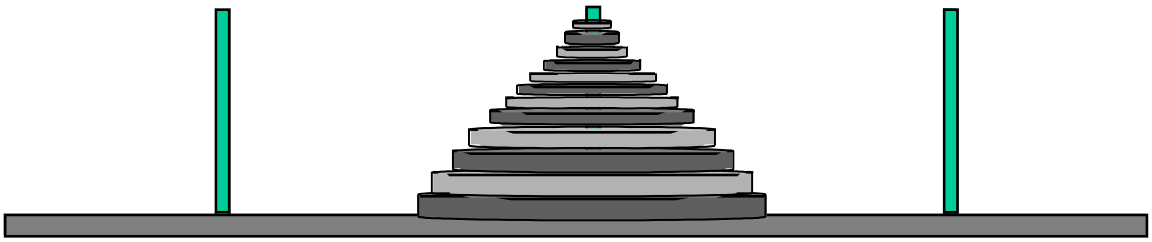






Name________________________________ Date_______________

Tower of Hanoi



There is an ancient legend that in the great tower of Hanoi there stand three diamond spindles. On the middle one there is a stack of 64 golden disks of different sizes, each one smaller than the one below it. Monks in the temple have the task of moving the disks from one spindle to another, but they can move only one disk at a time, and they can never place a larger disk on top of a smaller one. The legend says that when this task is complete, the temple will disappear in a clap of thunder and the world will end. If the monks are very efficient and move these disks in the quickest way possible with each move lasting only one second, how long do we have until the world ends?

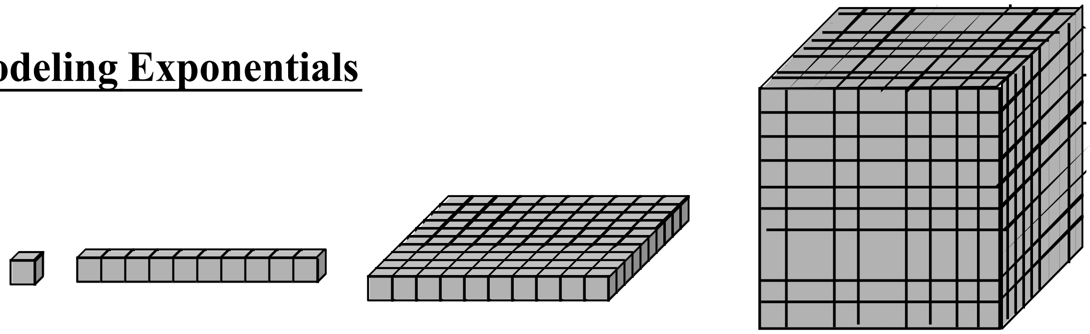
To find out how long we have until the world ends, start with a smaller problem and search for a pattern. If there was only one disk, how many moves would it take to transfer that? What if there were only two disks? Fill in the table below.

Number of disks	**Minimum number of moves**
1	___________
2	___________
3	___________
4	___________
5	___________
6	___________
7	___________

Can you find a pattern? According to the legend, how long do we have until the world ends?

Name____Date__________

Modeling Exponentials



1. The figures above represent Base-10 blocks. The smallest one is a single block. The long block is made of ten smaller blocks. The flat block is ten rows of ten or 100 small blocks. How many small blocks are in the big cube? __________

A manufacturer makes these types of blocks, but not always with ten on a side. When orders come in, his order blank looks like this with x representing the length of the long block.

x	***x***	$\boldsymbol{x^2}$	$\boldsymbol{x^3}$	**Cost**
2	_______	_______	_______	_______
3	_______	_______	_______	_______
4	_______	_______	_______	_______
5	_______	_______	_______	_______
10	_______	_______	_______	_______

This way, buyers can choose the size of block they want, and how many of each shape they need.

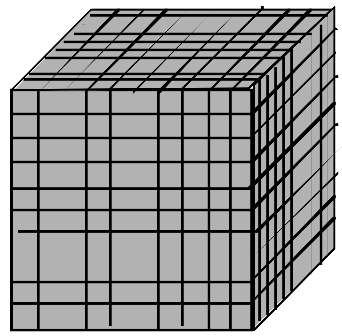
Each single block costs \$0.01.

2. If $x = 2$, sketch the different blocks below:

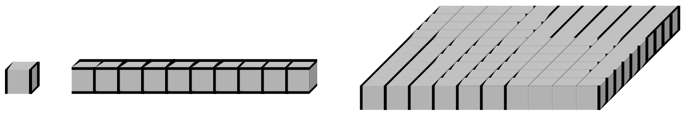
Single Long = x Flat = x^2 Big Cube = x^3.

3. What will be the cost of a long block and a flat ($x + x^2$)?

4. Will the cost of $x + x^2 = x^3$? Explain.



Modeling Exponentials - cont.



5. If $x = 3$, find the cost of each type of block.

Single Long = x Flat = x^2 Big Cube = x^3.

6. What will be the cost of a two long blocks? ($x + x$ or $2x$)

7. Will the cost of $x + x = x^2$? Explain.

8. When $x = 4$, find the cost of $3x^2 + 2x^3$.

9. When $x = 5$, find the cost of $10x + x^3$.

10. For which size block will $5x^2 = x^3$?

11. For which size block will $2x = x^2$?

12. Can you think of a block size where $x = x^2 = x^3$?

Scientific Notation Square Puzzle

3.01 3.1×10^2 120 210,000	2.01×10^5 1.2×10^2 2.01×10^2 3.1×10^1	1.03 201 1.2×10^5 3.1×10^6	130,000 120,000 21,000 1.03×10^1
2.1×10^5 1210 2.1×10^3 10,200	31 2100 1.02×10^1 3.01×10^3	3,100,000 10.2 2.01×10^4 1.3×10^4	10.3 20,100 1020 2.1×10^2
1.02×10^4 1,200,000 1.3×10^2 1030	3010 130 31,000 2.01×10^3	13,000 3.1×10^4 1.21×10^1 1.2×10^1	210 12.1 1.3 1.02×10^2
1.03×10^3 121 301,000 1.02	$.201 \times 10^4$ 3.01×10^5 1.3×10^3 2.1×10^1	12 $.13 \times 10^4$ 1.3×10^1 30,100	102 13 103,000 1.2×10^3

Name____Date__________

Mathematical Message - I

Write each number below in decimal from. Then place the numbers in numerical order.
When the numbers are in order, the code letters will spell out a message.

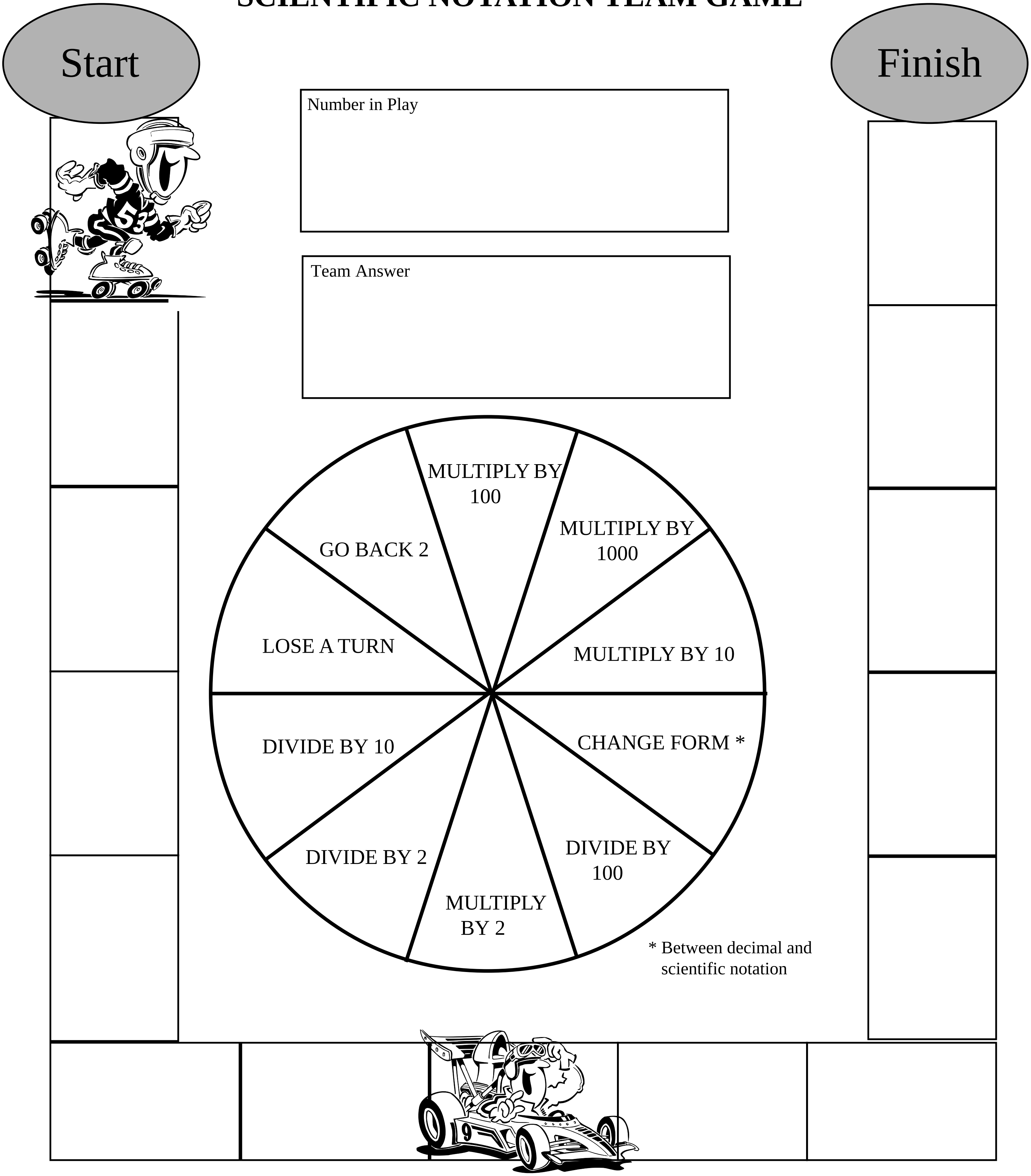
Exponential Form	Code Letter	Decimal Form	Numerical Order	Message
0.14×10^1	**H**	________	________	______
1.56×10^1	**A**	________	________	______
10.20×10^2	**R**	________	________	______
1.4×10^3	**O**	________	________	______
0.12×10^1	**A**	________	________	______
1.02×10^2	**space**	________	________	______
1.4×10^2	**E**	________	________	______
1.375×10^3	**O**	________	________	______
0.102×10^1	**M**	________	________	______
0.1145×10^2	**I**	________	________	______
1.2×10^2	**W**	________	________	______
1.32×10^4	**L**	________	________	______
1.02×10^1	**space**	________	________	______
10.84×10^1	**P**	________	________	______
11.45×10^2	**space**	________	________	______
0.132×10^1	**T**	________	________	______
1.2×10^3	**T**	________	________	______
1.2×10^1	**S**	________	________	______
1.145×10^2	**O**	________	________	______
0.14×10^2	**space**	________	________	______

Scientific Notation Square Puzzle

7,800 6.1×10^3 1.7×10^2 4.5×10^1	61,000 170 350 1×10^{-1}	4.5 3.5×10^2 7.8×10^2 4.2	6.1 780 0.42 0.0023
45 0.023 3500 0.078	0.1 3.5×10^3 1700 0.45	4.2×10^0 1.7×10^3 7.8×10^{-1} 23,000	2.3×10^{-3} 0.78 1.7×10^{-3} 610
7.8×10^{-2} 0.0045 2300 1×10^{-4}	4.5×10^{-1} 2.3×10^3 3.5×10^{-1} 7.8	2.3×10^4 0.35 0.045 1×10^{-2}	6.1×10^2 4.5×10^{-2} 350000 42
0.0001 2.3×10^{-1} 3.5×10^5 0.00017	7.8×10^0 350,000 2.3×10^{-4} 0.001	0.01 0.00023 0.17 7.8×10^1	4.2×10^1 1.7×10^{-1} 6.1×10^1 450

Cut out the squares above. Fit the squares together so that touching edges are equivalent.

SCIENTIFIC NOTATION TEAM GAME



* Between decimal and scientific notation

Name____Date___________

Interpreting Problems

Draw a picture of each situation below.

1. A scientist wants to study 24 stars. He studies $^1/_3$ of them one week, and $^1/_4$ of the remainder the next week. How many are left to study?

2. An observatory has selected 36 stars to study. Dr. Sagan studies $^2/_3$ of them, and Dr. Halley studies $^3/_4$ of them. What is the smallest number of stars that could have been studied by both scientists?

3. A laboratory orders 3 microscopes, 2 cameras, and 3 identical tripods. Each microscope costs $57.25 and each camera costs $557.75. If the total bill is $1423.75, how much did each tripod cost?

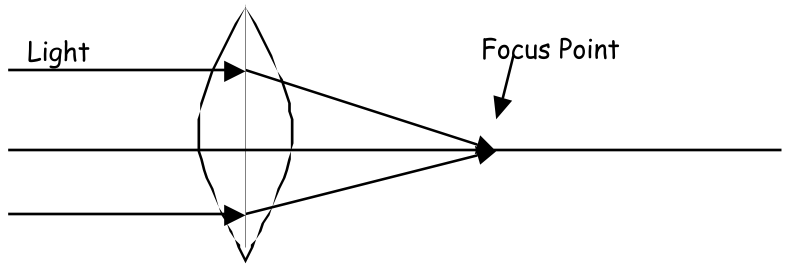
Weighty Problems

Problem 1 Sandra eats about 2000 calories per day with 40% of her calories from fat. Fat has about twice as many calories per gram as carbohydrates or proteins. If she eats the same amount (in grams) each day, but replaces half of her fat grams with carbs or protein, how many calories does she save? If 3500 calories extra is enough to gain a pound, and a 3500 calorie deficit is enough to lose a pound, how long will it take Sandra to lose one pound based on the plan above?	Problem 2 Mark wants to lose a few pounds so he decides to change his exercise plan. He usually watches TV for 30 minutes after he gets home from school. He finds that walking a mile burns 114 calories, and swimming burns 243 calories in the same 20 minute exercise period. He decides to walk one day and swim the next, alternating the two activities until he meets his weight loss goal. How long will it take him to burn the 3500 calories required to lose one pound by using this method?
Problem 3 For a person to find out how many calories they need per day, they should first convert their weight in pounds to kilograms (1 kilogram is about 2.2 pounds). Women should then multiply this number by 0.9. The resulting number is multiplied by 24. That is the number of calories needed to maintain this weight with no activity factored in. Next multiply by an activity factor: 1.3 for sedentary lifestyles, 1.5 for light activity, 1.7 for moderate, and 1.9 for heavy. Sue weighs 120 pounds and is moderately active. How many calories does she require per day to keep her same weight?	Problem 4 Tom likes to drink an average of two bottles of soft drink per day. Each bottle has 20 ounces. On the label, he reads that an 8-ounce serving has 97 calories. If Tom replaces these two bottles of soft drink with water, how many calories will he save per day? How long will it take him to save the 3500 calories required to lose one pound?

Name____Date__________

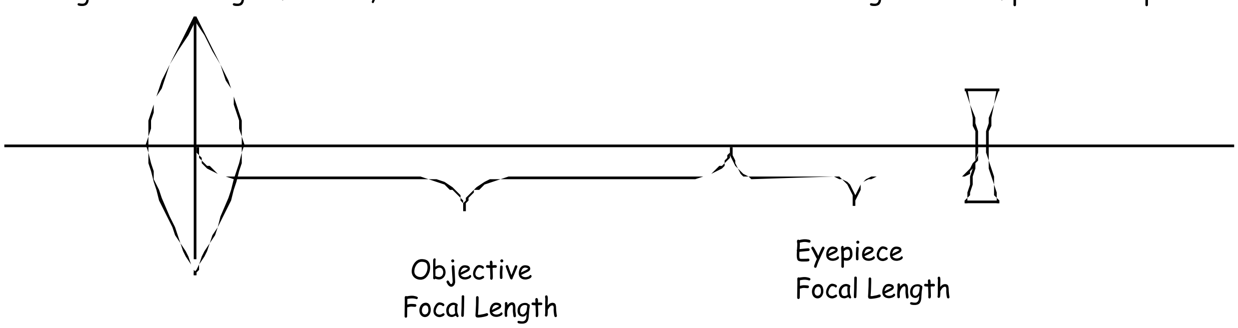
How a Simple Telescope Works

The simplest telescope, such as the one Galileo made, has only two lenses. One lens, called the objective lens, is large to gather lots of light and it focuses the light from distance objects to one point. The distance from the lens to the focus point is called the focal distance.



This lens actually makes things smaller.

But there is another lens in the telescope, close to the eye. It is called the eyepiece lens. It is usually smaller in diameter, closer to the size of an eye. This lens makes things appear larger. It also has a focal length. The diagram below, shows how these lenses should be arranged in a simple telescope.



The power of the telescope is how many times it magnifies things. If I want a telescope that makes things look 5 times as big as they normally look, I need to find lenses so that the focal length of the objective lens is 5 times as big as the focal length of the eyepiece lens.

1. If a telescope has an eyepiece lens with a focal length of 0.15 meters and an objective lens with a focal length of 0.45 meters, how far should the two lens be from each other in the telescope?

2. If a telescope has an eyepiece lens with a focal length of 12 cm, and we wish it to make things six times bigger than normal, what should the focal length of the objective lens be? How long would this telescope have to be?

3. A telescope has an eyepiece lens with focal length of 150mm and an objective lens with a focal length of 450 mm. How many times does this telescope magnify objects?

Name____Date___________

Acme Science Supply

Acme Science Supply

Refractor Lens	$ 7.50
Eyepiece lens	$ 4.25
Telescope Tube	$ 1.85
Planet models	$ 2.75
Wire	15 cents per foot
Styrofoam balls (various sizes)	6 for $1.00

Special Sale

Moon globe	$15

1. To make a telescope, John needs two telescope tubes, a refractor lens and an eyepiece lens. How much will this cost?

2. To make a model of the solar system, Susan is going to use 12 styrofoam balls and 90 feet of wire. How much will this cost?

3. Leonard has just enough money to buy a refractor lens and an eyepiece lens. If he doesn't buy those, how much more will he have to save to buy the moon globe?

4. Mike spent $29.75 buying 9 planet models and 4 comic books. How much did each comic book cost?

Name____Date___________

Directions: Round each check amount up to the nearest dollar, then subtract from the checkbook total. Complete the chart, and then answer the questions at the bottom of the page.

Bill's Dad's checks for the month of October.

1. Dry cleaner's	**$18.34**	**2. Grocery store**	**$79.02**
3. Department store	**$67.45**	**4. Gas Bill**	**$49.98**
5. Electric Bill	**$43.76**	**6. Phone Bill**	**$52.07**
7. Grocery store	**$87.43**	**8. Shoe store**	**$29.27**
9. Petsmarty	**$63.49**	**10. Walmark**	**$24.85**

Beginning Total	Actual Check	Dad's Register	New Total
$600.00			

1. **About how much money do you think Bill's dad saved by doing his check-book this way?** ____________________

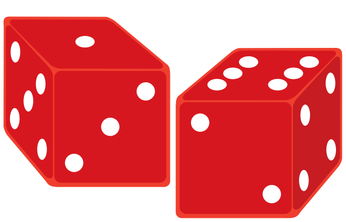
2. **How much did he actually save?** _____________________

3. **Would it be a good idea for someone to round their check values down instead of up? Why or why not?**

Name____Date____________

Exponent Dice

roll	base	exponent	factors	product
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				



Name____ Date____________

Rational Number Operations II

Round	A	B	sum	difference	product	quotient
1	$\frac{3}{5}$	$\frac{1}{8}$				
2	$\frac{4}{6}$	$\frac{1}{3}$				
3	$\frac{5}{6}$	$\frac{1}{12}$				
4	$\frac{3}{4}$	$\frac{1}{2}$				
5	$\frac{7}{8}$	$\frac{1}{10}$				

1. Which round(s) give larger results than A or B?

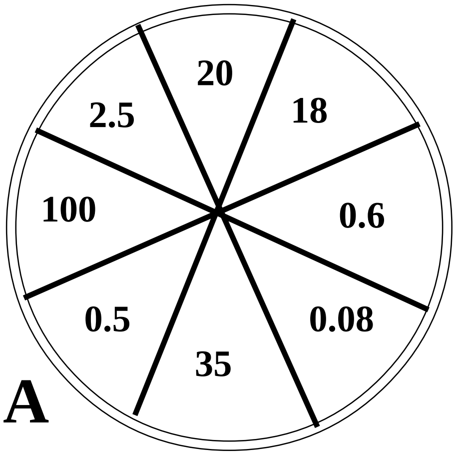
2. Why?

3. Which round(s) give smaller results than A or B?

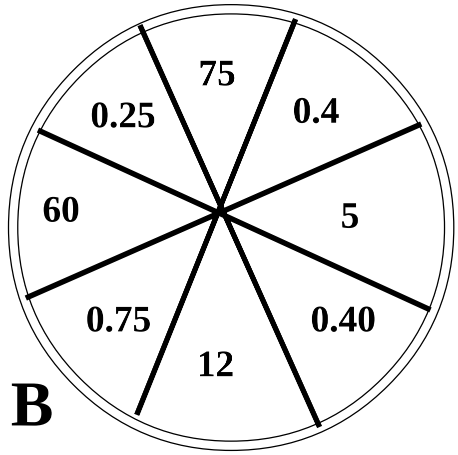
4. Why?

Name____Date__________

Rational Number Operations I



A



B

spin	A	B	product	quotient		spin	A	B	product	quotient
1						10				
2						11				
3						12				
4						13				
5						14				
6						15				
7						16				
8						17				
9						18				

Name____Date____________

Comets in the News

According to astronomers, a visible comet will appear in our skies about once every 20 years.

1. About how many comets have been visible in our skies since the airplane was invented?

2. About how many comets have been visible in our skies since your grandfather was born?

3. About how many comets can you expect to see in the remainder of your lifetime?

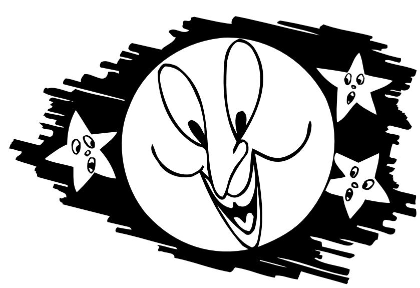
4. About how many comets will be visible on Earth from the year 2000 until the year 3000?

5. Since three spectacular comets were witnessed from 1994-1997, does this mean we will not see any more comets for 60 years? Explain your answer.

6. Comet Hale-Bopp has a diameter of 25 miles (40 km). Find two towns in our state that are about that distance apart.

7. What would the circumference of Hale-Bopp be? Find two towns in our state that are about that distance apart.

8. Comet Hyutakewhich appeared in 1996 had the longest tail ever seen on a comet. It was 100 degrees long. Pretend that you were wearing a Hefty plate on your head on a night when the comet was observed. Let the indentations along the rim represent your view of the sky all around. Color in enough indentations to represent 100 degrees.



1. Carowinds™ ticket costs are $42.99 for adults and $25.99 for children. Jack needs to purchase 4 adult tickets and 5 children's tickets. Is $450 a reasonable amount of money for the tickets? Why or why not?

2. Barb's family is taking a break at the park for lunch. She takes them to the Chicken Stand where the chicken finger lunch costs $6.99 with a drink and the chicken dinner costs $8.95 but drinks are $1.50 extra. She orders 5 chicken finger lunches and two chicken dinners and two sodas. If she only has $50 to spend, is her order reasonable?
Why or why not?

3. The sixth grade class is taking a day trip to Carowinds™. They have 6 hours to spend at the park. John and Dave want to ride as many rides as possible; however, they know that they will definitely ride Top Gun. The wait at Top Gun is one hour. The average wait for all the other rides is 45 minutes. Is it reasonable to think that they can ride 6 rides* by the end of the day?
Why or why not?

(*Take into account that walking between rides will take 5-10 minutes.)

4. Gina and Diane are in line for the bumper cars at 4:00 p.m. The bus leaves the park at 5:00 p.m. Since some people ride single and others double, each turn on the bumper cars holds between 20 and 40 passengers. Gina estimates there are 75 people in line in front of them. Each ride takes 15 minutes. Is it reasonable to think that they will be able to ride the bumper cars before leaving for the day?
Why or why not?

5. Tyrone brought some spending money on his trip. He would like to buy a souvenir
for everyone in his family. He lives with his parents, grandparents and 3 brothers and sisters. In the souvenir shop, the prices range from $1.95 to $12.95. He has only $20 to spend. Is it reasonable to buy each person a gift for $2.99?
Why or why not?

6. Terry and Deshawn want to spend their day in the Water Park. Their goal is to ride every water ride least one time. If the average time per ride, including wait time, is 35 minutes, is it reasonable for them to be able to ride all 14 water rides in 6 hours?
Why or why not?

Scientifico Gameboards

Between 1 and 50	**Between 51 and 100**	**Between 101 and 500**	**Between 501 and 1000**
Between 1001 and 5000	**Between 5001 and 10,000**	**Between 10,001 and 50,000**	**Between 50,001 and 100,000**
Between 100,001 and 500,000	**Between 500,001 and 1,000,000**	**Between 1,000,001 and 5,000,000**	**Between 5,000,001 and 10,000,000**

.000001 to .0000049	**.000005 to .000009**	**.00001 to .000049**	**.00005 to .00009**
.0001 to .00049	**.0005 to .0009**	**.001 to .0049**	**.005 to .009**
.01 to .049	**.05 to .09**	**.1 to .49**	**.5 to .9**

Student________________________________

Scientific Notation	Standard Notation

Student ________________________________

Scientific Notation	Standard Notation

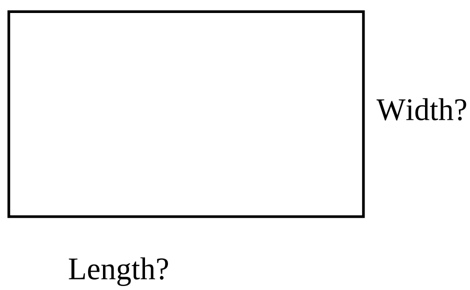
Name____Date__________

Space Ship Storage

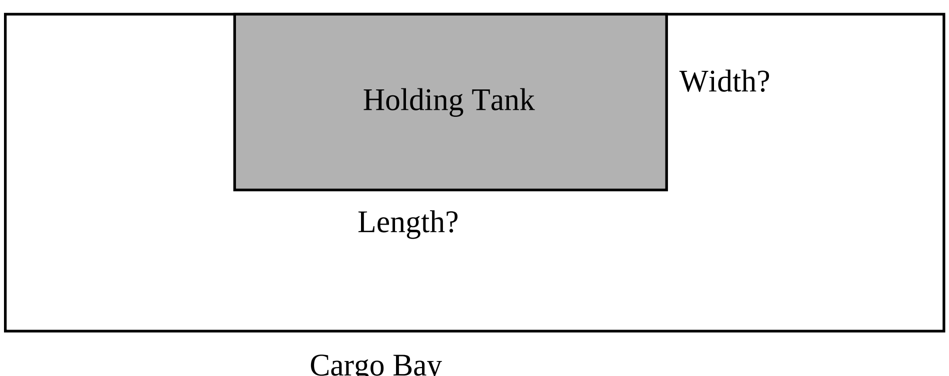
NASA is planning to make a new space craft that will have a rectangular cargo bay. It is important for the bay to hold as much as possible, but it should be made with the smallest amount of material possible to cut down on costs.

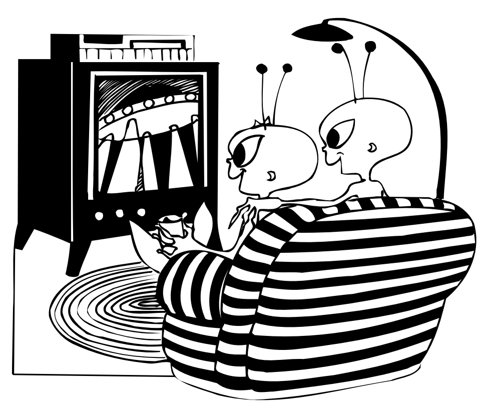
The designers are told that the rectangle should have a perimeter of 48 yards. How can they make this rectangle so that it will contain as much area as possible?

Cut two pieces of pipe cleaner 24 cm long. Use the two pieces to represent your 48 yards of perimeter. Experiment with various rectangles. What is the biggest area you can make?



Extension: Now NASA wants to make a rectangular holding area for specimens inside the Space Shuttle Cargo Bay. One wall of the holding tank will be along the wall of the shuttle. The other three walls will be made from a sheet of metal that is 32 feet long. What dimensions will the holding bay have if you want the maximum area possible?





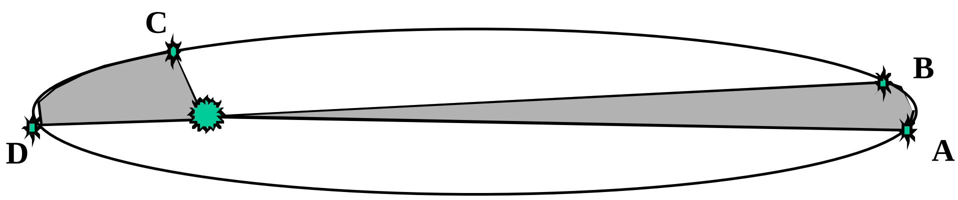
Name____Date____________

Kepler's Laws

In the early 1600's Johannes Kepler was busy studying the skies. He figured out some laws that govern how the planets and other bodies such as comets travel. He first noticed that their orbits were in the shape of an ellipse, and he also noticed something about their speed.

Planets sweep out equal areas in equal times.

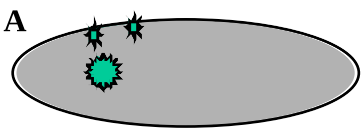
Example: Imagine this is the orbit of a comet going around the sun. While the comet moves from point A to B, we can imagine that it covers a wedge of the ellipse shaded below.



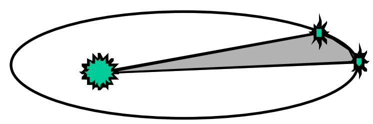
While it moves from C to D, a different wedge is covered. Kepler's law says that when the time traveled is equal, the area of the wedges has to be equal.

1. Which of the diagrams below could represent equal time periods in a comet's path?

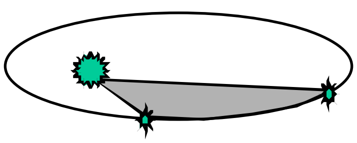
A



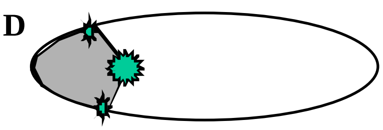
B



C



D

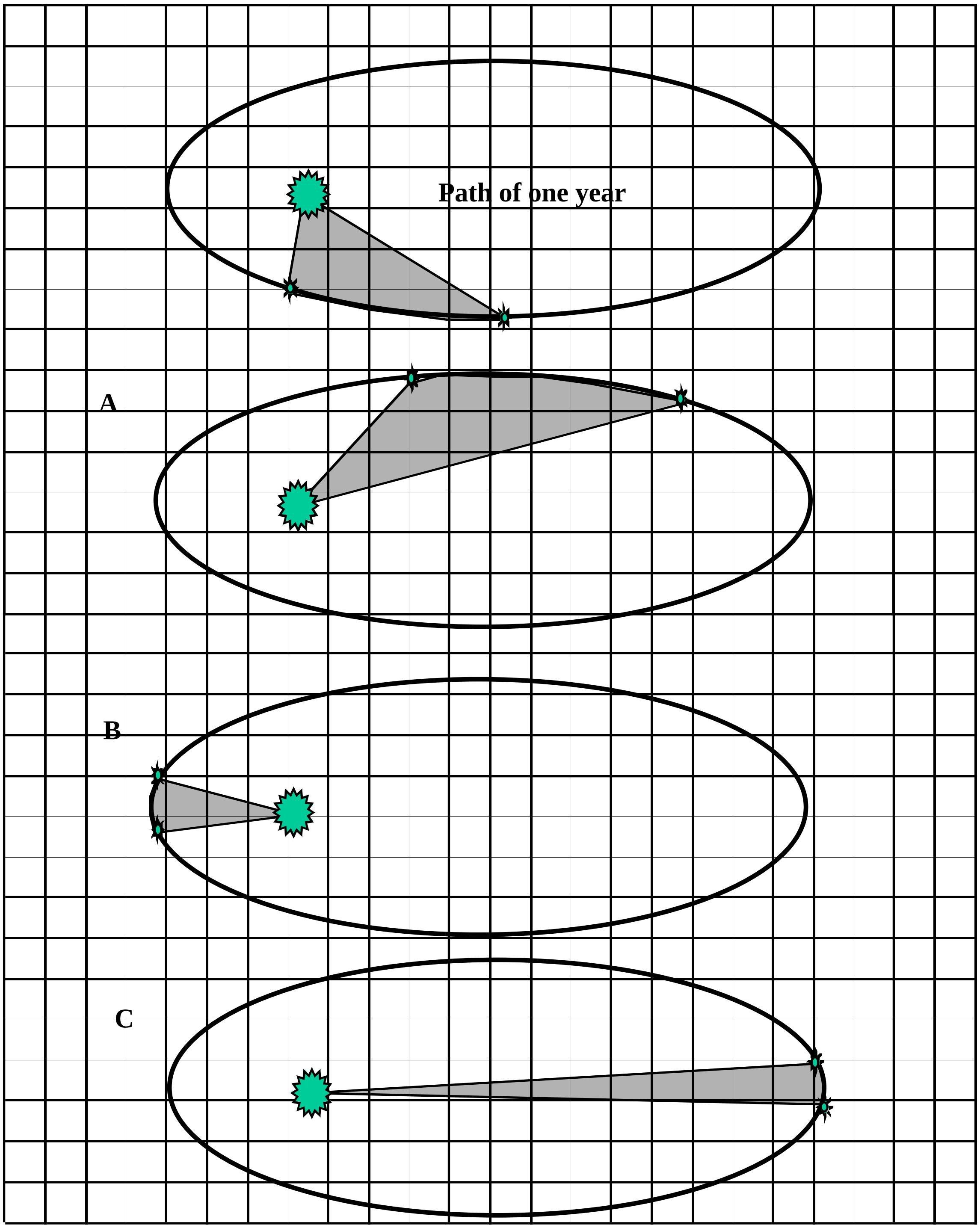


2. Does the planet move faster when it is close to the sun, or far away?

Name____Date____________

Kepler's Laws (cont.)

The diagram below shows one year in the path of a comet. Which other diagram would also show about one year?

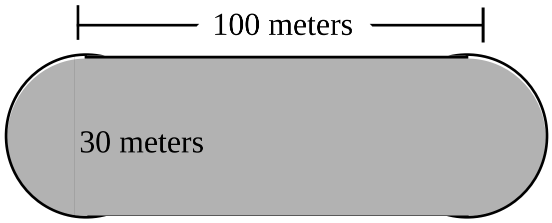


Name____Date____________

Circumference Stumpers

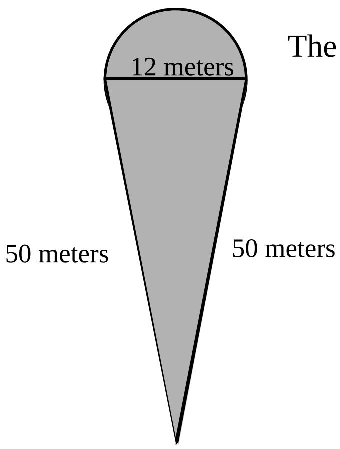
Find the perimeter of each shaded figure below.

1.



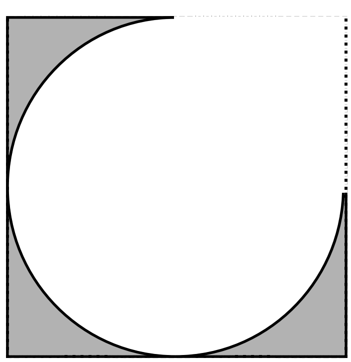
The ends of this track are semicircles.

2.



The top of this shape is a semicircle.

3.



24 meters

Name____Date___________

Eyes on Space

Some of the world's biggest telescopes are listed below. In each case, the diameter is given. Find the radius and circumference. Use the pi key on your calculator, and round to the nearest tenth.

Telescope	Diameter	Radius	Circumference
Radio Telescope Arecibo, PR	1000 feet	_______	__________
Very Large Array Socorroo, NM (has 27 units of 82 feet each)	82 feet	_______	__________
Radio Telescope Effelsburg, Germany	100 meters	_______	__________
Hale Telescope Mount Palomar, CA	200 inch	_______	__________
Reflector scope Zelenchukskaya, Russia	236 inches	_______	__________
Yerk's Refractor William's Bay, Wisconsin	40 inches	_______	__________

Put the diameters above in order from smallest to largest.
Convert each diameter above to yards. (100 meters is about 330 feet.)

Diameter given above	Equivalent diameter in yards
________________	_____________
________________	_____________
________________	_____________
________________	_____________
________________	_____________
________________	_____________

Estimation Problem Discussion Cards

Problem 1 Airline engineers need to know the weight of a plane and its cargo in order to make decisions that will enable the plane to take off. These decisions might involve the area of wings or size of fuel tanks. A certain plane can hold 200 passengers and it is estimated that they will weigh an average of 150 pounds with weights ranging from 60 pounds to 300 pounds. What error can occur if they use the lightest weight as an estimate? What error can occur if they use the heaviest weight as an estimate? What error can occur if they use the average weight as an estimate? Which is best? Is any estimate adequate?	Problem 2 An apple farmer is planning the budget for his upcoming year. His income is based solely on the amount of apples his trees produce. In his newest orchard section, the trees produce an average of 112 pounds of apples per tree. But in some years and in some trees the production is as low as 80 pounds per tree and at best the production is 125 pounds per tree. He can sell his apples at 50 cents per pound. What error can occur if they use the lightest weight as an estimate? What error can occur if they use the heaviest weight as an estimate? What error can occur if they use the average weight as an estimate? Which is best? Is any estimate adequate?
Problem 3 Susan and Jim are running a concession stand for a baseball park. In planning how much food to prepare, they use statistics from previous sales. The park normally has 550 people attending. The lemonade sales per customer varies from 3 oz. per customer to 16 oz. per customer with an average of 7 oz. per customer. What error can occur if they use the smallest measure as an estimate? What error can occur if they use the largest measure as an estimate? What error can occur if they use the average measure as an estimate? Which is best? Is any estimate adequate?	Problem 4 Your job is to make a car parking lot that will hold 100 cars. You plan to arrange the lot with 2 double rows of 25 and 3 traffic lanes, each 25 feet wide. Cars vary in length from 12 to 18 feet. The average length is 13 feet. What error can occur if you use the shortest length as an estimate? What error can occur if you use the longest length as an estimate? What error can occur if you use the average length as an estimate? Which is best? Is any estimate adequate?

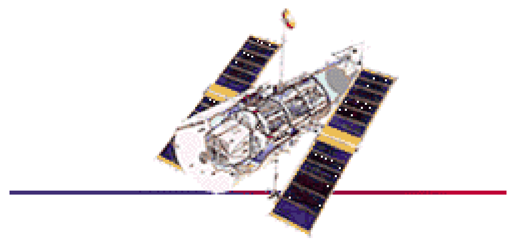
Name____Date___________

Hubble Telescope

Use $\pi = 3.14$

1. The Hubble Telescope has a mirror which is 94 inches in diameter.
What is its radius?______
Circumference? ____________

2. The Hubble Telescope is about 43 feet long and 14 feet wide. What is something on Earth which is about this size?



3. The Hubble weighs 25,500 pounds. How many tons is this? _______
About how many cars would it take to equal the weight of the Hubble? ______
About how many grown men would it take to equal the weight of the Hubble? _____

4. The Hubble orbits Earth about 340 miles above the surface of the Earth. ______
Find two cities in the US which are about that distance apart. _________

5. What is the advantage of having the Hubble telescope in space?

The Hubble has helped us see many space objects more clearly, and to discover many that we had not seen before. It has helped scientists detect a galaxy which is further away from us than any found before. It is estimated that this galaxy is 13,000,000,000 (13 billion) light years from us.

6. What number can you multiply 13 million by to get 13 billion?

13,000,000 x ______________ = 13,000,000,000

Name____Date________

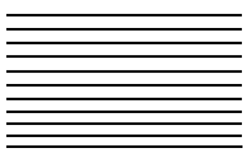
Make Your Own Graduated Cylinders

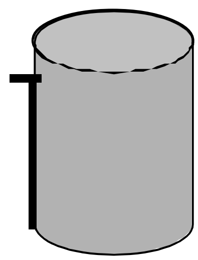
Materials: Various transparent cylinders with vertical sides such as olive jars, perfume sample vials
medicine bottles
graph paper with grids of various sizes
fine point marking pen that will write on glass or plastic
one standard measure that can measure a liter or other convenient amount

How to divide a length into ten equal parts

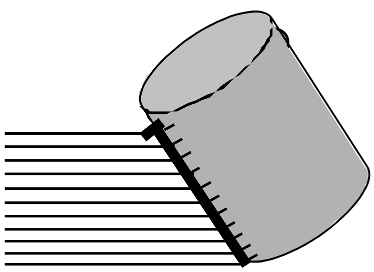
Use 11 parallel lines that divide a section of a page into ten equal spaces. These lines can be from notebook paper or graph paper. The height from the top line to the bottom needs to be less than the length of the object you want to divide.

Place the object that you want to divide so that the top edge is on the top line and the bottom edge is on the bottom line.





Suppose we want to divide the part of this cylinder marked by a heavy line into ten parts.



Tilt the cylinder, or a strip of paper cut to the same size, so that the top of the heavy line is on the top parallel line, and the bottom of the scale line is on the bottom parallel line. The parallel lines now show you positions to mark for the ten division lines.

1. Mark one of your containers so that each division line represents a deciliter (0.1 liter).
2. Are the lines far enough apart so that you can divide each space into ten equal parts?
3. Now measure a deciliter and pour it into a smaller container that is nearly the same size. Perhaps a large pill bottle would work. Divide this so that each mark represents a centiliter (0.01 liter). Are the lines far enough apart so that you can divide the spaces into ten equal parts again? If so these will be milliliters (0.001 liter).
4. Now measure a centiliter into a smaller container that is nearly the same size. (Some food coloring comes in plastic vials that may be about the right size. To use those, cut off the tops.) Divide this into milliliters.
5. Do you have a vial that you can divide into tenths of a milliliter? (A perfume sample vial might work.)
6. Keep making measuring containers that are more and more precise. What is the most precise container you can make? If you had smaller and smaller containers, what other factors might limit your precision or cause error?

Name____**Date**________

Precisely!

Discuss each situation with your group. Other groups may have different ideas and answers.
Be prepared to explain why you chose the answer you did.

1. Dr. Morton's lab has a ruler that can be used to measure to the nearest millimeter, a micrometer that can be used to measure to the nearest millionth of a meter, and a measuring stick that can be used to measure to the nearest centimeter. He also has a scale that can be used to measure to the nearest ten grams, and a balance that can be used to measure to the nearest tenth of a milligram. He has a dose spoon that can be used to measure to the nearest centiliter, a cup that can be used to measure to the nearest deciliter, and a graduated cylinder that can be used to measure to the nearest milliliter. Which tool should he use to measure each of the following? Explain.

    a. Weight of a newborn baby.
    b. Weight of a headache powder he is prescribing.
    c. The amount of water he wants to use in his tea pot.
    d. The amount of liquid penicillin he needs to add in making an antibiotic capsule.
    e. Height of an elderly patient.
    f. Length of a antibiotic capsule.

2. Dr. Morton's three assistants are helping him make some anti-itch powder. Tom uses the scale and weighs out 320 grams of cornstarch to use as the base for the powder. Sue uses the balance and weighs out 50.2 milligrams of itch reliever for the powder. Ben uses the balance and weighs out 1.3 milligrams of perfumed salts to use in the powder. They mix this together, put it in a package, and label the package, "Anti-itch Powder – 320.0515 grams" Is there an error here?

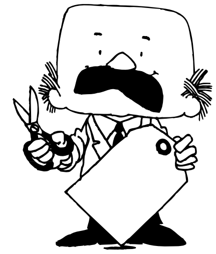
3. Dr. Morton has asked his assistants to measure a triangular region that showed up on an x-ray. The region is a right triangle, and Tom measures one leg to be 11 cm long. Ben measure the other leg and finds that it is 6 cm long. They both used the measuring stick. Sue uses the Pythagorean Theorem and reports that the hypotenuse is 12.529964 cm long. Is there an error here?

4. Discuss the best tools and techniques to use in mixing three ingredients to make a dry medicine that is combined by weight. The medicine is very strong and should be taken with extreme caution.

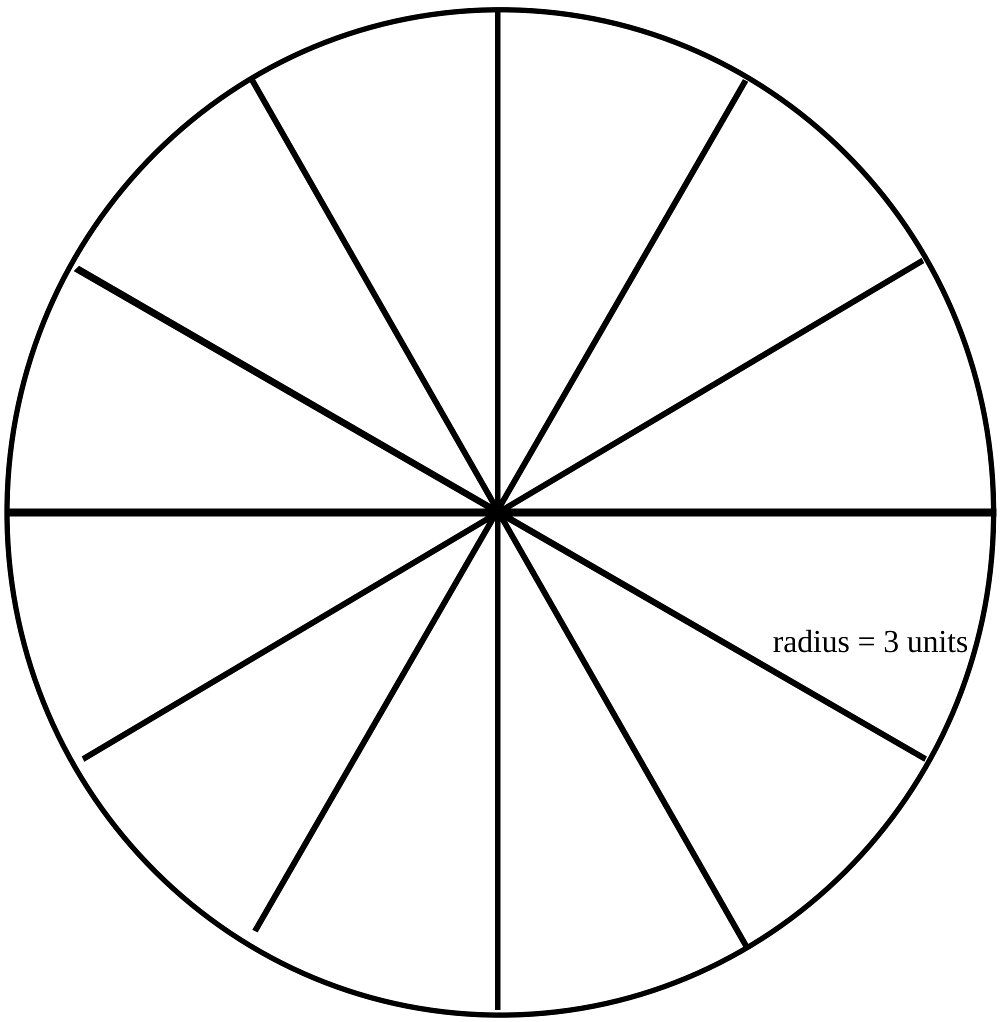
5. Discuss the best tools and techniques to use in measuring and constructing two congruent right triangles that will be used to hold up a shelf. The shelf is about the width of a notebook and should be about table height.

6. Discuss the best tools and techniques to use in measuring three liquids that will be used in a lotion to soothe aching muscles.

Name____Date____________



Slicing π



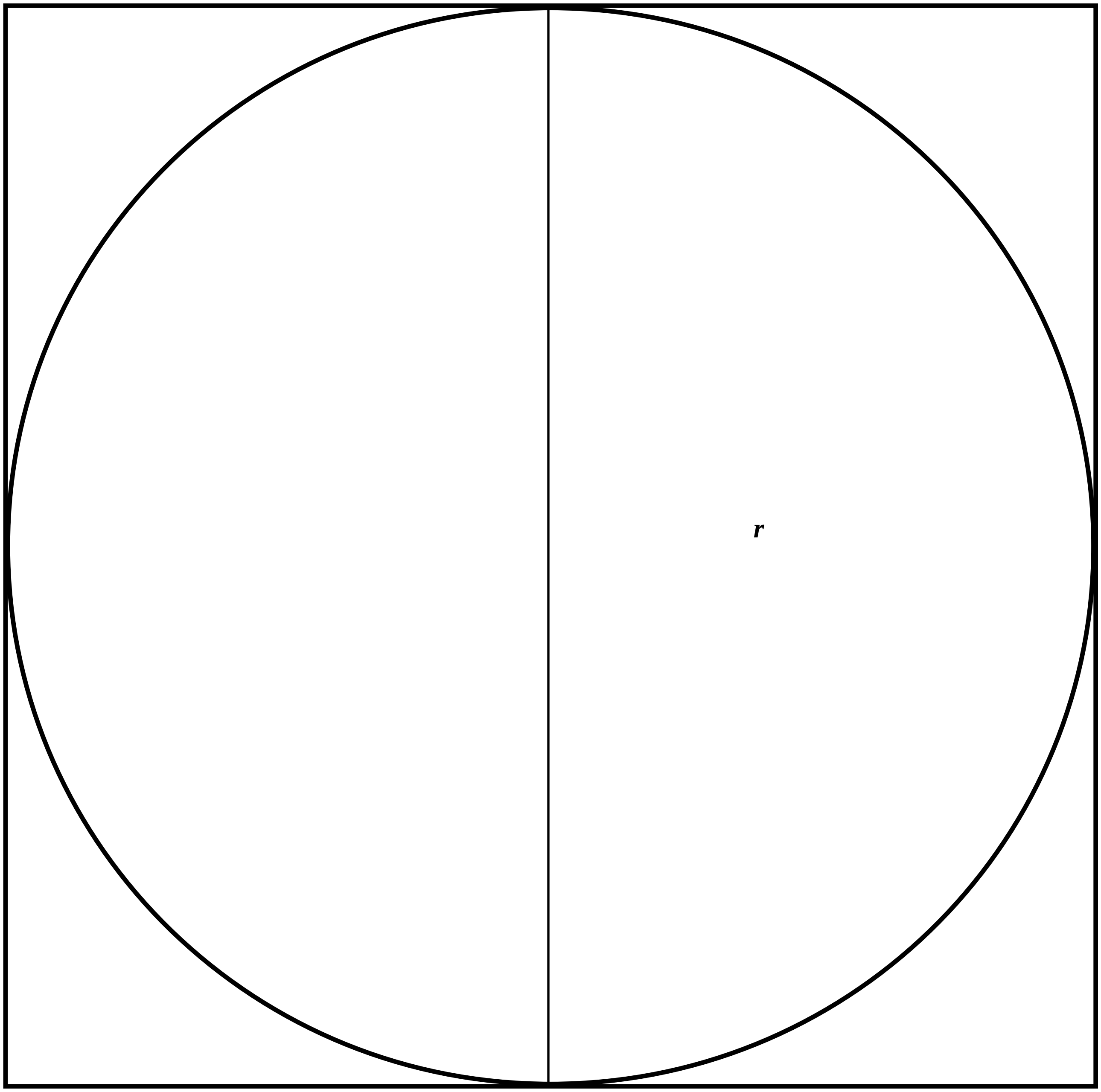
Cut the wedges from the diagram above and rearrange them into a shape as much like a rectangle as you can make it. What is the width of your "rectangle?" What is the length?

If this were a rectangle, what would its area be?

If instead of 3 units, you use the variable r as the radius, what would the area be?

Name____Date___________

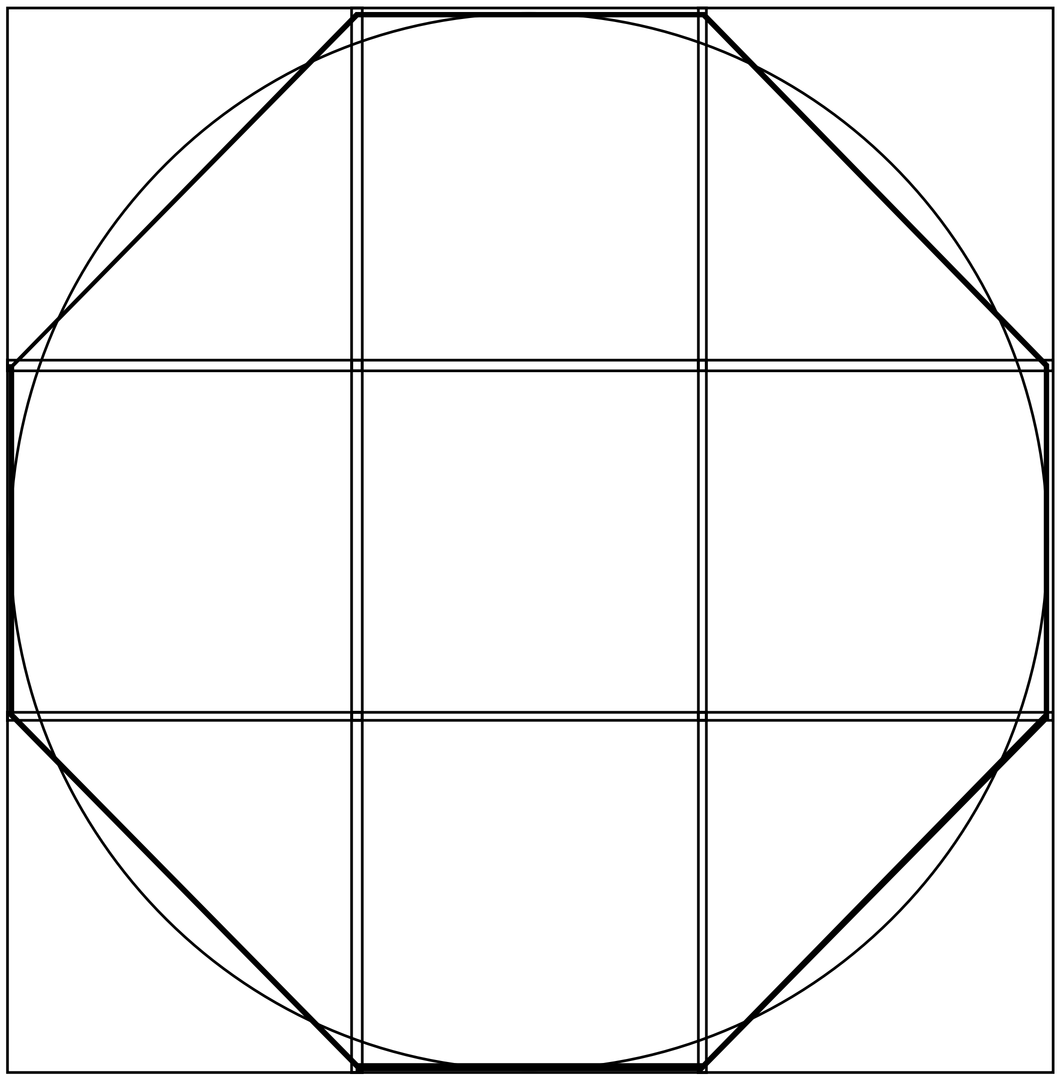
Bean π



1) Fill the circle with a layer of beans.
2) Put aside the beans you used to fill the circle.
3) Now cut apart the four squares and arrange them into a line. Each square has area = $\boldsymbol{r^2}$.
4) Use your beans to fill in the line of squares. Start at the left and fill in as far as you can go. How many squares were you able to fill in? What number do you think this is?

Name____Date____________

Nearly π



1. As you can see, the area of the circle and the area of the octagon are very close. If the radius of the circle is 1unit, what is its area?

2. If the radius of the circle is 1 unit, what is the side length of each small square?

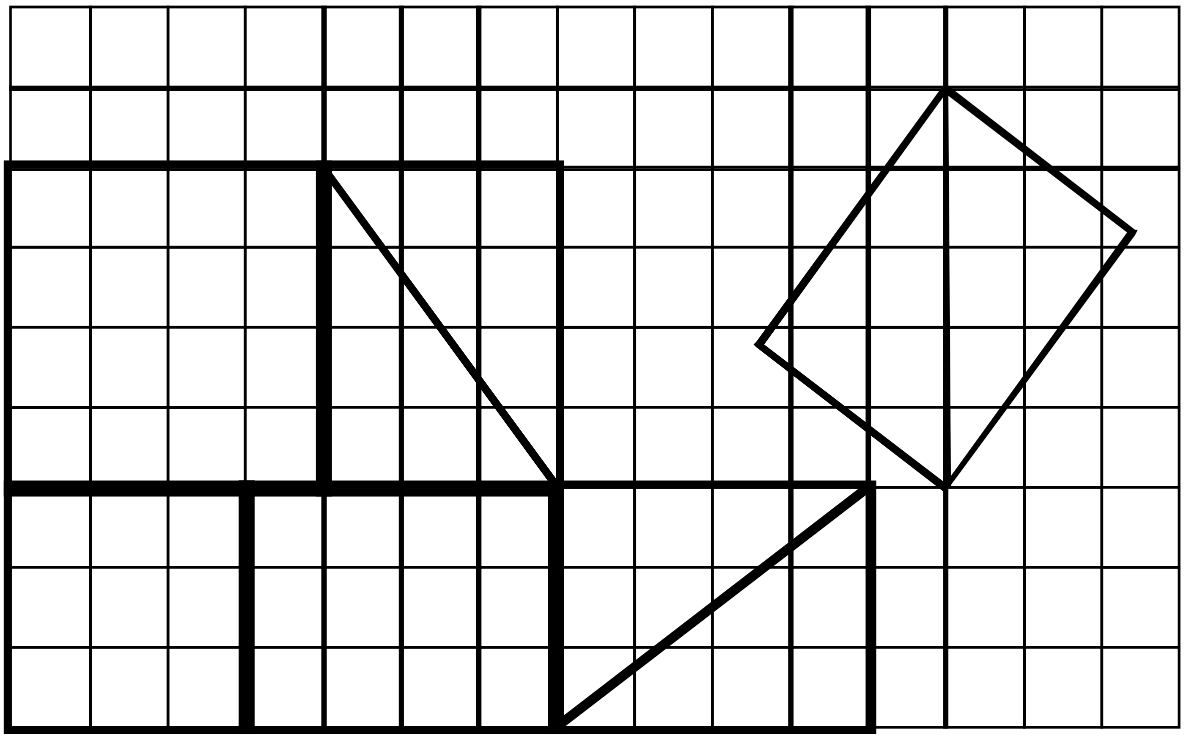
3. What is the area of each square? Of each triangle?

4. What is the area of the entire octagon?

5. How does this compare with the value of π ?

Name____Date__________

Shape Exploration



The pieces above include a 3 x 3 square, a 4 x 4 square, a 3 x 4 rectangle, and some triangles that are formed by cutting the 3 x 4 rectangle along the diagonal. The figure above shows that the hypotenuse of this triangle is 5.

1. Find the area and perimeter of each of the different shapes.

2. Make as many parallelograms as you can from two or more of the pieces above. Record your results on grid paper.

3. Make as many trapezoids as you can. Record your results on grid paper.

4. Find the area and perimeter of each parallelogram and trapezoid that you drew. You will be able to get the perimeters and areas by looking at the various pieces used in making the shape.

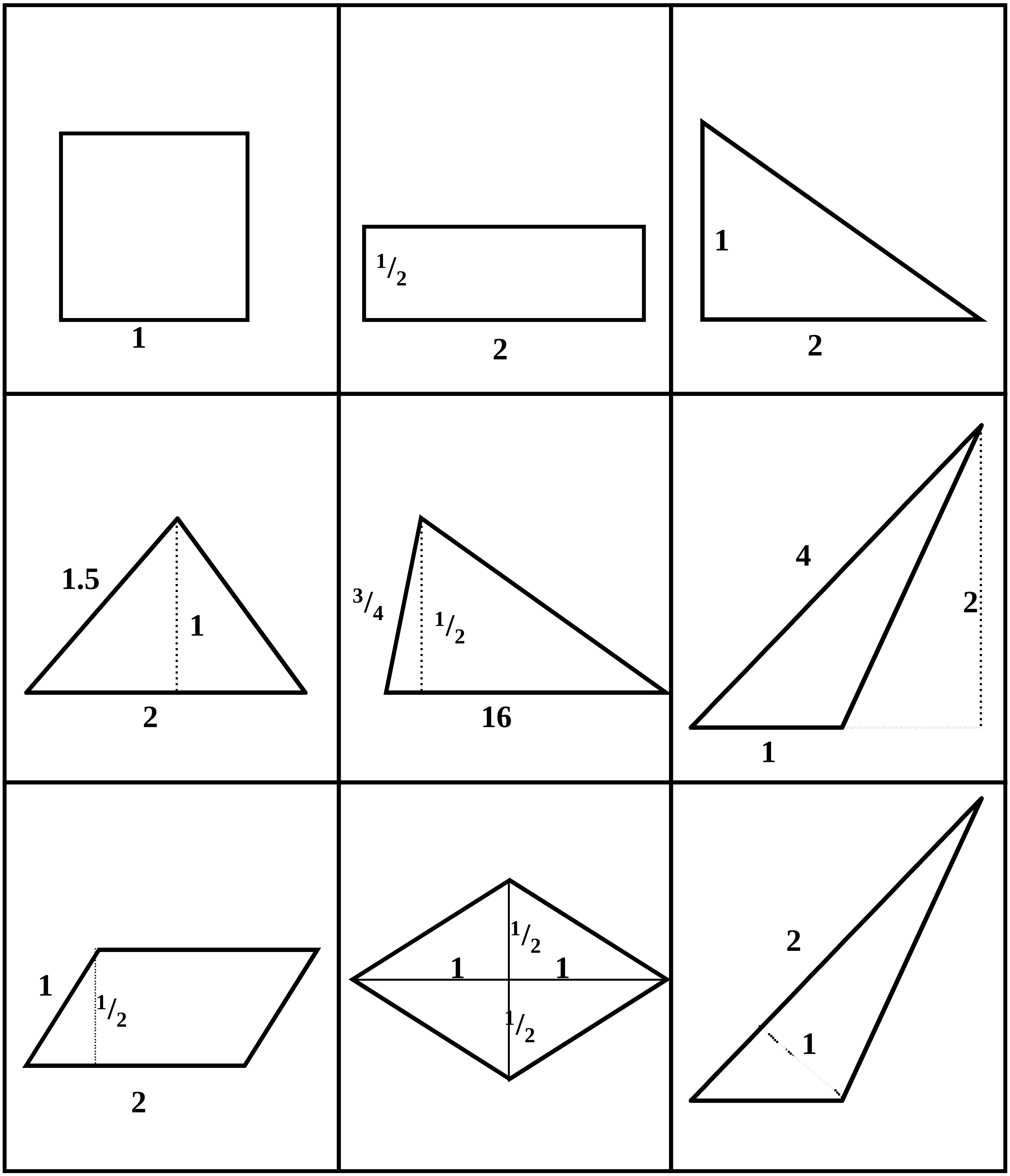
5. Can you determine a way to get the area of any parallelogram? any trapezoid?

Name____Date___________

Grid Paper

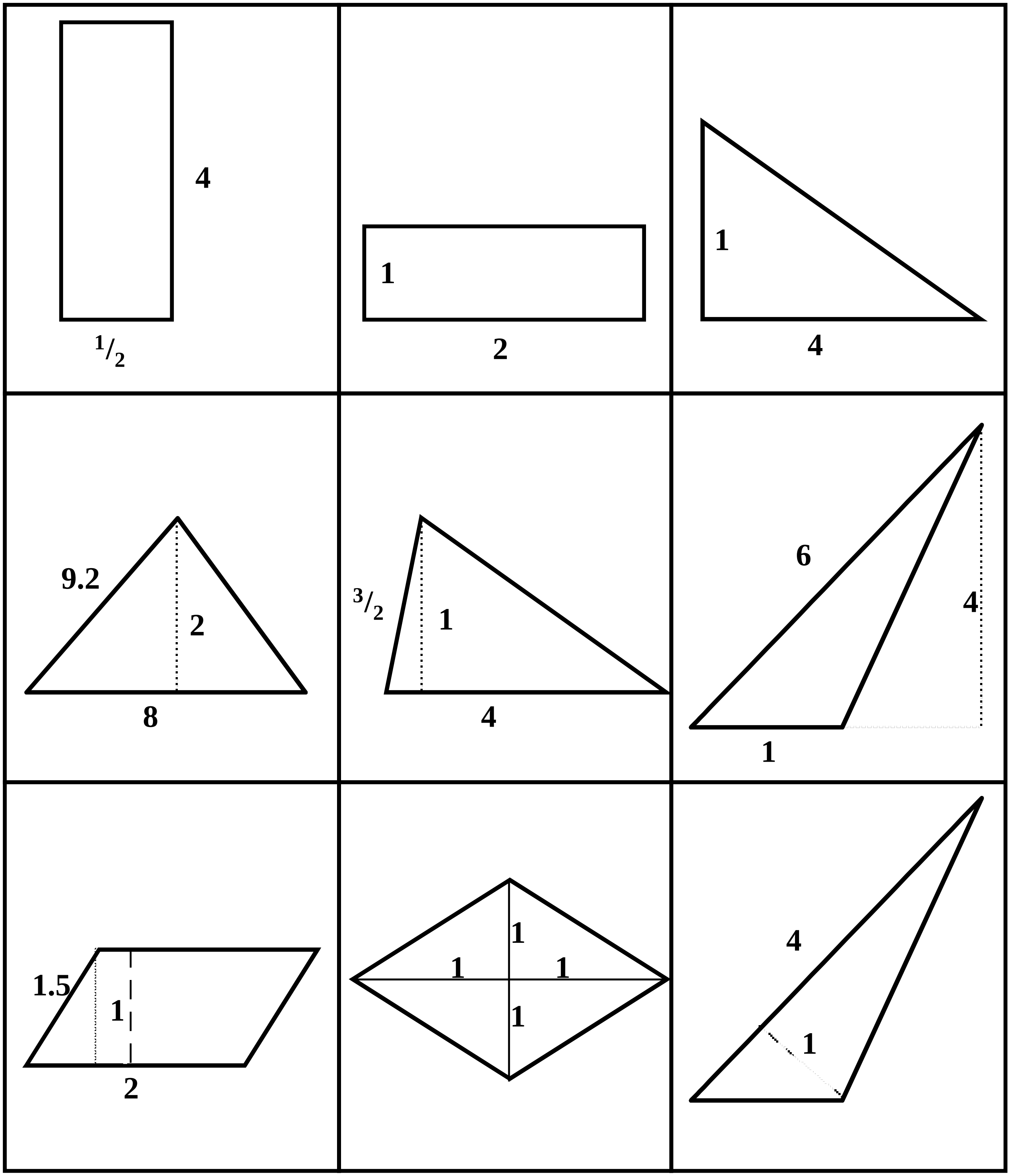
Name____Date____________

Pick-Up Area



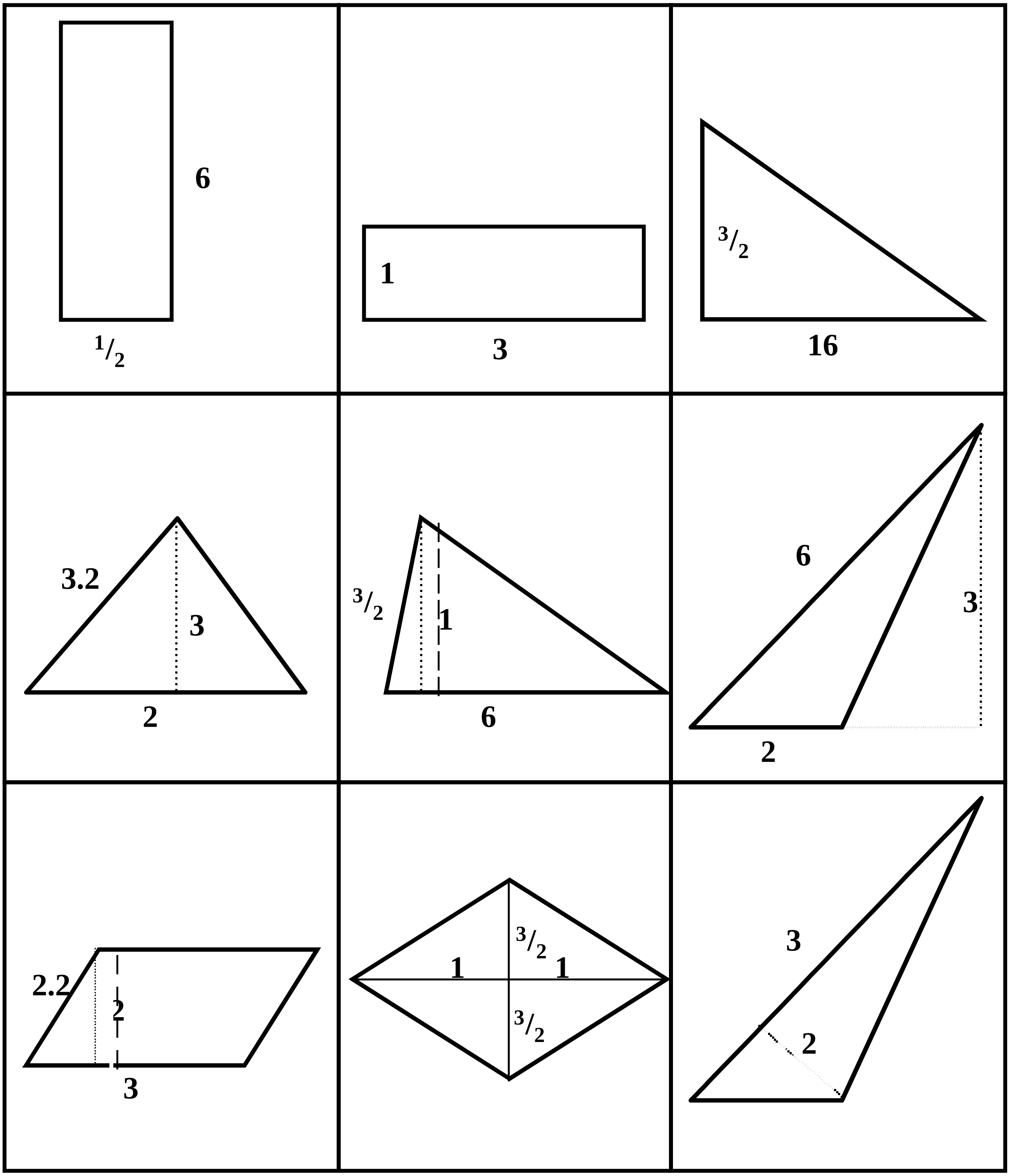
Name____Date____________

Pick-Up Area



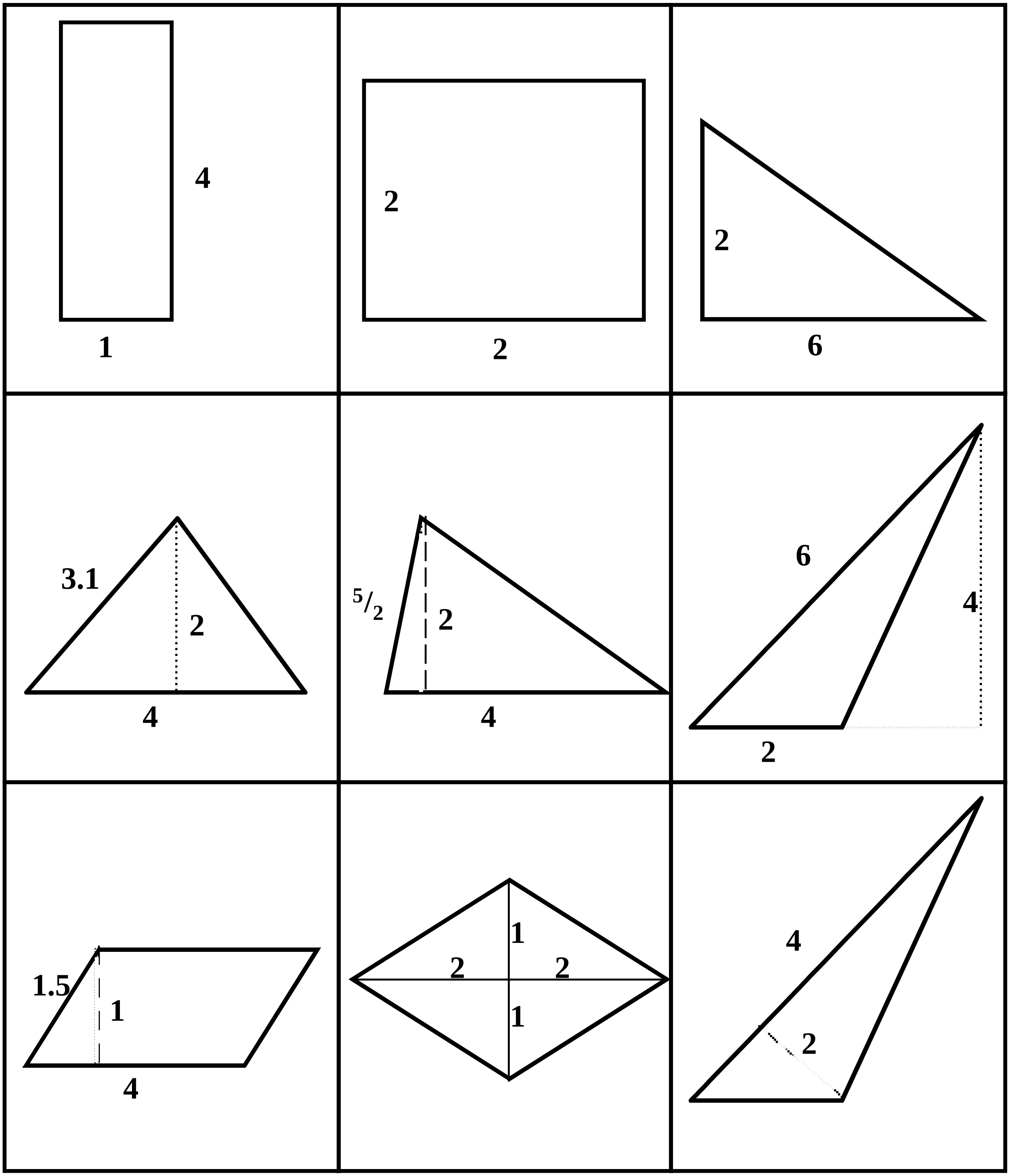
Name____Date____________

Pick-Up Area



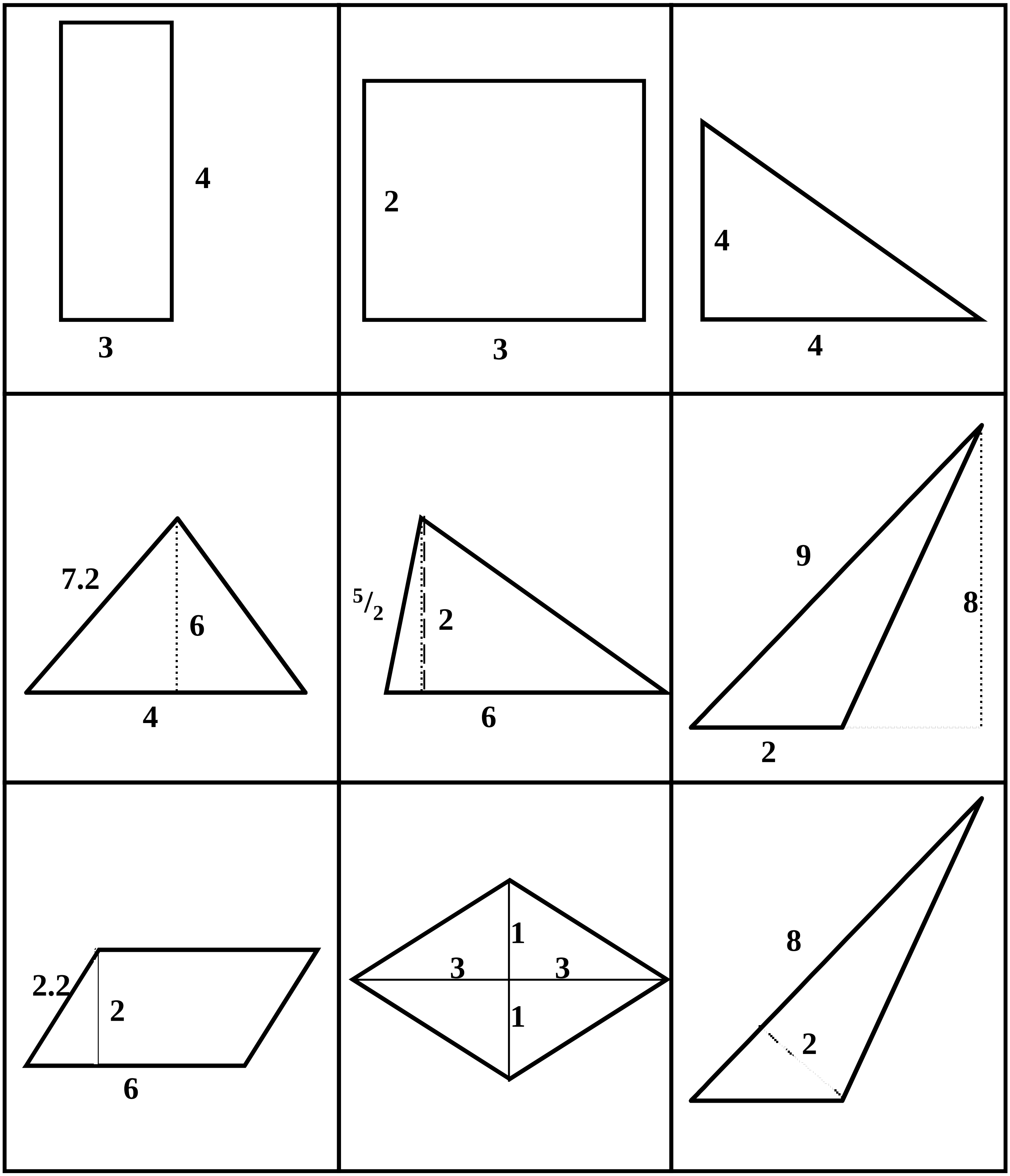
Name____Date____________

Pick-Up Area



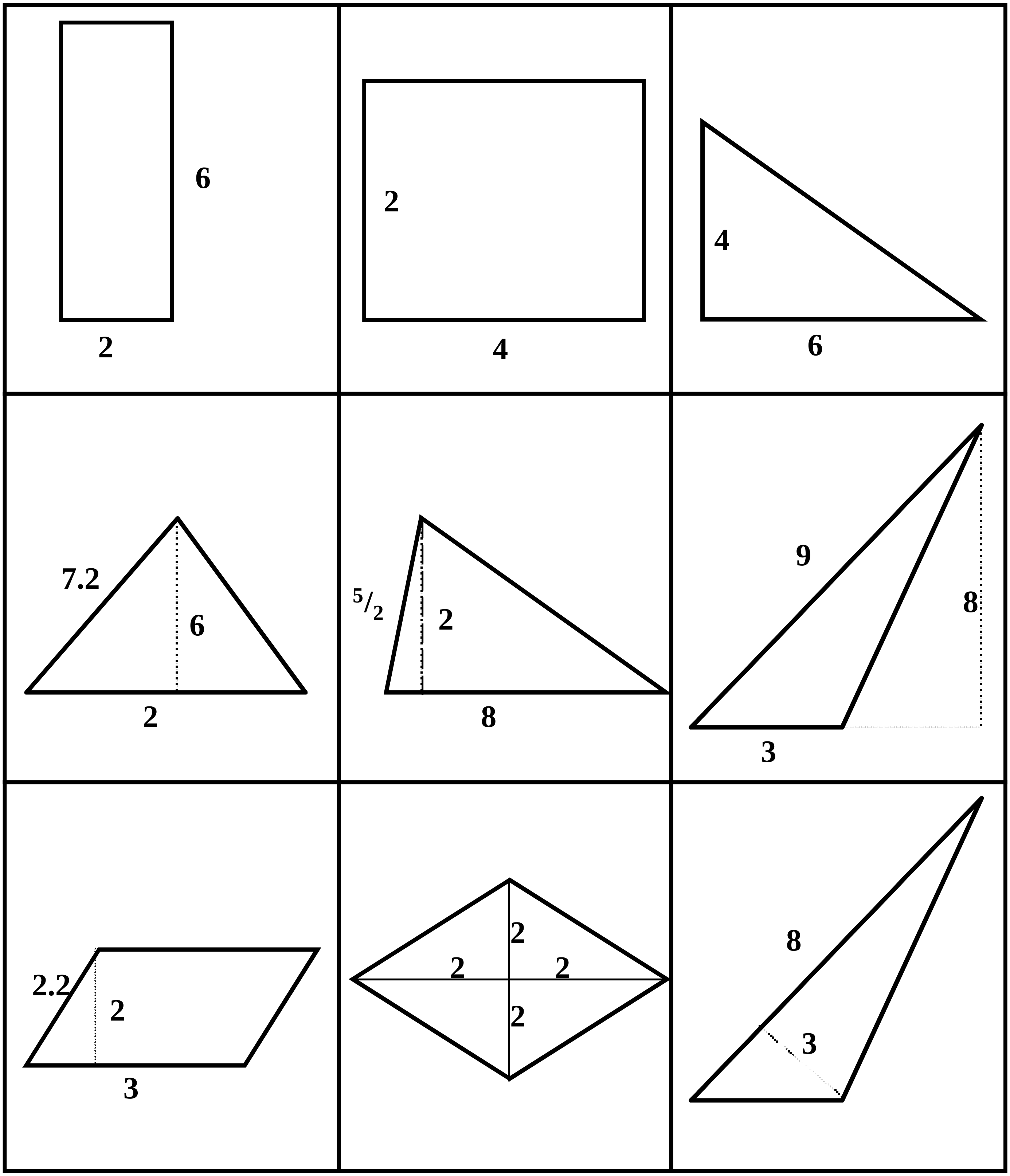
Name____Date____________

Pick-Up Area



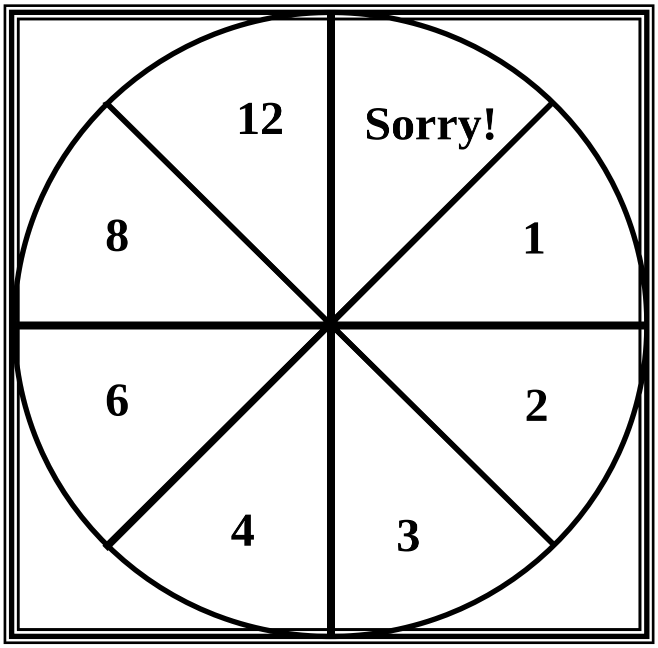
Name____Date___________

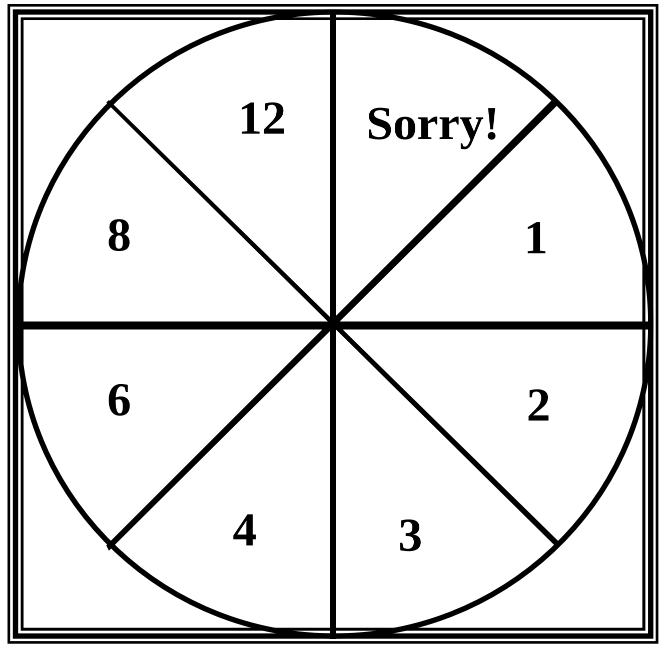
Pick-Up Area

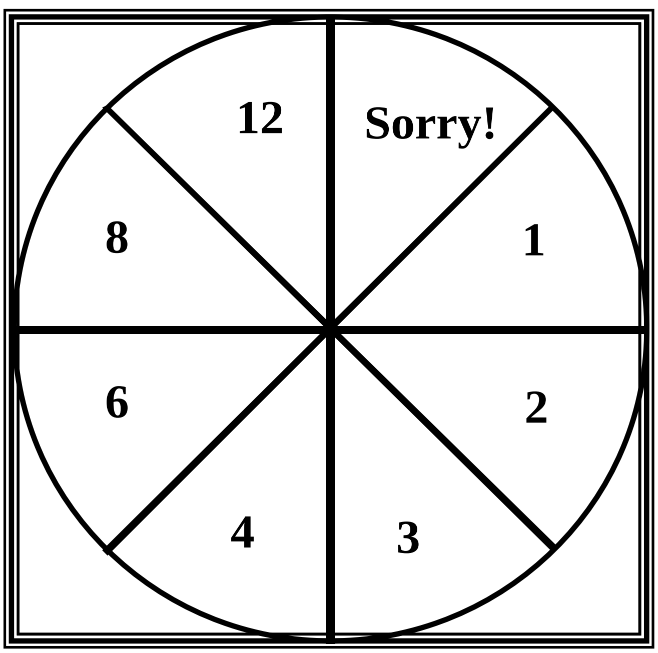


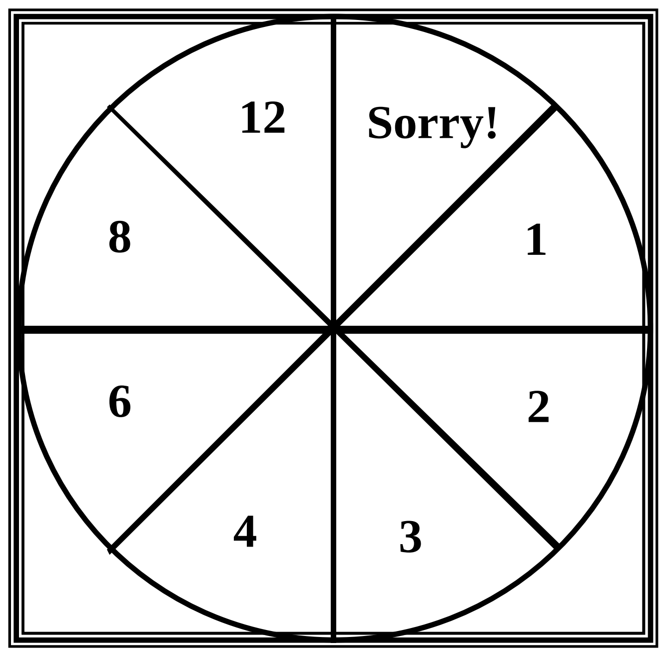
Name____Date____________

Pick-Up Area





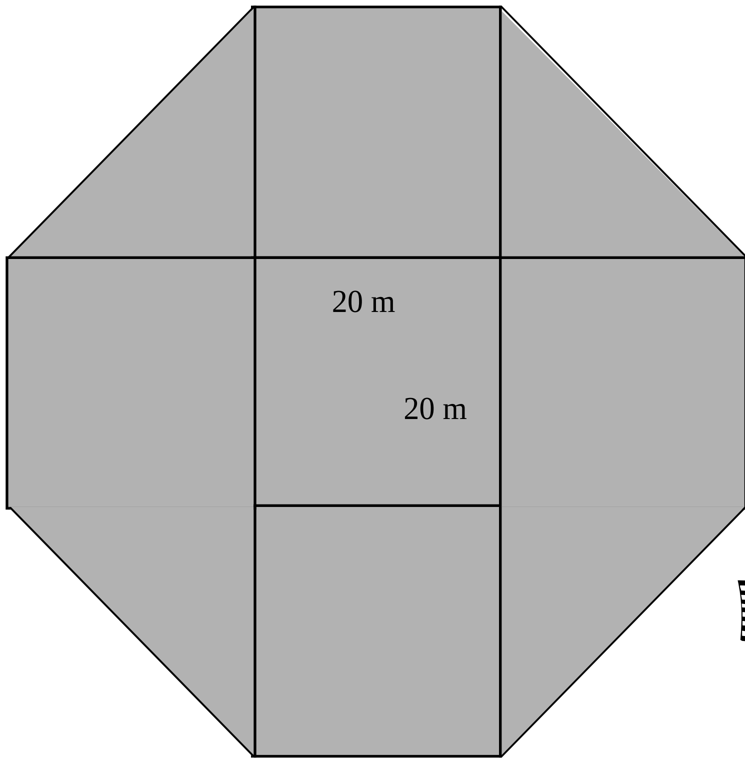


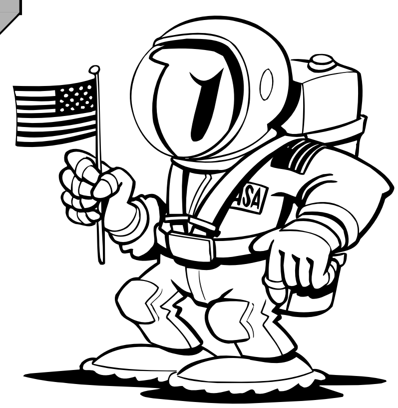


Name____Date____________

Finding Area

1. Find the area of the space station shown below. Note: All vertical and horizontal segments meet at right angles.



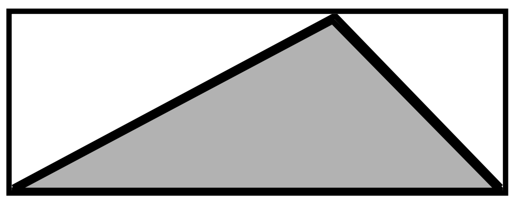


2. What is the name of this shape?
3. Do all eight interior angles of the shape have the same measure? What is their measure? Explain your answer.
4. Do all eight sides of this shape have the same measure? Explain your answer.

Name____Date___________

Mini Review - Area

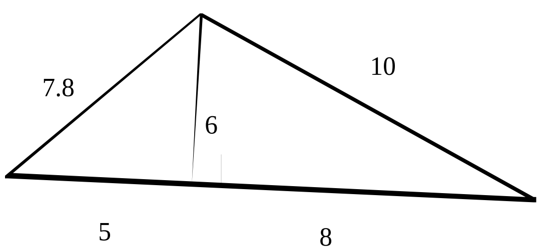
1. The area of the rectangle shown is 48 square cm. What is the area of the shaded triangle?



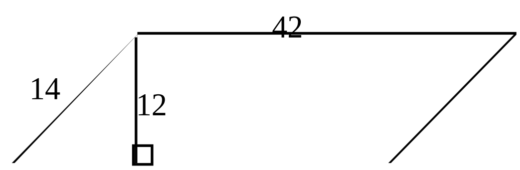
2. The area of the rectangle shown is 48 square cm. What is the area of the parallelogram shown?

Find the area of each figure shown. Measurements are in inches.

3.

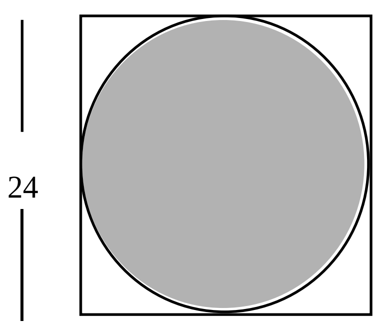


4.

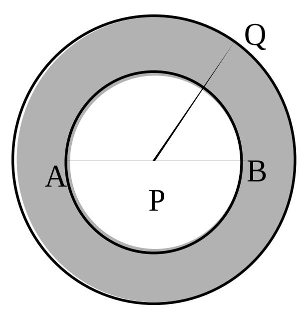


Find the shaded area. Measurements are in centimeters.

5.



6.



AB = 18, PQ = 12

Name____Date____________

Mini Review – Area (cont.)

Fill in each blank below.

7. 1 square foot = ________ square inches

8. 1 square yard = ________ square feet

9. 1 square meter = _________ square cm

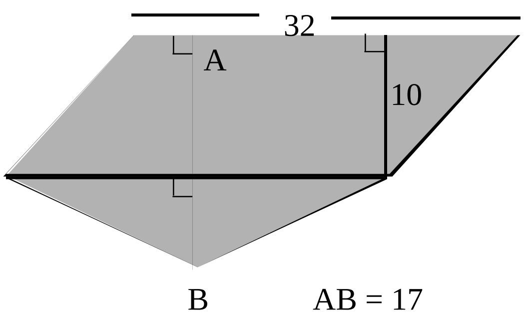
10. 1 square cm = ______ square mm

11. 36 square yards = ________ square feet

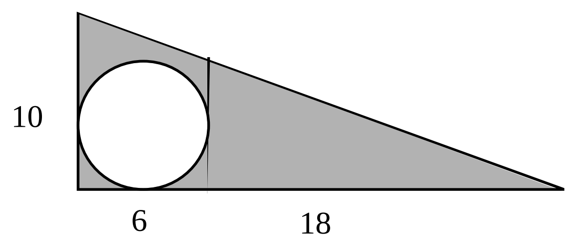
12. 3000 square cm = _______ square m

Find each shaded area below. Show your work. Measurements are in inches.

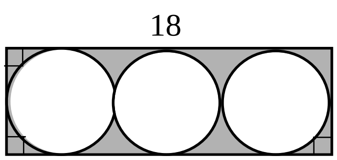
13.



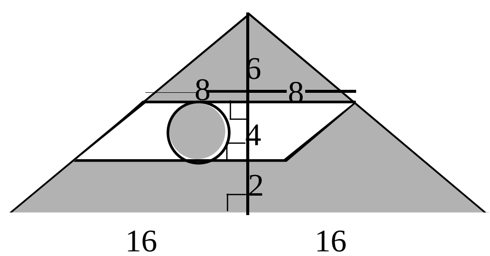
14.



15.

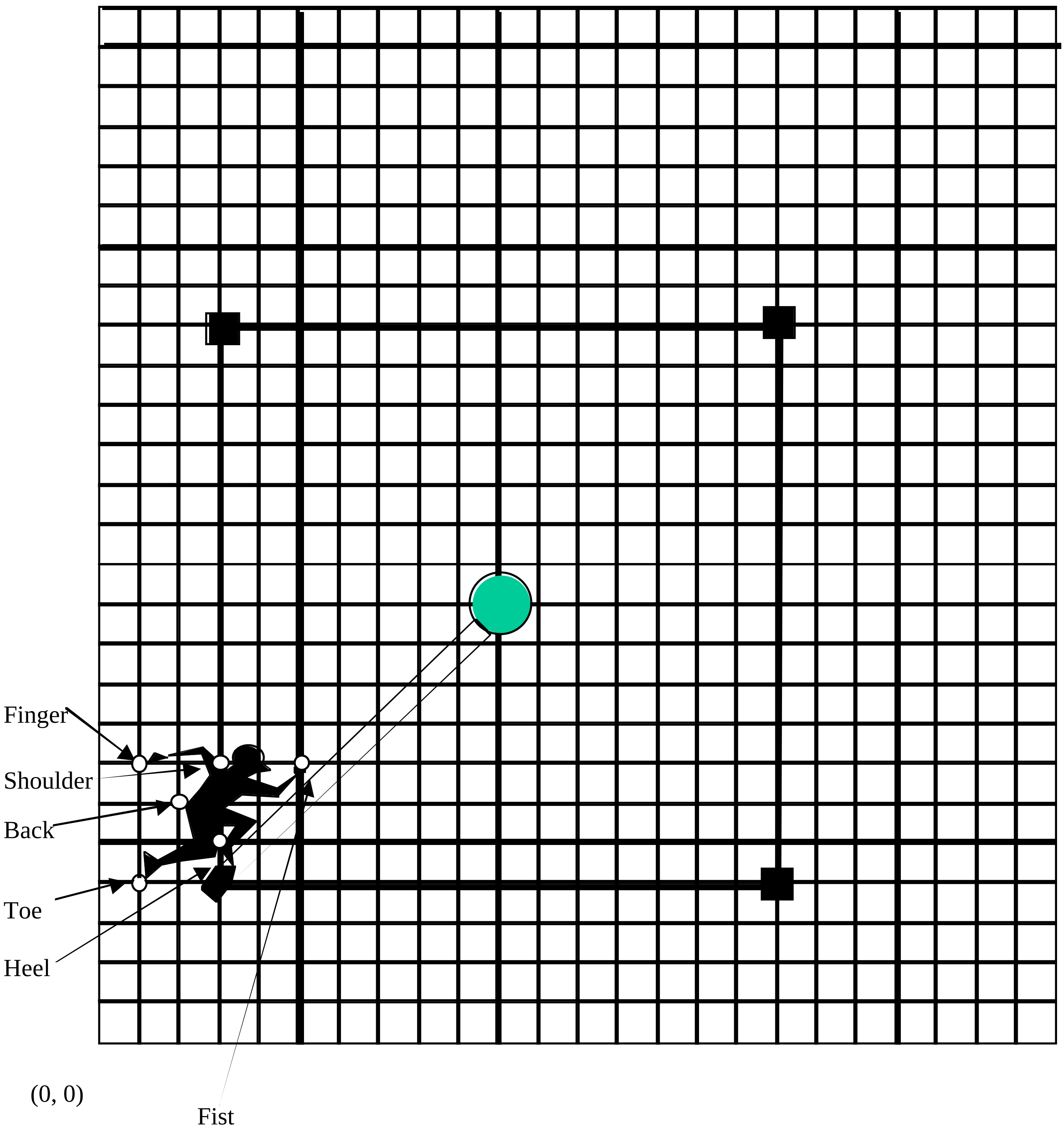


16.



Name____Date__________

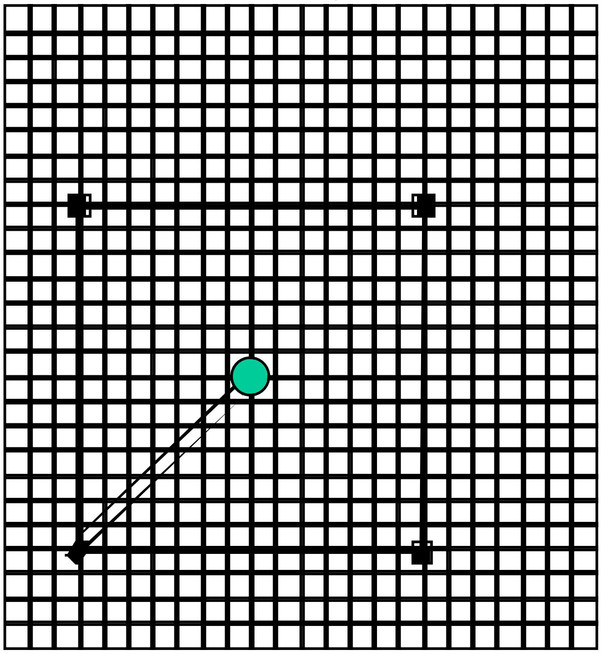
Slammin' Sammy



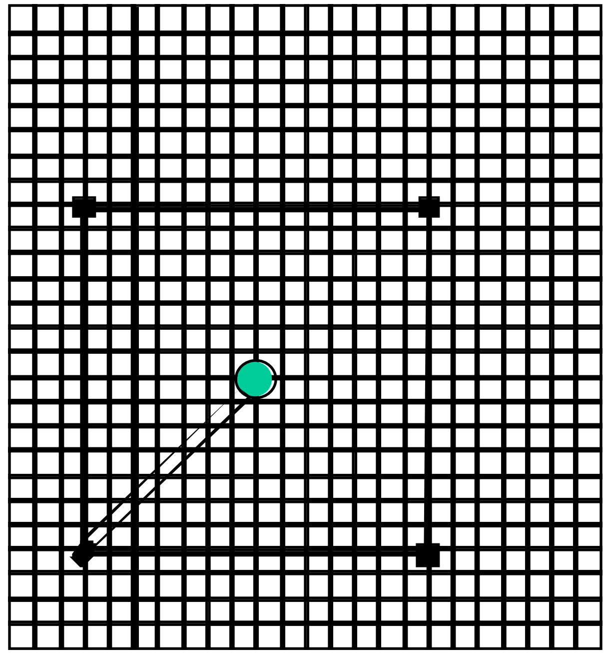
1. Give the coordinates of Sammy's six body parts:
Finger (,) Shoulder (,) Back (,) Toe (,) Heel (,) Fist (,)

Name____Date__________

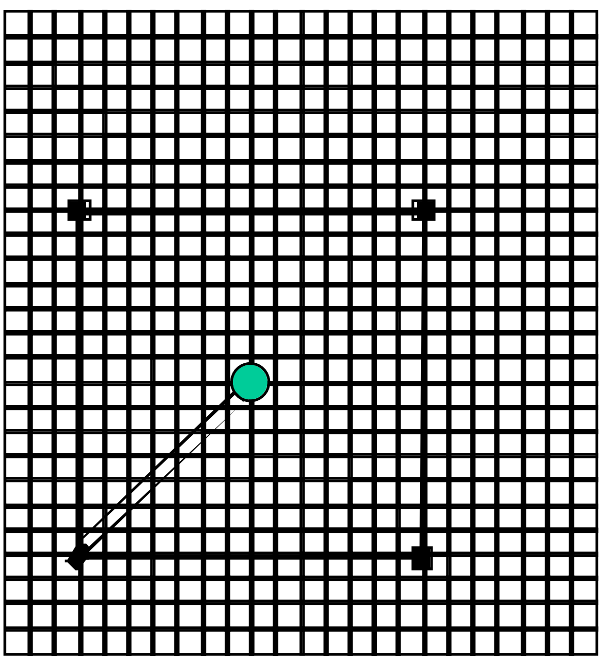
Slammin' Sammy



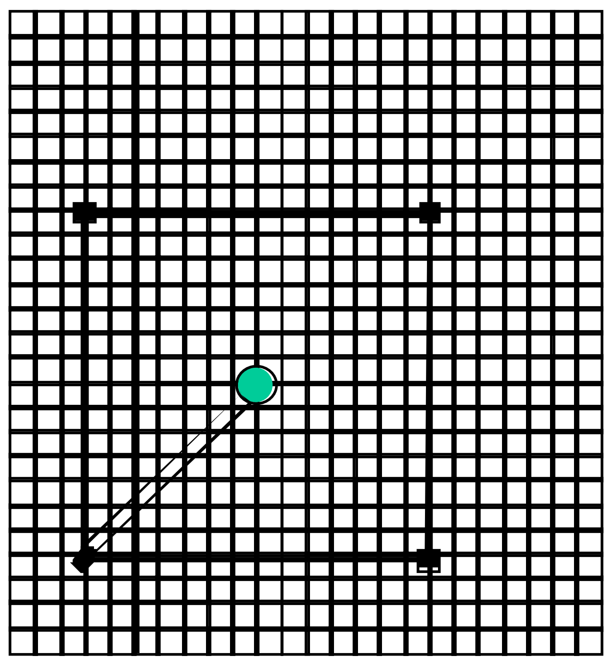
2. Draw Sammy at 1st base and give the coordinates of his five other body parts.
Toe (15, 4)



3. Draw Sammy at 3nd base and give the coordinates of his five other body parts.
Toe (1, 18)



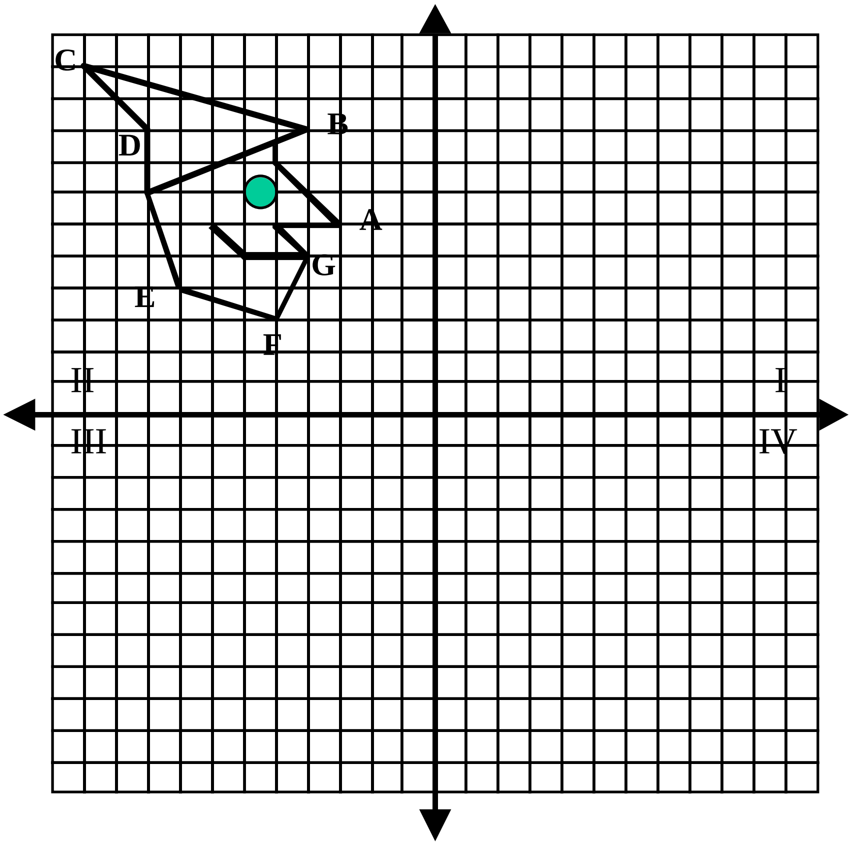
4. Draw Sammy at 2nd base and give the coordinates of his five other body parts.
Toe (17, 18)



4. Draw Sammy at 2nd base but this time Reflect him to face 3rd base.
Toe (17, 18)

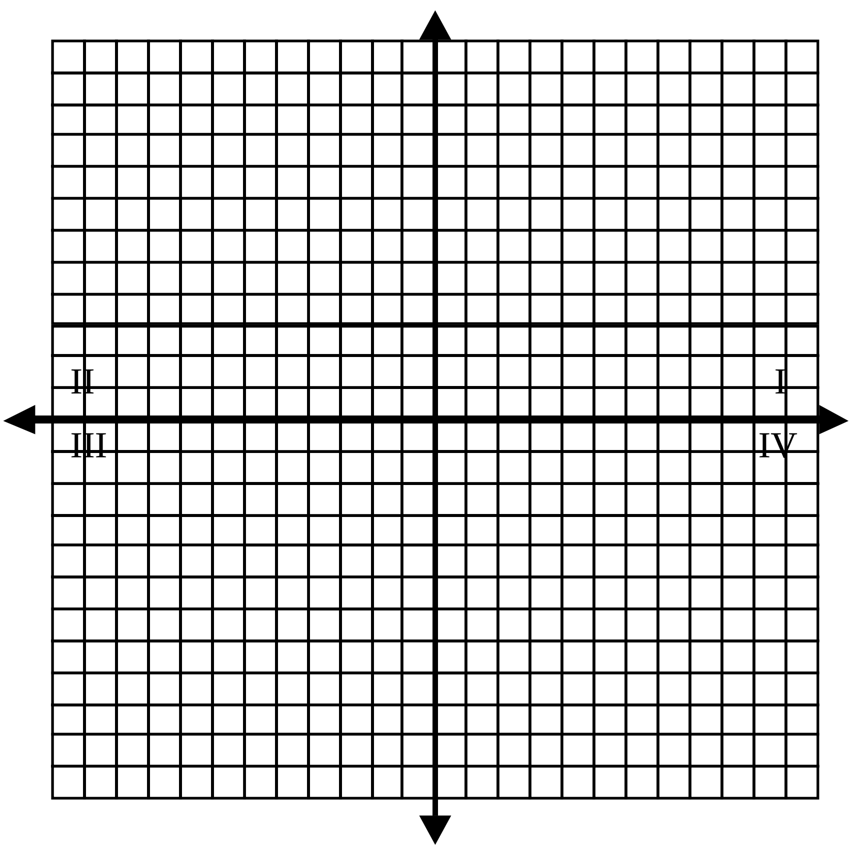
Name_______________________________________Date___________

Draw it Again, Sam



Slide Sam into quadrant IV. Then flip Sam upside down into quadrant III. List the coordinates.

	II	IV	III
A	(-3,6)	(9, -6)	(-3, -6)
B	______	______	______
C	______	______	______
D	______	______	______
E	______	______	______
F	______	______	______
G	______	______	______

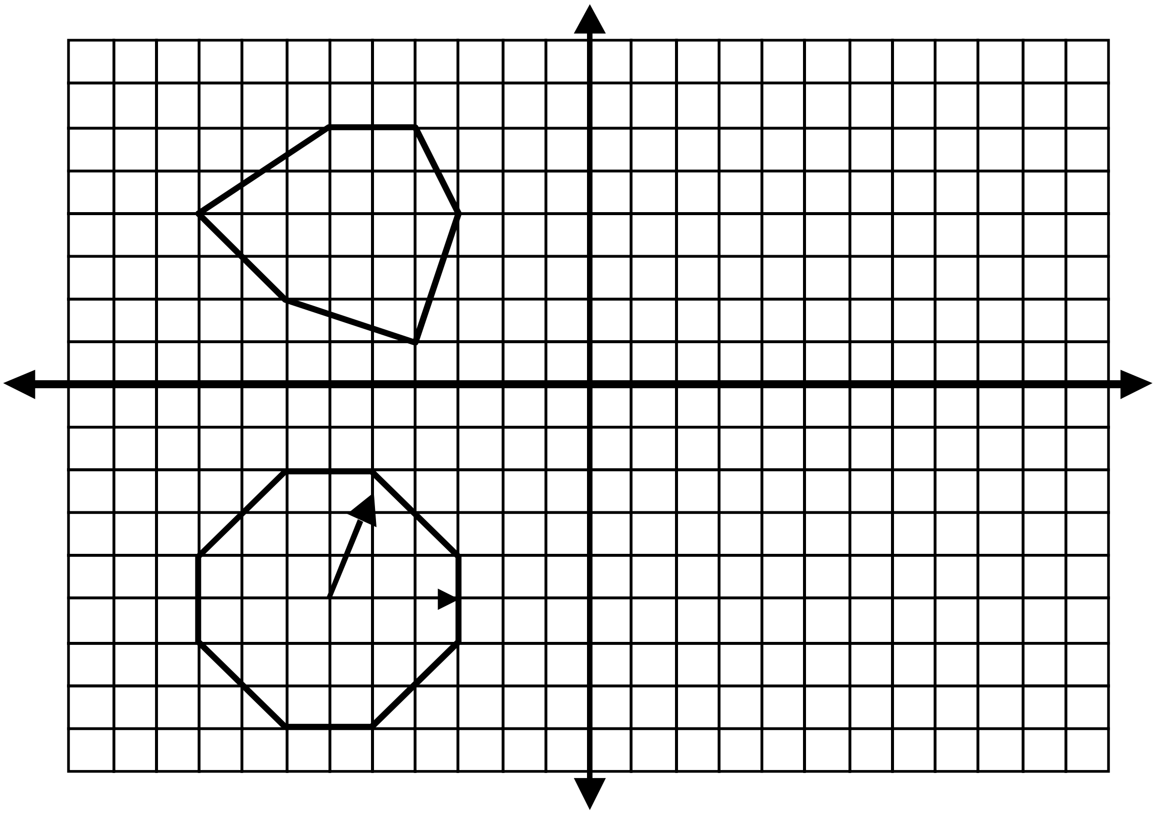


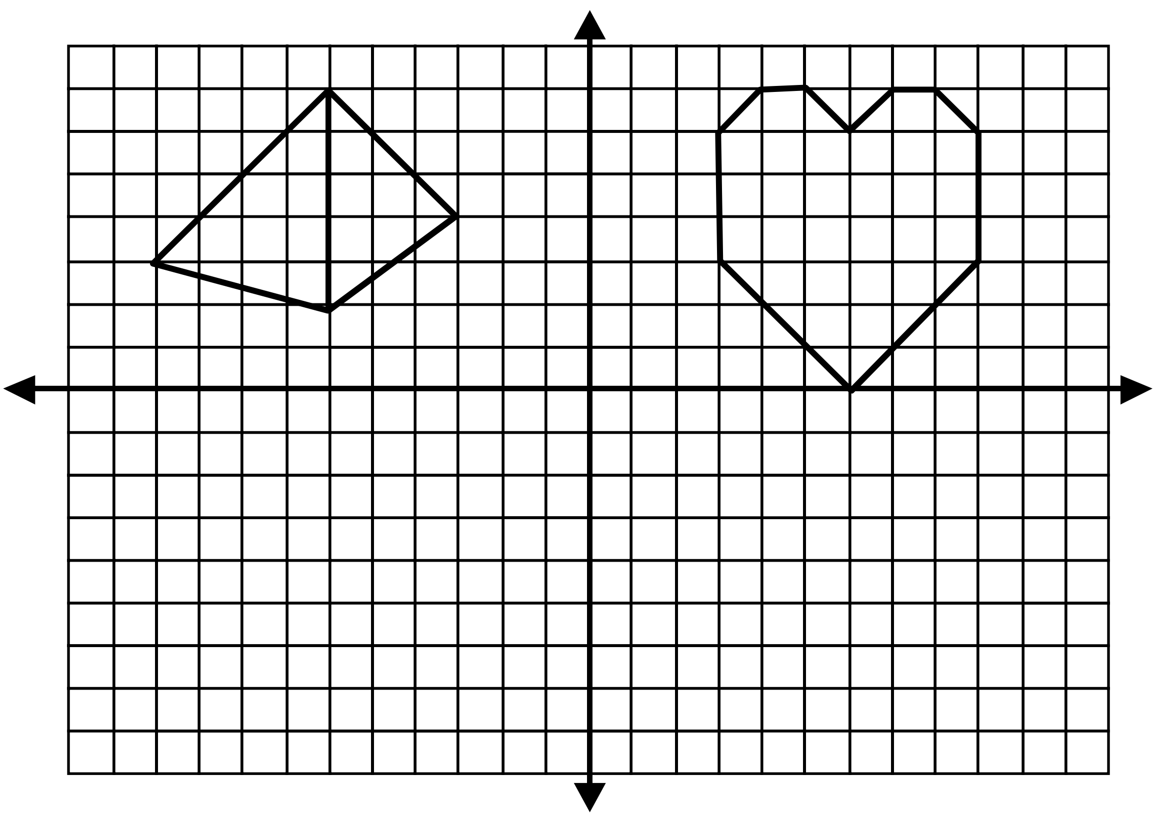
Now draw your own design in quadrant II. Slide it into quadrant IV. Then flip it upside down into quadrant III.
List the coordinates.

	I	IV	III
A	______	______	______
B	______	______	______
C	______	______	______
D	______	______	______
E	______	______	______
F	______	______	______
G	______	______	______

Name______________________________________Date___________

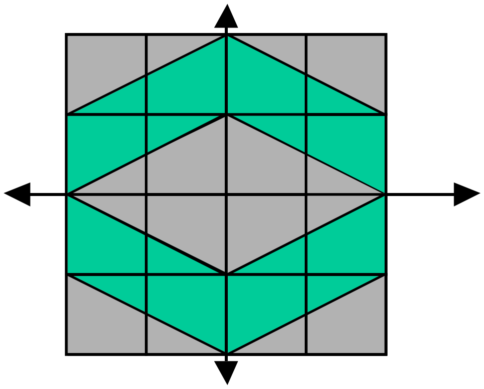
MIRA™ Activity



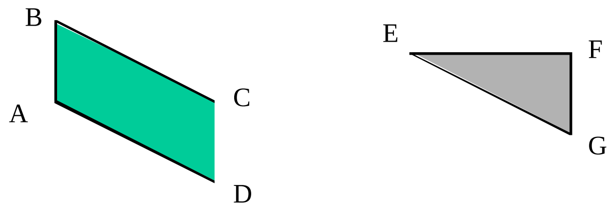


Name_________________________________Date__________

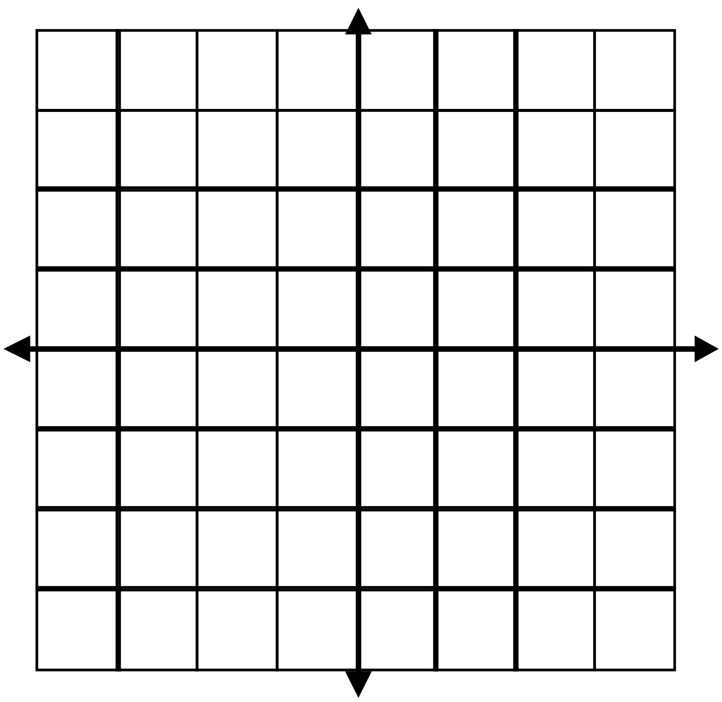
Quilter Challenge



Here is one way to create a design on a grid using the two shapes shown below.



Use the shapes to create your own design.
List the coordinates of each triangle and each parallelogram used.



Parallelogram coordinates

A B C D

Triangle Coordinates

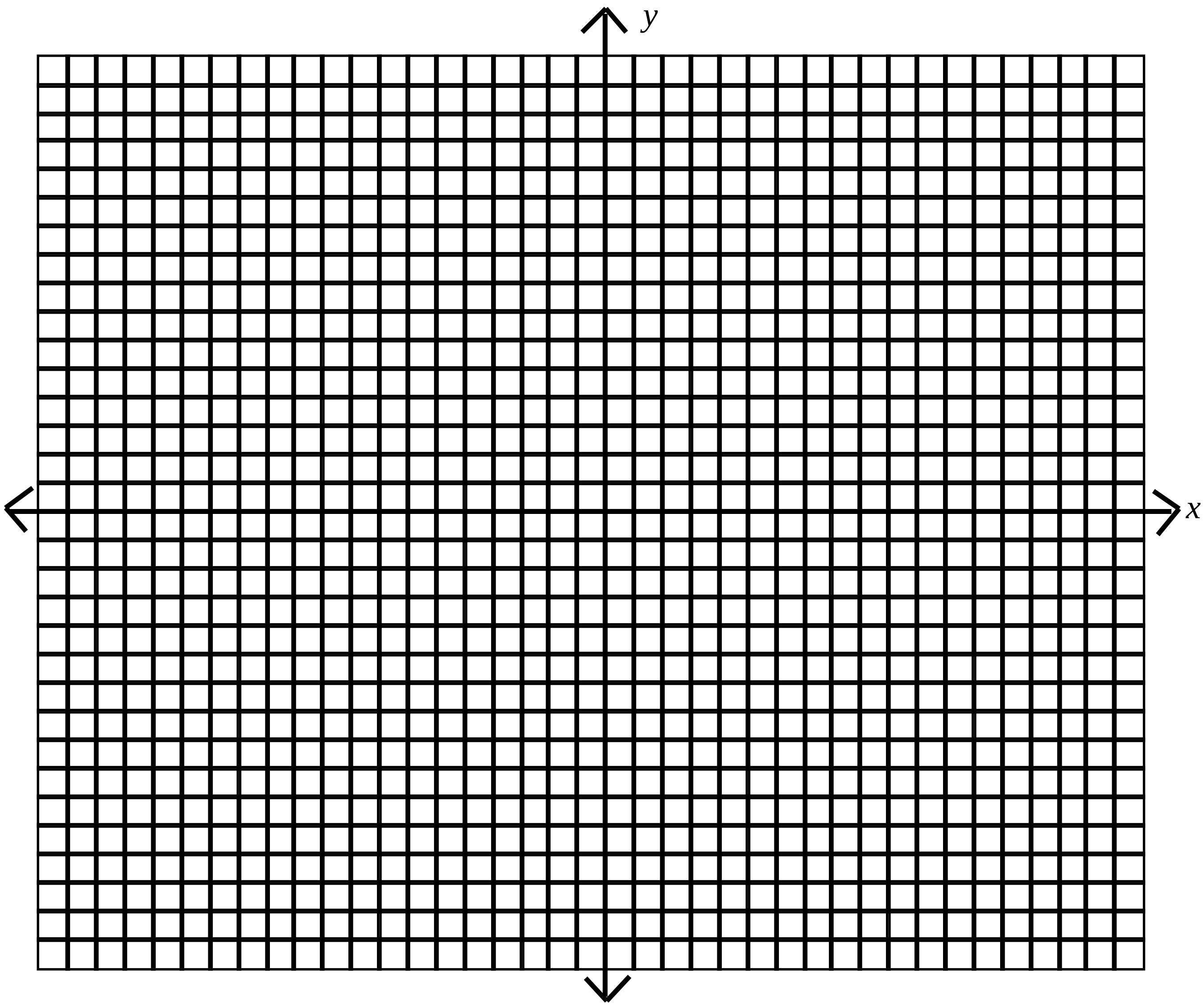
E F G

Geometric Transformations - **Name_________________________** **Date________________**

1. Connect these points in order to make a quadrilateral. (-1,2), (7, -3), (15,2), (7, 10)

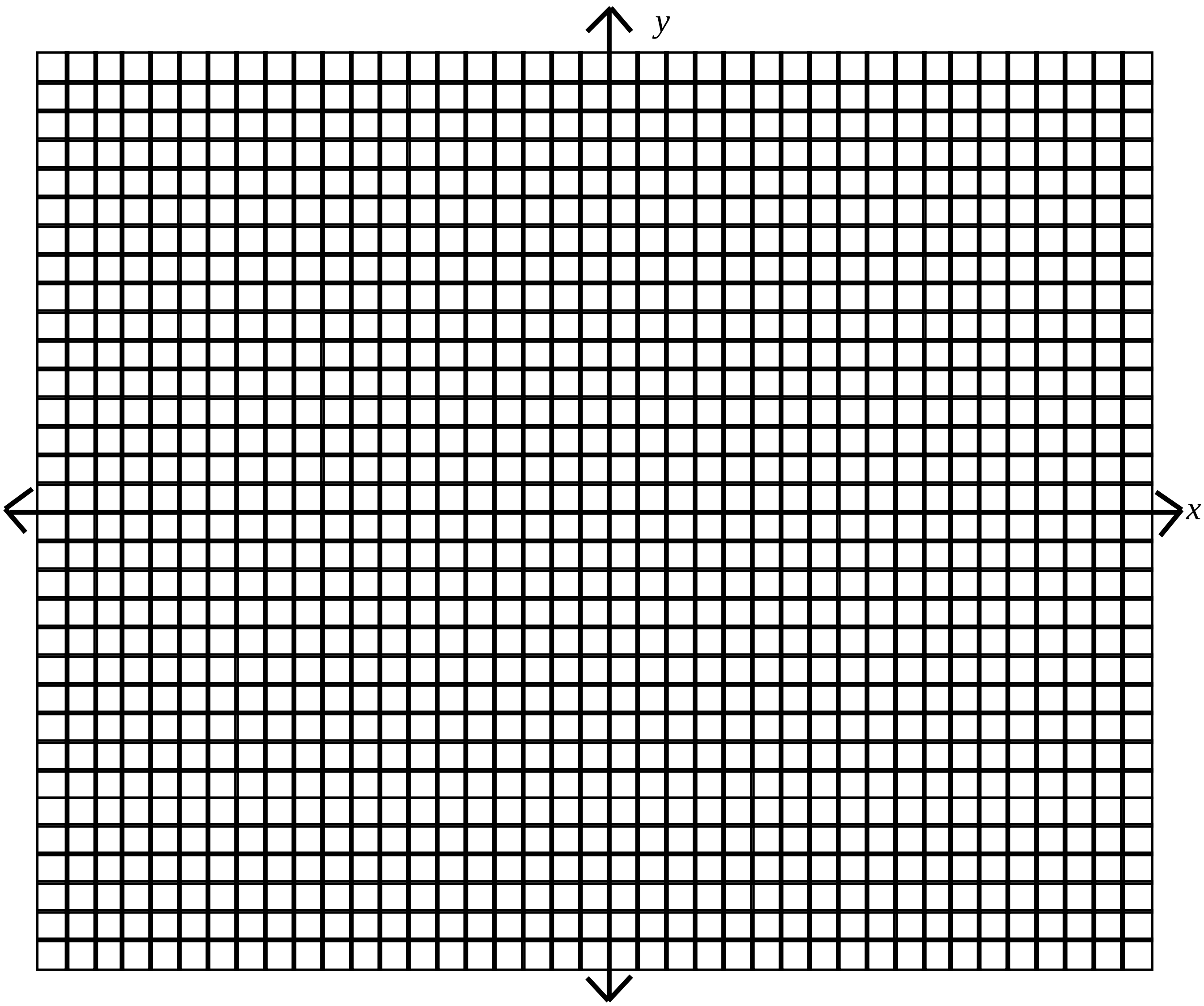
2. Draw the quadrilateral after it has been reflected over the *y*- axis. Draw this quadrilateral in red. List the new coordinates.

3. Reflect the original quadrilateral over the *x*-axis. Draw this quadrilateral in blue. List the new coordinates.



Geometric Transformations - **Name**________________________ **Date**_______________

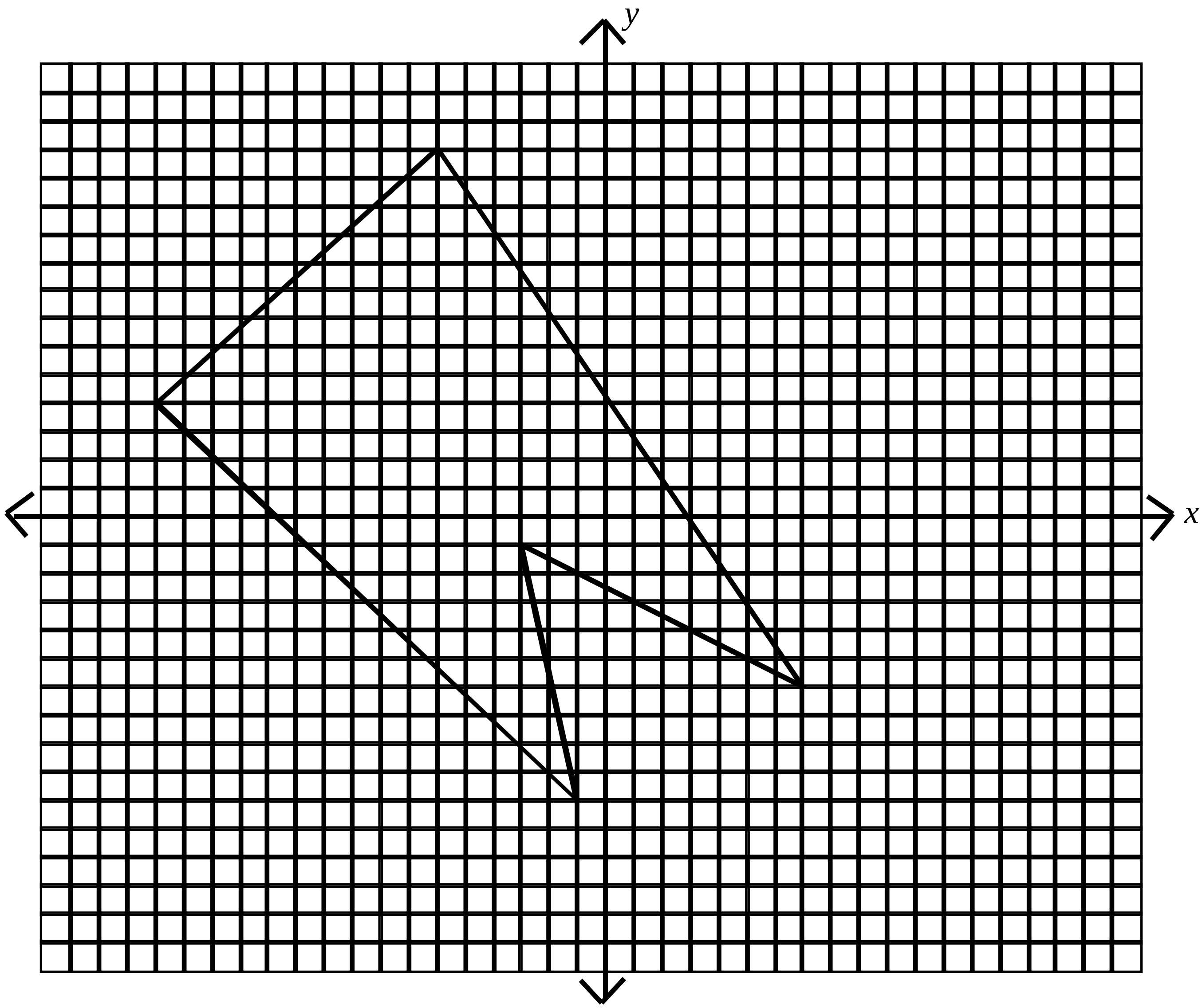
1. Connect these points in order to make a quadrilateral:
   (-12,-2), (-12,10), (-6,10), (-6, 5), (-12,5)
2. Translate the figure according to the rule: (x, y) ⟶ (x + 8, y - 10)



Geometric Transformations - **Name**________________________ **Date**_______________

1. Draw the pentagon below after it has been reflected over the *y*- axis. Draw this figure in red.

2. Draw the pentagon below after it has been reflected over the *x*-axis. Draw this figure in blue.



Name____Date__________

Transformations in the Coordinate Plane

Joseph Georgeson

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1991 Mathematics Institute

In the context of transformations, students will explore the effect addition and multiplication have on shapes drawn in the coordinate plane. Why is it, for example, that when something is added to the coordinates of a shape, it is not changed in size, only in position? Or how does multiplication of the coordinates of a shape affect the shape if the number is positive, negative, bigger than 1, less than 1 but bigger than 0, or equal to 1, or the result of adding numbers that are less than 0 to the coordinates?

The activities should be set up so that students are given the instructions for making a transformation rule. Their job is to work in cooperative groups and attempt to make conjectures about their rules, test the validity of their conjectures, and demonstrate to other groups what they have found. It is hoped that through the activities in this unit, students will come to a better understanding of arithmetic as it applies to this geometric model, and will have a better appreciation for the transformations that they see in the world around them.

Prerequisite:

· coordinate geometry (knowing how to locate points when the coordinates are given)
· area and perimeter on grid paper (informal knowledge is all that is required)
· other skills that students either have learned and forgotten, or never have learned at all

(Note: This is always the case in any class, so it is assumed that the teacher will provide appropriate instruction when necessary. For example, if students have never used variables, they will need some instruction. Some students, however, may have had exposure to variables, but in a different context. The teacher must determine what enabling instruction needs to be given.)

A discussion of the word "transformation" would be a good place to begin this unit. A general definition of transformation might be "change." Examples to be considered are slides, turns, flips, expansions, contractions, or combinations of these. The vocabulary that is used should be whatever students can understand at an intuitive level.

Students should be able to give many examples of transformations that they see around them. Have them give examples while a list is kept on the overhead. Keep that list during the time the unit is being done for reference. A few examples that might be mentioned (you should spend time informally discussing these examples and solicit from students many more examples):

· bricks on a wall, ceiling tiles, desks in a classroom, and blocks on a sidewalk can all be modeled by a translation or slide;

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Transformations in the Coordinate Plane

·propellers, certain letters of the alphabet, and Ferris wheels are examples of turns or rotations;
· people growing, the image of a shape on an overhead projector, or the image of a slide in a slide projector are all models of an expansion;
· melting ice, maps of the world, and model airplanes are models of contractions; and mirrors, cars, people, and many geometric shapes model reflections or flips.

This list is not complete. Students should add to this list from their own experiences. Once they start, they will find many examples. This could be an ongoing activity from the beginning of the unit until the end of the year.

Activity 1:

On the first day bring magazines to class and have students identify pictures that represent each of the transformations. Make a bulletin board on which a collage of examples of the various transformations are displayed. Students could work in groups and put their pictures on the board in an organized fashion. One group could be responsible for “putting up” rotations or turns, while another group might be responsible for translations. Every group will find examples and funnel them to the appropriate group to decide how to display all of them.

End the class with discussion of their examples. Many questions could be asked, such as how they identified the transformation. What characteristics make a translation? How can you describe the rotation you found? What is special about a flip or reflection that tells you that it is one?

Activity 2:

The class will be exploring the transformations that they identified and displayed in Activity 1. However, they will be doing the exploration on graph paper using mathematical notation to describe each transformation. The same mathematics that works on graph paper is applicable to the real world models of transformations they have found. It is important to relate this mathematical model to the real world examples as often as possible. The following example introduces the notation that students will use during this unit. It gives students a working vocabulary to apply to each task so that they will understand what they are looking for when they work independently.

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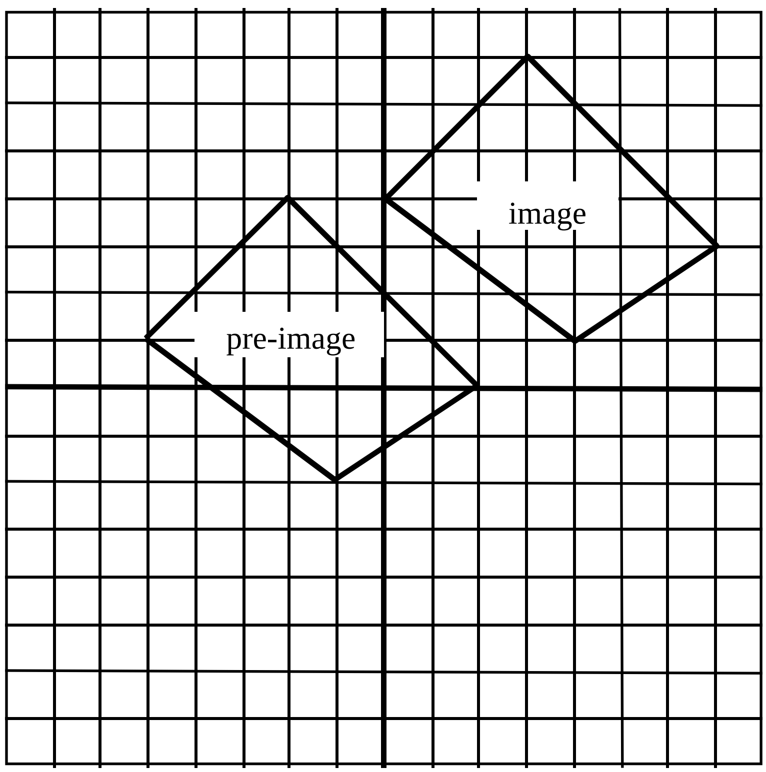
Transformations in the Coordinate Plane

Vocabulary: pre-image — the original shape
image — the transformed shape

Example 1: Demonstrate the following transformation:
(x,y) ⟶ (x + 5, y + 3) means add 5 to the x-coordinate and 3 to the y-coordinate for each of the vertices in the pre-image to build the image.



For example, the point (-1,-2) is transformed into the point (4,1) using the rule, "add 5 to the first coordinate, and add 3 to the second coordinate." The other vertices of the pre-image are transformed in the same way.

Note to teachers: Shapes can be restricted any way the teacher feels is necessary. For example, restricting shapes to the first quadrant might be necessary for some classes, although, in some cases it might be surprising to see what students can do and understand if the context is meaningful. The context of these transformations could serve as a good model to introduce in a meaningful way the idea of adding positive and negative numbers.

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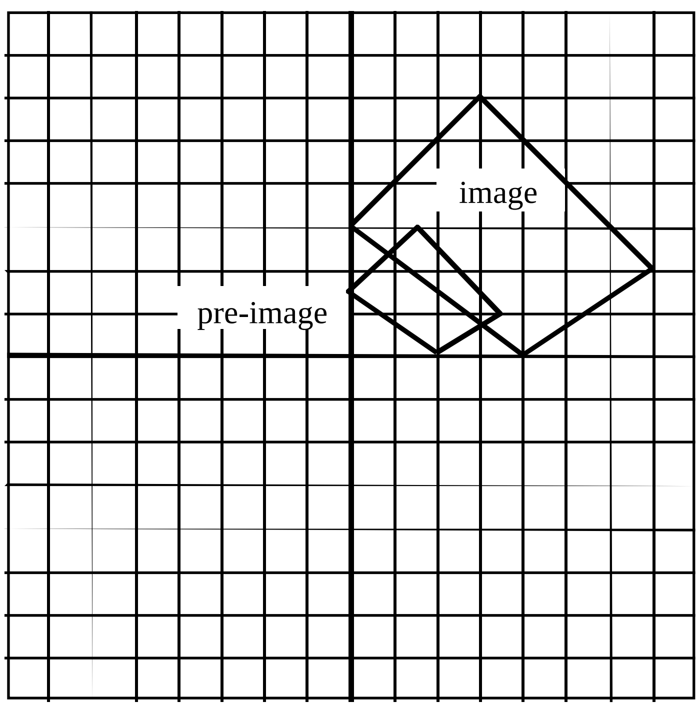
Transformations in the Coordinate Plane

Questions:
In what ways are the image and pre-image alike?
How are they different?
Did the same thing happen to every point, or just the corners?
Are the shapes similar? Congruent?
Are the lengths similar? Equal?
What do the numbers 5 and 3 have to do with anything?
What if 5 were subtracted instead of added?
Why didn't the shape get bigger -- we added something to the coordinates?
If corresponding vertices are connected, what shape results?
What questions can you (the student) ask?
Are there other things you noticed?
Are the shapes oriented the same way? (Is the top still the top?)
What if this transformation were done over and over again?
Many more are possible. Students could surely come up with a few.

Next, ask students to predict what will happen in the following transformation:
$[(x,y) \longrightarrow (x+4, y+4)]$
Why do you think that? How is this like the first one that was demonstrated?
How could you verify your prediction?

Example 2: Demonstrate the following transformation:
$(x,y) \longrightarrow (2x,2y)$



Name____Date________

Transformations in the Coordinate Plane

Notes:

The image of (2,0) is (4,0), and so on. The coordinates in the image are found by following the rule, "double each coordinate." It is important to both write the rule using algebra (symbols) and say the rule using everyday language. This helps students see that one use of a "variable" is to describe in a convenient way a pattern or rule that has some use.

Other shapes could be graphed. It is important to pick shapes that fit on the graph paper you are using. Students could make up their own. Be careful (or aware) of shapes like squares or rectangles with lines of symmetry that make it difficult to see certain transformations.

Questions:

Is this an expansion or a contraction (did the image get bigger or smaller)?
What happened to the shape?
How are the image and pre-image related (sides, angles, orientation)?
If corresponding vertices are connected, what shape results?
How is the area related? (This might be where a "guess" is acceptable, or simply the idea that the shape got bigger or smaller if the transformation is a contraction.)
What is the ratio of the length of the pre-image to the length of the image?
How do the areas compare when expressed as a ratio?

Activity 3:

Give students adequate time, plenty of graph paper, and some rules to investigate. After doing the few you recommended, they should make up some rules on their own. Their job as they do this activity is to discover relationships between what is done to the coordinates and its effect on the image. The features they should look for are size (area and perimeter), orientation (top, bottom, left, and right), shape (similar, congruent, stretched, distorted), and others that students feel are important to name in describing what happened to the shape after it was transformed. Which of these features remained the same, and which were changed? How were they changed? The vocabulary of the students and the way in which they described the transformation should be accepted. Try to make them feel that the discoveries they are making are new and different and that you are surprised.

Name____Date________

Transformations in the Coordinate Plane

Suggested Transformations:

Students should investigate several classes of transformations:

a. Transformations that lead to expansions will be of the form:
$(x,y) \longrightarrow (ax,ay)$, where $a > 1$.

b. Transformations that lead to contractions will be of the form:
$(x,y) \longrightarrow (ax,ay)$, where $0 < a < 1$.

c. Transformations that lead to reflections will be of the form:
$(x,y) \longrightarrow (ax,ay)$, where $a < 0$. The size may change also.

d. Transformations that lead to translations or slides will be of the form:
$(x,y) \longrightarrow (x + a,y + b)$, where a and b are real numbers. Integers would be the easiest to consider.

e. Transformations of the form $(x,y) \longrightarrow (y,x)$ will lead to reflections, but the line of reflection will be the line $y = x$.

f. Other transformations that could be explored:
$(x,y) \longrightarrow (0,y)$
$(x,y) \longrightarrow (x,0)$
$(x,y) \longrightarrow (x,y)$
$(x,y) \longrightarrow (2,4)$

Summary Questions:

How does the image of a shape that is drawn change when the coordinates are changed according to some rule? What features of the shape are changed, and what features remain fixed? How could you describe the changes? How are the changes related to what was done to the coordinates? These are some questions that this unit attempts to answer. It is not important for all students to find all of the answers. It is, however, important for all students to explore these patterns and work with other students to better understand these ideas.

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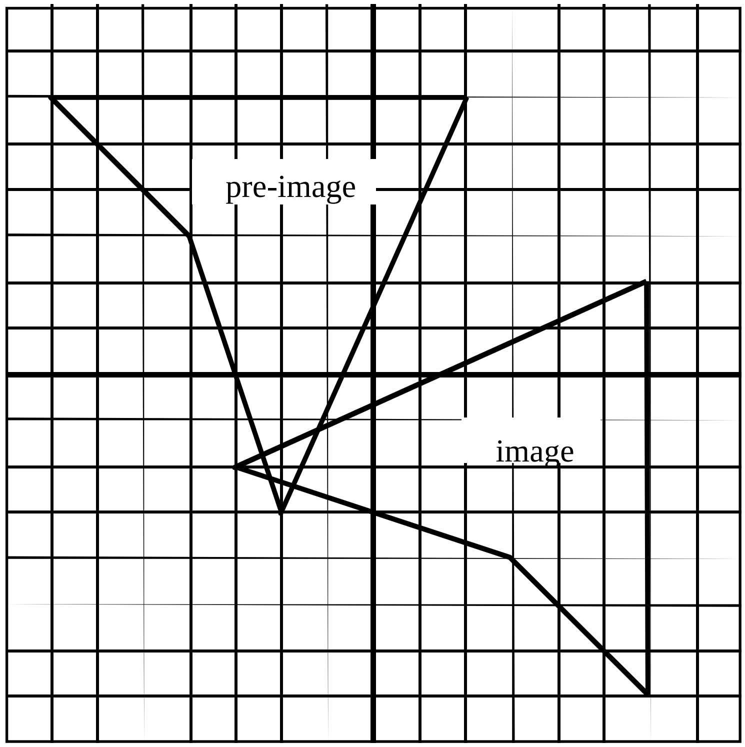
Transformations in the Coordinate Plane

Some examples of what students should be able to do.

(x,y) → (y,x)



(x,y) → (-x,-y)

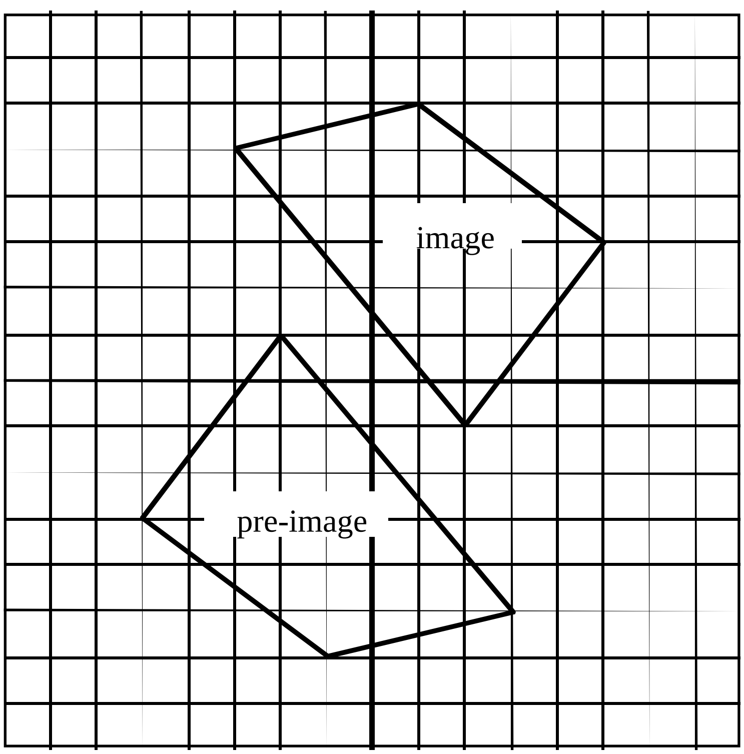


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Table Top Transformations

Materials:

· A large piece of 1" grid graph paper from a roll or 4 sheets of 1" grid graph paper taped together to form on large sheet

· Markers · Index cards

· Rulers · Charts TTT-1 and TTT-2

· Scissors · Graph grids to record transformations

1) Write in your math notebook anything you know about slides, flips, and turns.
2) Compare notes with a partner and make additions.
3) Investigate and discuss correct vocabulary (translations, reflections, and rotations).
4) Use your large sheet of graph paper to make a coordinate plane. Show x- and y- axes. Label grid from -12 to 12.
5) Cut geometric shapes described in BlacklineMaster III - 17 from 3″ x 5″ index cards.
6) Place the rectangle in the first quadrant with vertex A at (2,3) and B at (2, 6).
7) Record the other coordinates in TTT-1 for the original position.
8) Complete the chart for the rectangle’s translation 3 right and 1 down, rotation 90 degrees clockwise, and reflection across the y-axis.
9) Remember to return to your original position after completing each transformation.
10) Repeat steps 7-10 for each polygon.
11) On separate graph paper, graph the original position, rotation, translation and reflection for each polygon.

Extensions:

·Complete chart TTT-2

·Use different starting points, polygons, points of translation

·Rotate different degrees and directions

·Reflect across a line other than an axis, or rotate around a point other than the origin.

·Try a larger-than-life-size coordinate plane on the floor of your classroom. Use students to plot points.

Concepts to Review:

·Placement and labeling of quadrants

·Geometric shapes, names and properties

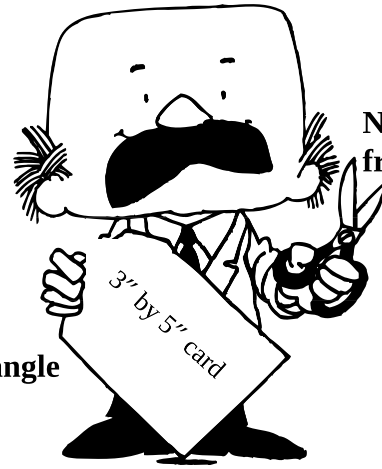
·Writing ordered pairs

·Location of x- and y-axes

·Counterclockwise and clockwise

Name____Date___________

Table Top Transformations

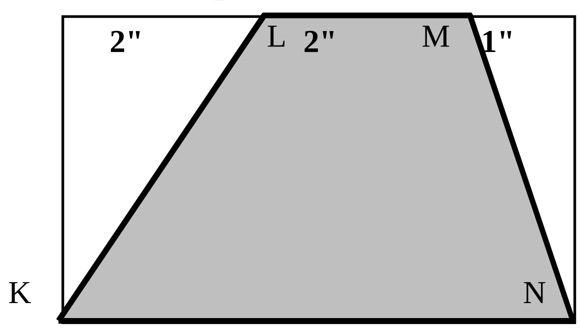


Note: cut these shapes from 3″ by 5″ cards

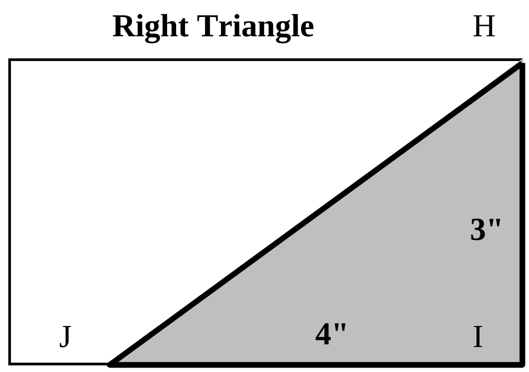
Shapes to use:

Rectangle

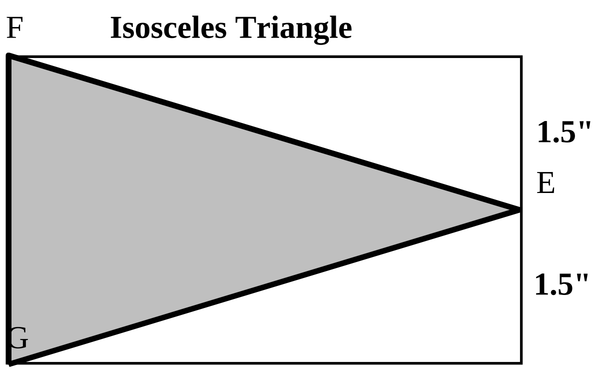
Trapezoid



Right Triangle



Isosceles Triangle



Name____Date________

Table Top Transformations
Chart (TTT - 1)

Give coordinates of original position, then the coordinates of the transformed shape.
The rotation is 90^0 clockwise about the origin. The reflection is about the y- axis.

Shape	Original Position	Translate 3 right, 1 down	Rotate 90^0 Clockwise	Reflect across y-axis
Rectangle	A(2, 3) B(2, 6) C(,) D(,)	A(,) B(2, -4) C(,) D(,)	A(,) B(,) C(,) D(,)	A(,) B(,) C(,) D(,)
Right Triangle	H(0, 3) I (0, 0) J (,)	H(,) I (2, -4) J (,)	H(,) I (,) J (,)	H(,) I (,) J (,)
Isosceles Triangle	E (-2.5 , 0) F (,) G(-1 , -5)	E(,) F(,) G(-1 , -3)	E (,) F (,) G(,)	E(,) F(,) G(,)
Trapezoid	K(,) L (6, -1) M(8, -1) N(,)	K(,) L (,) M(,) N(-1 , 1)	K (,) L (,) M(,) N (,)	K(,) L (,) M(,) N(,)

Name____Date________

Table Top Transformations
Chart 2 (TTT-2)

Record coordinates of origional position of your choice, then the coordinates of the transformed shape. The rotation is 180^0 clockwise about the origin. The reflection is about the x-axis.

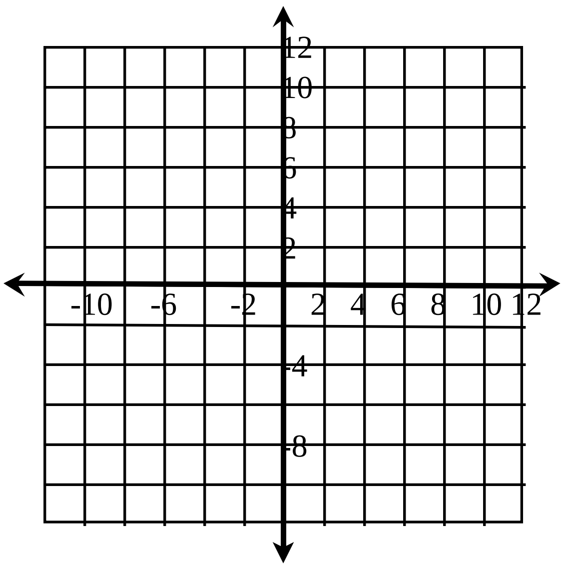
Shape	Original Position	Translate	Rotate	Reflect
Rectangle	A(,) B(,) C(,) D(,)	A(,) B(,) C(,) D(,)	A(,) B(,) C(,) D(,)	A(,) B(,) C(,) D(,)
Right Triangle	H(,) I(,) J(,)	H(,) I(,) J(,)	H(,) I(,) J(,)	H(,) I(,) J(,)
Isosceles Triangle	E(,) F(,) G(,)	E(,) F(,) G(,)	E(,) F(,) G(,)	E(,) F(,) G(,)
Trapezoid	K(,) L(,) M(,) N(,)	K(,) L(,) M(,) N(,)	K(,) L(,) M(,) N(,)	K(,) L(,) M(,) N(,)

Name____Date____________

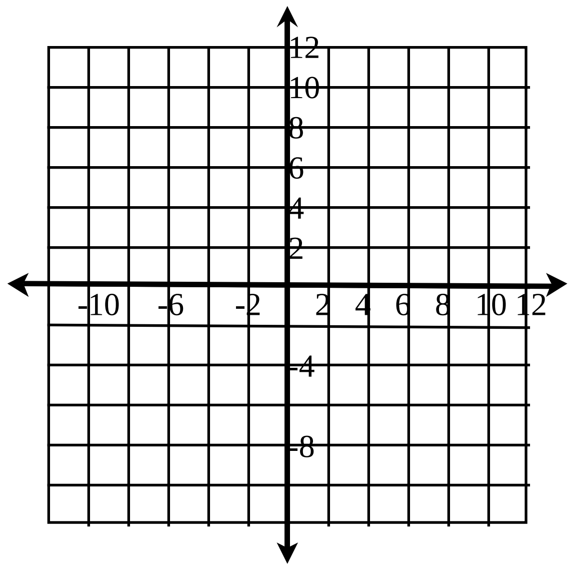
Table Top Transformations

Grid Recording Sheet

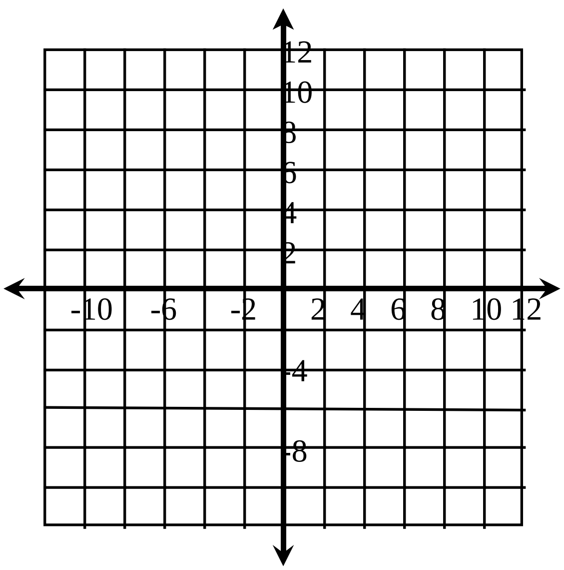
Polygon ____________



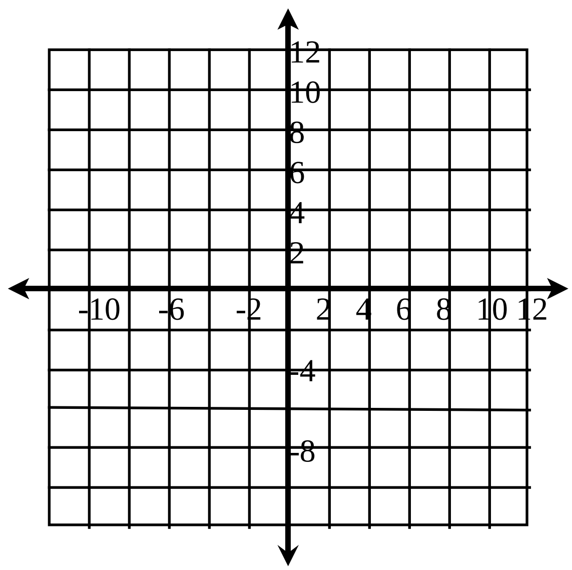
Original Position



Translation



Rotation



Reflection

Name____Date___________

One Inch Square Grid Paper

Name______________________________________Date___________

Coordinating Change

I. Plot the following points and draw the polygon, ABCD.
A(0,0), B(0,5), C(5,5), D(5,0)
What is the shape of ABCD? ___________

What is the perimeter of ABCD? __________

What is the area of ABCD? ___________

II. On a new grid, draw a new shape. Use the same coordinates as ABCD, but change each *x*-value to 3 times the original value. Keep the *y*-values the same.
A′(,), B′ (,), C′(,), D′(,)
How does the shape of A'B'C'D' compare to the shape of ABCD?

What is the new perimeter? __________

What is the new area? __________

III. On a new grid, draw a new shape. Use the same coordinates as ABCD, but change each *y*-value to 2 times the original value. Keep the *x*-values the same.
A′′(,), B′′ (,), C′′(,), D′′(,)
How does the shape of A′′B′′C′′D′′ compare to the shape of ABCD?

What is the new perimeter? __________

What is the new area? __________

IV. On a new grid, draw a new shape. Use the same coordinates as ABCD, but change each *x*-value AND each *y*-value to 2 times the original value.
A′′′(,), B′′′ (,), C′′′(,), D′′′(,)
How does the shape of A′′′B′′′C′′′D′′′ compare to the shape of ABCD?
What is the new perimeter? __________
What is the new area? __________

Name____________________________________Date__________

Coordinating Change (cont.)

V. Plot the following points and draw the polygon, ABCDEFGH.
A(0,0), B(6,0), C(6,8), D(4,8), E(4,4), F(2,4), G(2,8), H(0,8)
What is the shape of ABCDEFGH? __________
What is the perimeter of the polygon? _________
What is the area of the polygon? __________

VI. On a new grid, draw a new shape. Use the same coordinates as ABCDEFGH, but change each *x*-value to 3 times the original value. Keep the *y*-values the same.
A′(,), B′ (,), C′(,), D′(,), E′ (,), F′(,), G′(,), H′(,)
How does the shape of the new polygon compare with the original?

What is the new perimeter? _________
What is the new area? _________

VII. On a new grid, draw a new shape. Use the same coordinates as ABCDEFGH, but change each *x*-value to 3 times the original value. Keep the *y*-values the same.
A′′(,), B′′ (,), C′′(,), D′′(,), E′′ (,), F′′(,), G′′(,), H′′(,)
How does the shape of the new polygon compare with the original?

What is the new perimeter? _________
What is the new area? _________

VIII. On a new grid, draw a new shape. Use the same coordinates as ABCDEFGH, but change each *x*-value AND each *y*-value to 2 times the original value.
A′′′(,), B′′′ (,), C′′′(,), D′′′(,), E′′′ (,), F′′′(,), G′′′(,), H′′′(,)

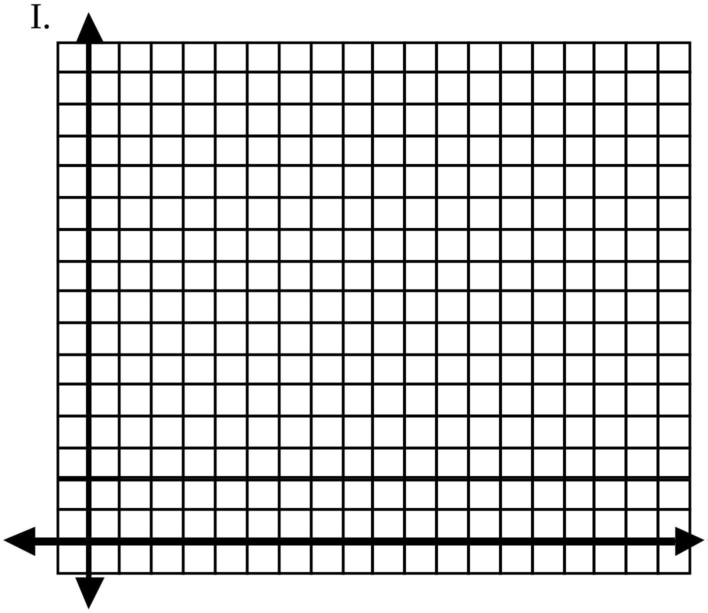
How does the shape of the new polygon compare with the original?

What is the new perimeter? _________
What is the new area? _________

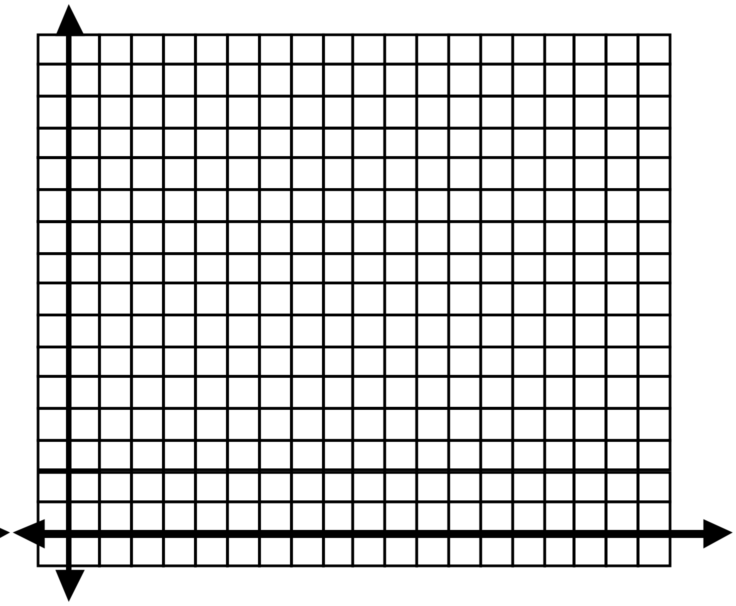
Name_____________________________________Date___________

Coordinating Change – Grid Sheet

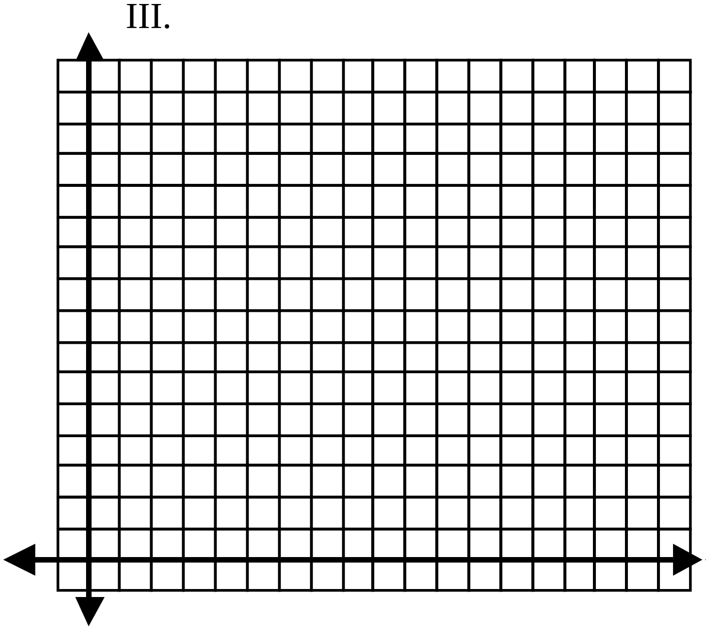
I.



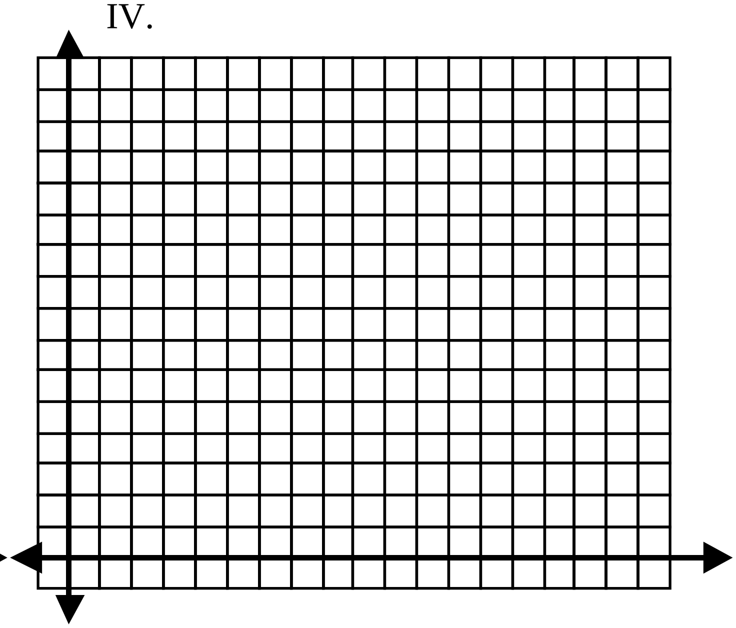
II.



III.



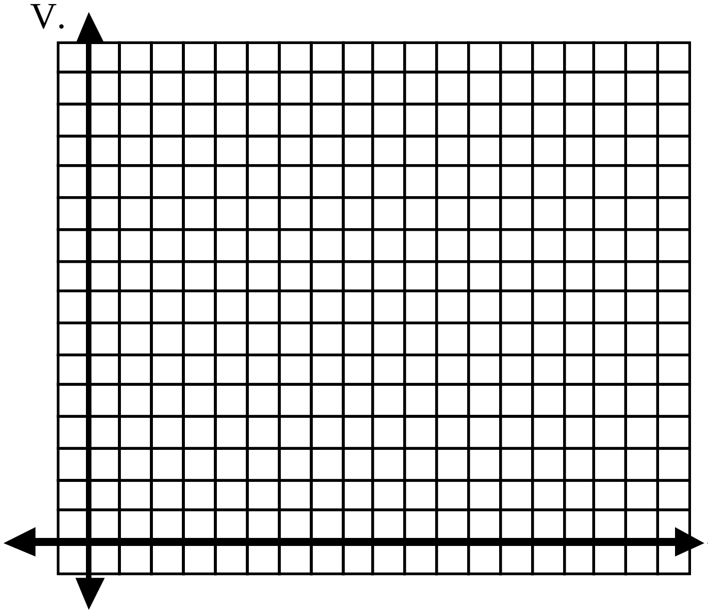
IV.



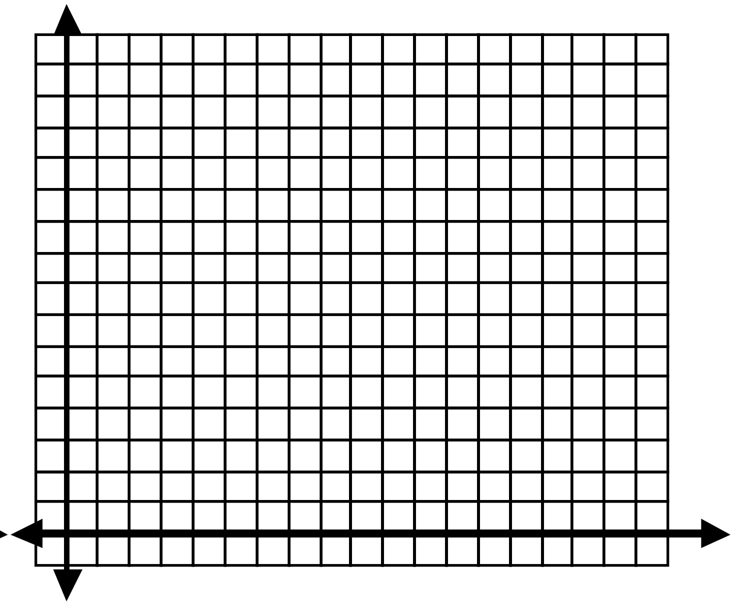
Name____________________________________Date__________

Coordinating Change – Grid Sheet

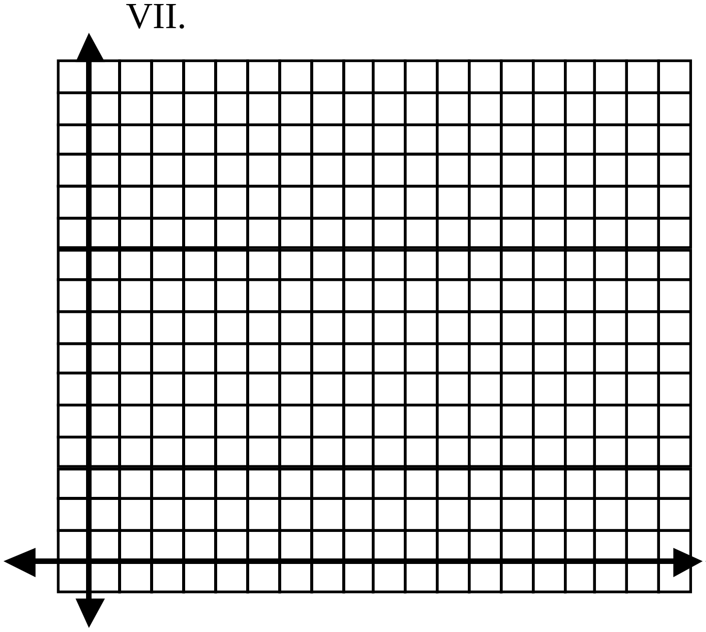
V.



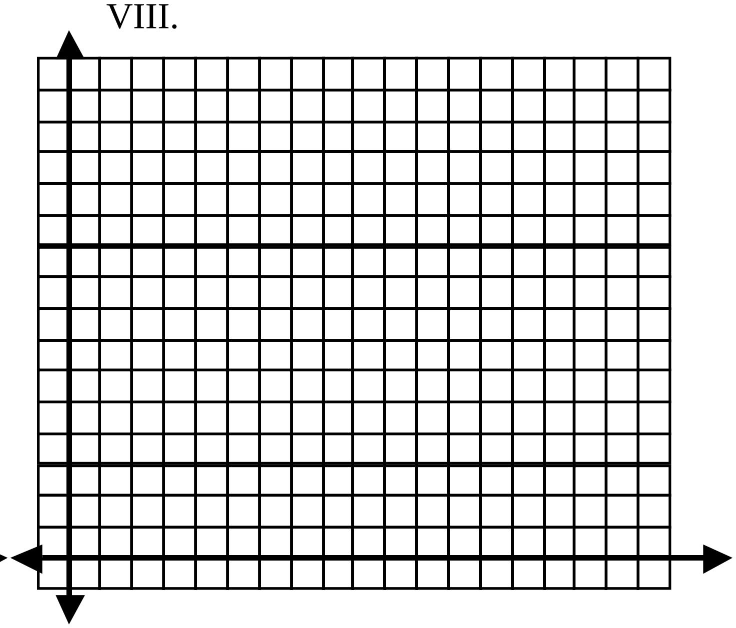
VI.



VII.



VIII.



IX. Suppose a regular pentagon is drawn so that the area is 20 square inches. An enlargement is made with each side of the new figure being twice the length of each side of the original. Predict the area of the enlarged pentagon.

____

Decimal Drop

Name____Date____________

Trial 1: Capture distances with only decimeter markings

Name	Trial 1	Trial 2	Trial 3	Average

Trial 2: Capture distances with centimeter markings

Name	Trial 1	Trial 2	Trial 3	Average

Decimal Drop

Name____Date____________

Trial 1: Capture distances with only decimeter markings

Name	Trial 1	Trial 2	Trial 3	Average

Trial 2: Capture distances with centimeter markings

Name	Trial 1	Trial 2	Trial 3	Average

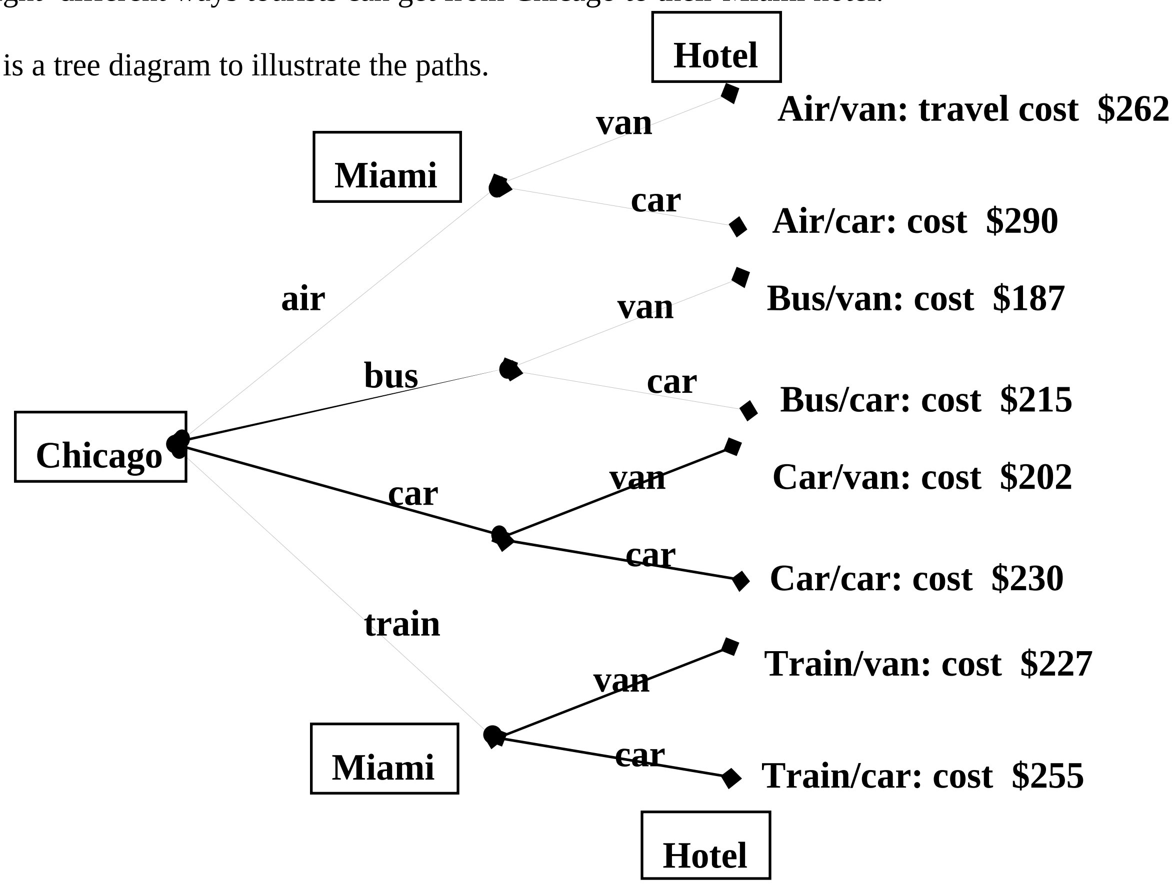
Name________________________________Date__________

Tree Diagrams and the Fundamental Counting Principle

The **Fundamental Counting Principle** tells us that if we have two decisions to make, and there are ***M*** ways to make the first decision, and ***N*** ways to make the second decision, the product of ***M*** and ***N*** tells us how many different outcomes there are for the overall decision process. In general, when a series of decisions are to be made, the product of all the ways to make individual decisions determines the number of outcomes there are.

Example: A travel agent plans trips for tourists from Chicago to Miami. He gives four ways to get from town to town: air, bus, car, train. Once the tourists arrive, there are two ways to get to the hotel: hotel van or car. Since there are four ways to make the first decision, and two ways to make the second, there are eight different ways tourists can get from Chicago to their Miami hotel.

Here is a tree diagram to illustrate the paths.



1. If these eight outcomes are chosen equally by tourists, what is the probability that a randomly selected tourist used a car for both parts of the trip?
2. What is the probability that a randomly selected tourist used a car on at least one part of the trip?
3. What is the probability that the trip cost less than $200?
4. What is the probability that the trip cost over $250?
5. If the tourists were flying to New York, there would be a third way to get to the hotel – subway. Draw a tree diagram to show the possible routes. How does this relate to the Fundamental Counting Principle?

Name________________________________Date__________

Tree Diagrams and the Fundamental Counting Principle (cont.)

Andy has asked his girlfriend to make all the decisions for their date on her birthday. She will pick a restaurant and an activity for the date. Andy will choose a gift for her. The local restaurants include Mexican, Chinese, Seafood, and Italian. The activities she can choose from are Putt-Putt, bowling, and movies. Andy will buy her either candy or flowers.

How many outcomes are there for these three decisions?
Draw a tree diagram to illustrate the choices.

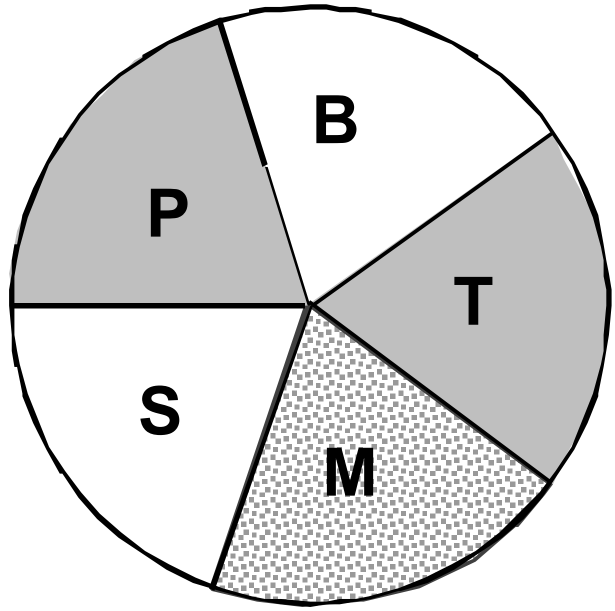
Dinner for Two	Cost for two	Gift Cost
Mexican - $20	Putt-Putt - $14	Flowers - $25
Chinese - $25	Bowling - $10	Candy - $7
Seafood - $30	Movies - $20	
Italian - $15		

1. If all the possible outcomes are equally likely, what is the probability that the date will cost over $50?
2. What is the maximum cost for the date? The minimum?
3. What is the average cost for this date?
4. What is the probability that the date costs exactly $60?
5. What is the probability that the date costs under $40?

Name________________________________Date__________

My Word!

Group member	Task
A	Spin the letter spinner
B	Toss coin for a vowel: Heads = A Tails = I
C	Toss coin for a letter: Heads = E Tails = R



I. Make a tree diagram to show the possible words.
What is the probability that your group will make a word?

B

T

M

S

P

Name________________________________Date__________

My Word! continued.

II. Do the experiment 25 times. What percentage of the time did your group form a word?

Check here if you formed a word

1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				

III. Compare theoretical probability with experimental probability.

IV. Would you play this game? What if a carnival had this experiment as a game? To play you pay 50 cents, and if you make a word, you win 75 cents. Discuss the fairness of this game and the wisdom of playing or running the game.

Name______________________________________Date_____________

Frequency Distribution

Materials needed: 25 unbroken pieces of dried spaghetti pasta, metric ruler, recording sheet.

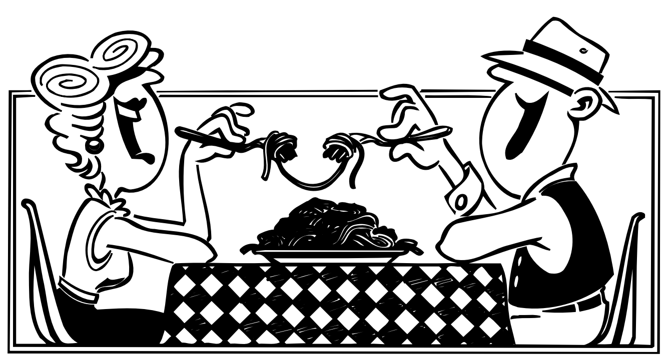
Work with a partner. Break each of the spaghetti strands into two pieces. The breaking point should vary in as random a pattern as possible.

Measure each piece to the nearest mm and record the lengths in the frequency distribution table shown below.

Length	Tally	Frequency	Percentage
0 – 2 cm	_____	________	_______
3 - 5 cm	_____	________	_______
6 – 8 cm	_____	________	_______
9 – 11 cm	_____	________	_______
12 – 14 cm	_____	________	_______
15 – 17 cm	_____	________	_______
18 – 20 cm	_____	________	_______

Is there a problem with the categories selected? How can you correct this?
Fix the problem and complete the table.

Length	Tally	Frequency	Percentage
_______	_____	________	_______
_______	_____	________	_______
_______	_____	________	_______
_______	_____	________	_______
_______	_____	________	_______
_______	_____	________	_______
_______	_____	________	_______



Name____Date___________

Space Race

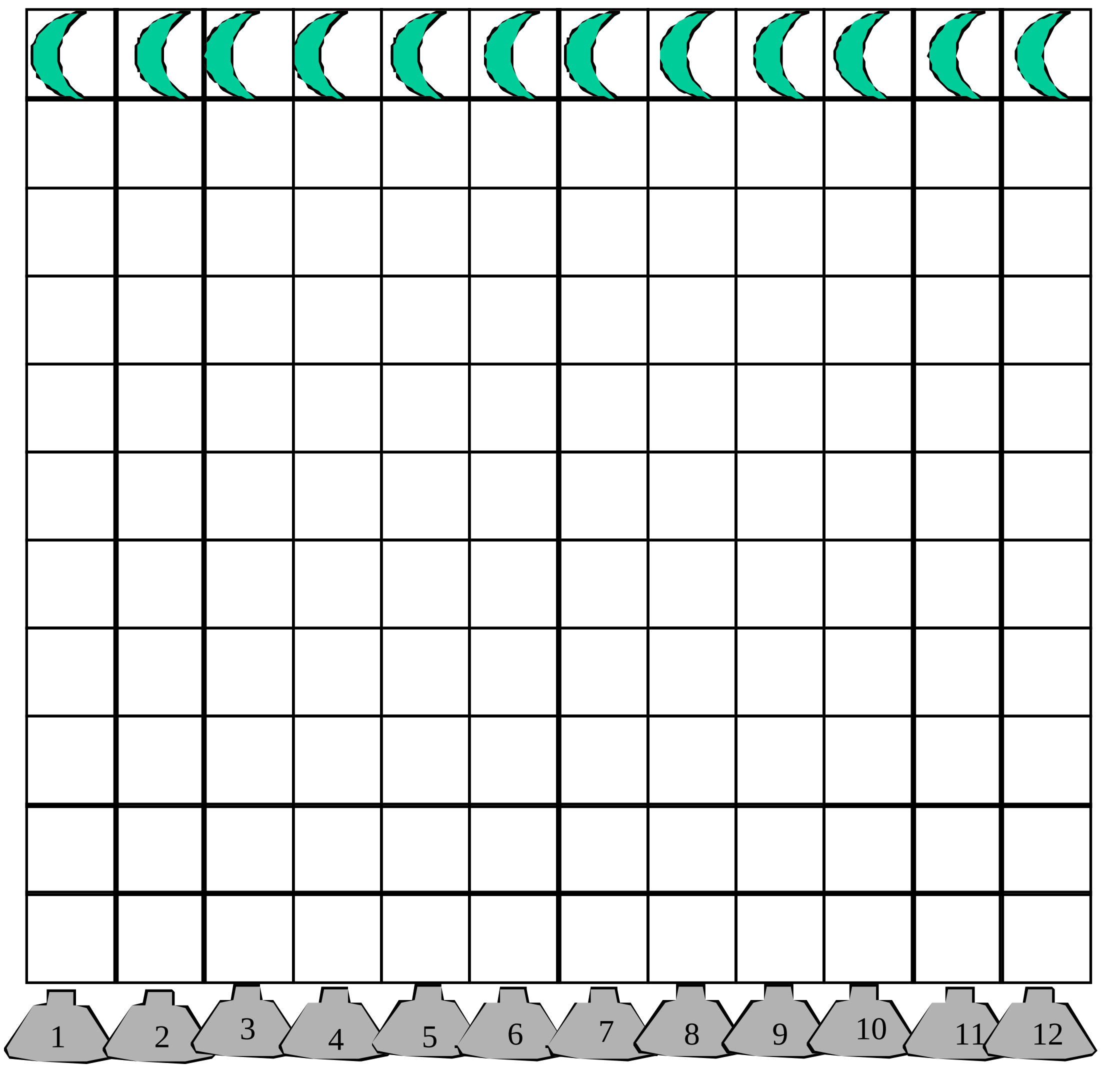
In 1957 the USSR launched the first satellite, Sputnik, into space. This started a space race between the USSR and the USA. Start your own space race below.

Roll a pair of dice. Each time you roll the dice, make an **X** in one of the boxes above the number That represents the sum of the numbers on the dice you rolled.

Which space capsule will reach the Moon first?

Which would you want to be riding on?

Run the race three times if you have time.



Name____Date____________

Application Contingency

Age Range	Men	Women	Totals
20-29	30	18	48
30-39	24	24	48
40-49	80	40	120
50 and over	6	18	24
Totals	**140**	**100**	**240**

The table above shows the ages and gender of candidates who applied for the space colony. Use the information to answer the questions below.

1. There were 240 applicants. If all the applications are put in a barrel and one is drawn, what is the probability of drawing the application of someone from 40-49 years of age?

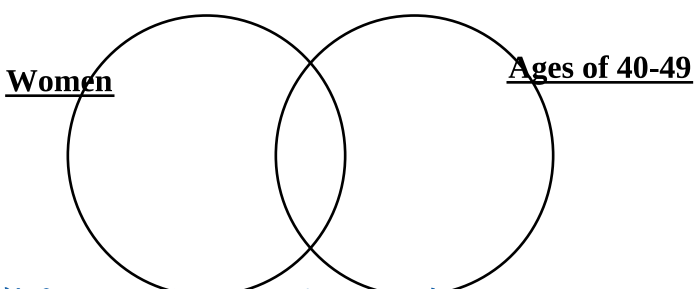
2. What is the probability of drawing the application of a woman?

3. What is the probability of drawing the application of a man 40-49 years old?

4. Susan picked an application from the barrel and said "I have the application of someone over 50." What is the probability that she had the application of a woman?

5. What is the probability of drawing an application of someone at least 40 years old?

6. Susan made a Venn Diagram as shown below. Indicate the number of applicants in each section of the diagram. How many will be in each section?



Name_______________________________________Date___________

Mini Review - Probability

A class has access to these random number generators: some regular six-sided dice, some 12-sided dice, a spinner marked 1-10, and fair coins.

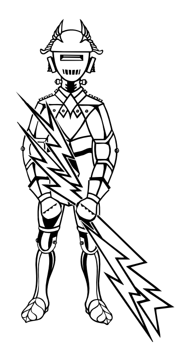
1. Someone in your class believes that if you toss heads on a coin, then the next toss is more likely to be tails than heads. Describe how you would design an experiment to test this. Carry out the experiment and describe the results.

2. Someone in your class wants to know the probability that when five people meet, at least two of them will be born in the same month. Describe how you would design an experiment to test this. Carry out the experiment and describe the results.

3. The *Bubble Chew* company puts 10 different Action Man cards in its packs - one card per pack.

What is the probability that you will have to buy fewer than 20 packs of gum to get the entire set?

How would you design an experiment to test this?
Carry out this experiment and describe the results.



Name____Date____________

Mini Review – Probability (cont.)

Answer each question below.

4. If a coin is fair, how many times can you expect to toss heads out of 50 tries?

5. If you roll a fair die, what is the probability of rolling a three?

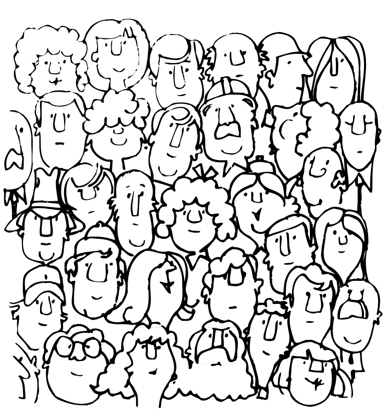
   If you roll this die 600 times, how many times can you expect to roll a three?

   If you roll this die six times, how many times can you expect to roll a three?

6., On Saturday afternoons, at a movie theater, there is an equal probability that the customers are male or female. Which is more likely, A or B?

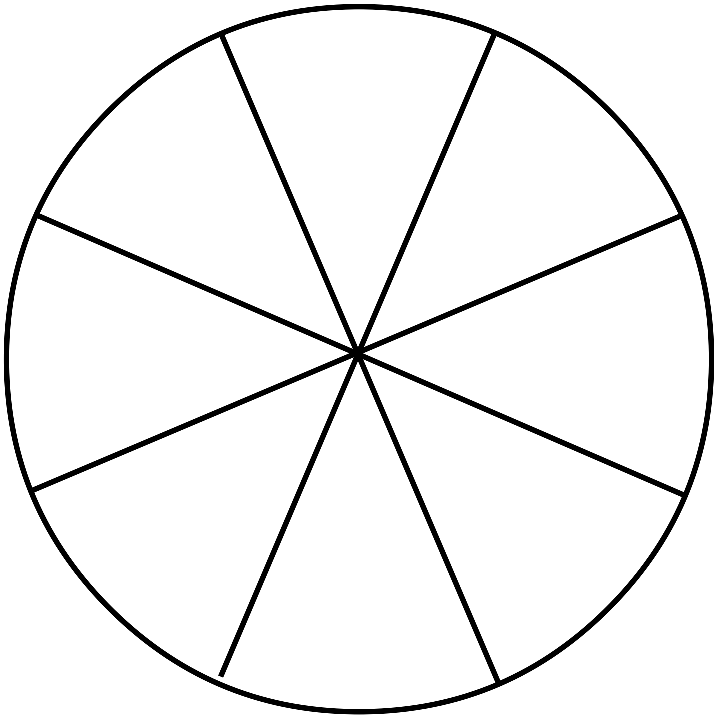
   A When the 200 seats fill up, 100 customers are male and 100 are female.
   B When the first two customers come in, one is male and one is female.

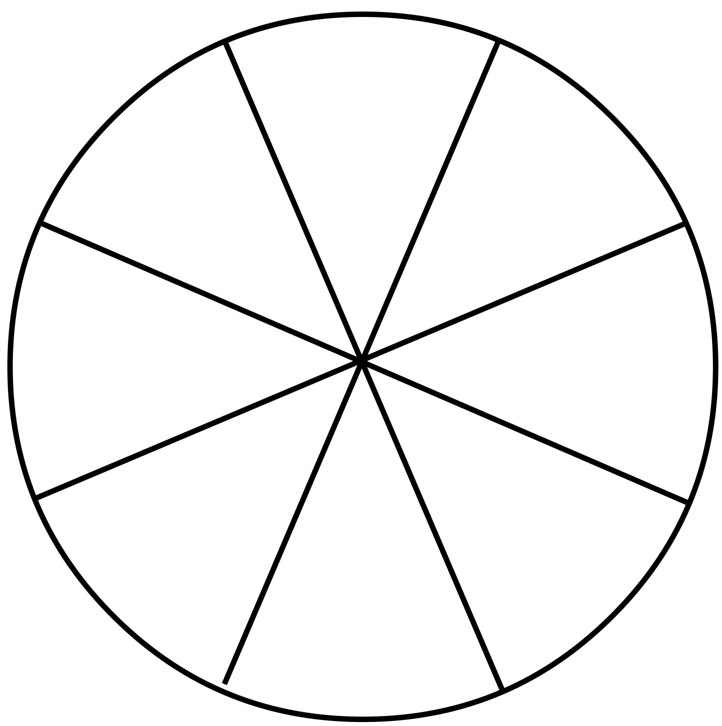
   Explain your answer.



Name___________________________________ Date__________________

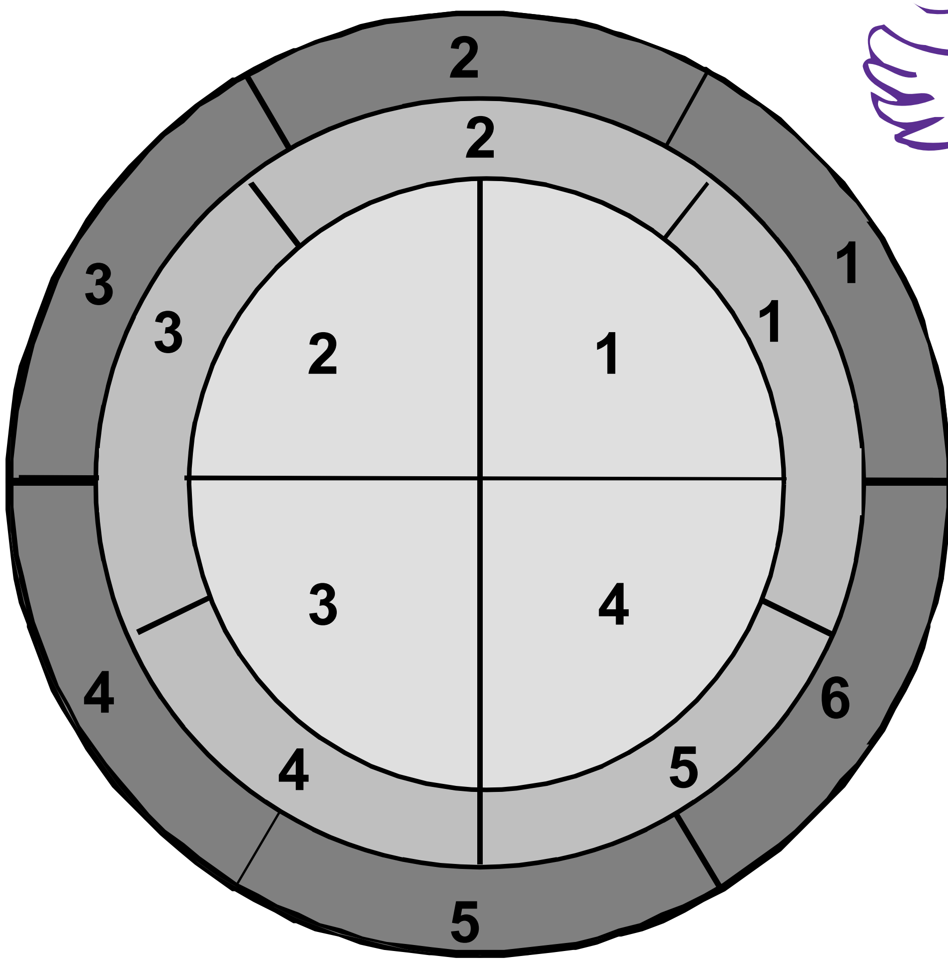
Making Spinners





Name____Date____________

Are Spinners Really Random?



Name____Date________

Estimating Wildlife Populations

The container provided for your group contains all the trout in a lake. The Wildlife Commission has asked you to estimate how many there are.

Procedure:

1. Count out 20 blue marbles (or other items as designated by your teacher) and place them into the container. Close the container and mix well. (These items represent tagged trout that the wildlife manager puts into the lake.)

2. Use the cup provided (a half cup measure for example) and dip into the bag removing a sample of marbles. (This represents the wildlife managers sampling fish.) Repeat this sampling several times. After each trial, return the captured "trout" to the "lake." Record the results below.

Trial #	**Total number of Marbles**	**Number of "tagged" marbles**	**% of "tagged" marbles**
1			
2			
3			
4			
5			

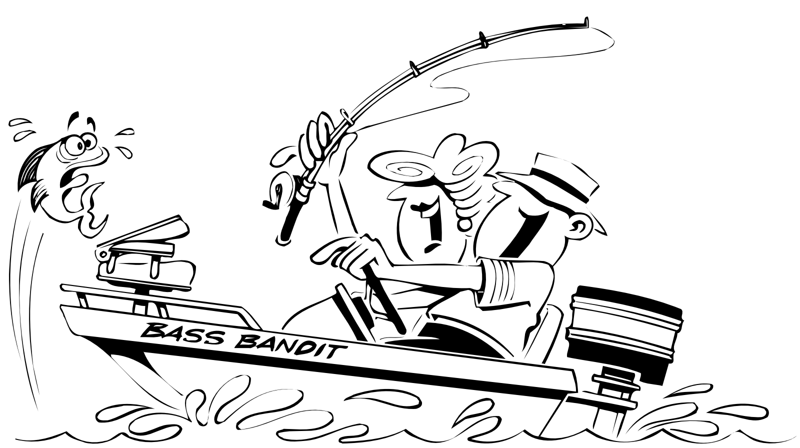
3. Average the results from the five trials above. Use this as an experimental value for Probability(catching a tagged fish).

   ____

4. Use the equation below to calculate an estimate of the number of trout in the lake.

$$P(\text{catching a tagged trout}) = \frac{\text{Number of tagged trout in the lake}}{\text{Number of total trout in the lake}}$$

5. If time permits, exchange containers with another group and repeat the experiment. Compare your results with those of the other group.



Name____Date____________

Spin to Win!

You are going to conduct an experiment in which you will spin both spinners and record the value spun, for example, if you spin a **two** and a **dime**, you will record **$0.20**.

1. What are the possible outcomes? What is the probability of each outcome?

2. Now conduct the experiment 36 times and record your results in the table below.

Trial#	Coin	Number	Value	Trial #	Coin	Number	Value	Trial #	Coin	Number	Value
1				13				25			
2				14				26			
3				15				27			
4				16				28			
5				17				29			
6				18				30			
7				19				31			
8				20				32			
9				21				33			
10				22				34			
11				23				35			
12				24				36			

3. How do your results compare with the theoretical probability?

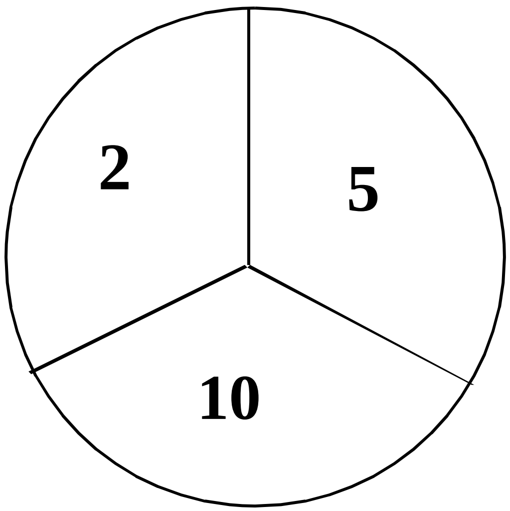
4. Now make a pie chart of your results. Show the number of times you got exactly 50 cents, more than 50 cents, and less than 50 cents.

5. Calculate the probability of getting exactly 50 cents, less than 50 cents, more than 50 cents. How does this compare with your pie chart?

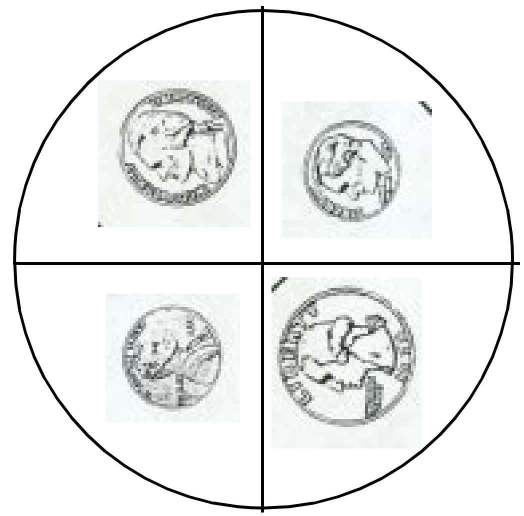
6. Suppose this were a carnival game. You must pay 55 cents to play it, and you win what you spin. Discuss the fairness of this game and the wisdom of playing it or running it.

Name____Date___________

Spin to Win!



Number of Coins



Type of Coin

Name____Date________

Losing Your Marbles

Marbles are dropped into the top of this device. After they pass through several junction points, they come out into one of the round containers at the bottom.

At each junction point, there are two channels that the marble might follow. There is an equally likely chance that the marble will fall left or right at each junction.

If 16 marbles are dropped into the top chute, how many are expected to end up in each of the round containers?

What is the probability of a marble falling into each of the five circles?

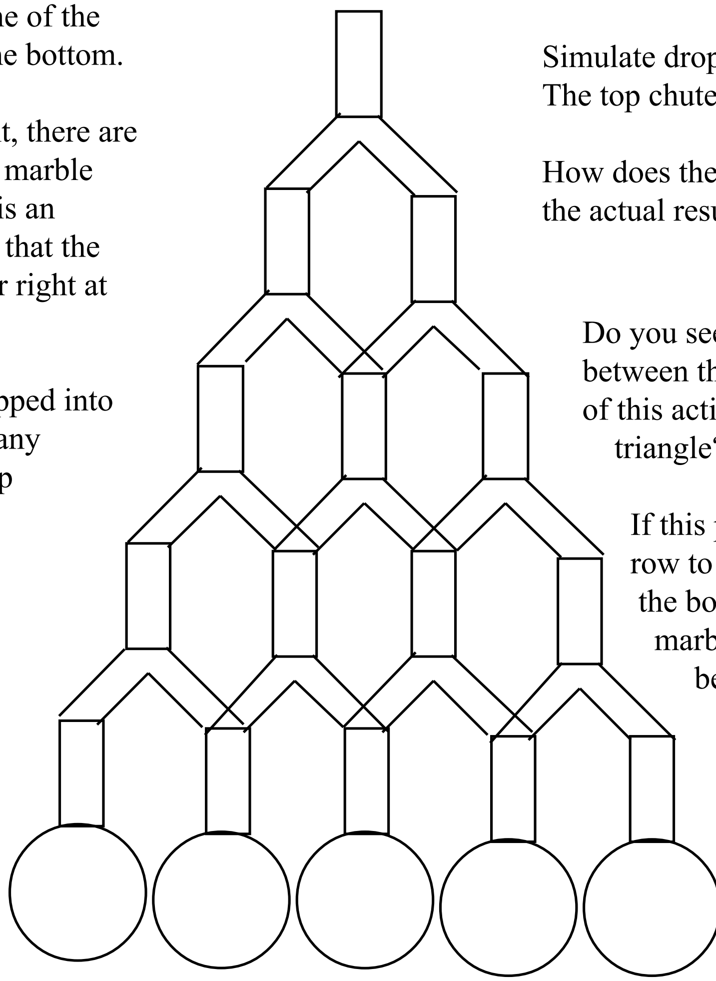
Use a coin to determine whether a marble will fall left or right (heads = right, tails = left).

Simulate dropping 16 marbles into The top chute. Record your results.

How does the expected compare with the actual results?

Do you see a relationship between the theoretical outcome of this activity and Pascal's triangle?

If this pyramid had one more row to make six circles at the bottom, how many marbles out of 32 would be expected to fall into each of the six circles?



Expected

1 **2** **3** **4** **5**

Actual ___ ___ ___ ___ ___

Probability of Falling into a Specific Circle

Five circles: ____ ____ ____ ____ ____

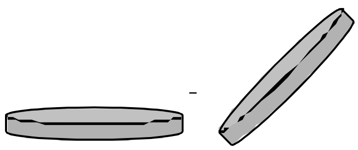
1 **2** **3** **4** **5**

Six circles: ____ ____ ____ ____ ____ ____

1 **2** **3** **4** **5** **6**

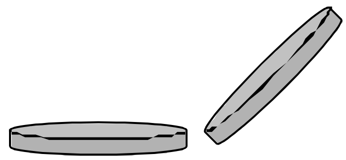
<u>Oops!</u>

Two coins are tossed, what is the probability that both land heads up?



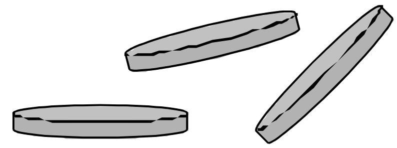
1

Two coins are tossed, what is the probability that the two coins show the same side up (both heads or both tails)?



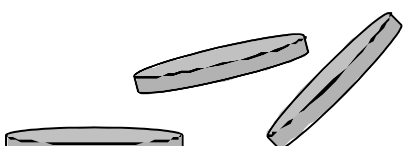
2

Three coins are tossed, what is the probability that the three coins all land heads up?



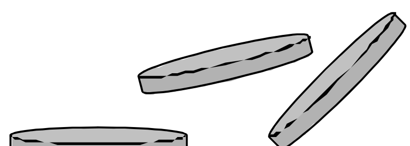
3

Three coins are tossed, what is the probability that the three coins show two heads and one tail?



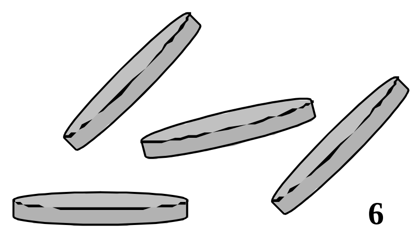
4

Three coins are tossed, what is the probability that the three coins all show the same side up (all 3 heads or all 3 tails)?



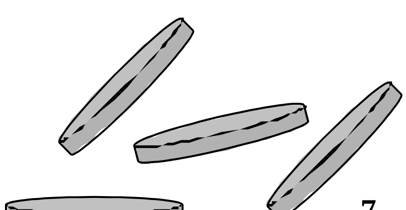
5

Four coins are tossed, what is the probability that the four coins all show the same side up (all 4 heads or all 4 tails)?



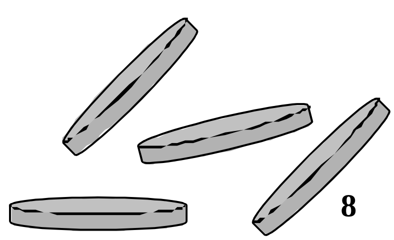
6

Four coins are tossed, what is the probability that the four coins all land heads up?



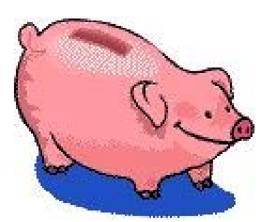
7

Four coins are tossed, what is the probability that the four coins show one head and 3 tails?



8

A quarter, a nickel, and a dime are in a bank. what is the probability that the quarter falls out first and the nickel falls out second?



9

Oops!

Two dice are rolled. What is the probability that the first one shows 2 and the 2nd one shows 4?

10

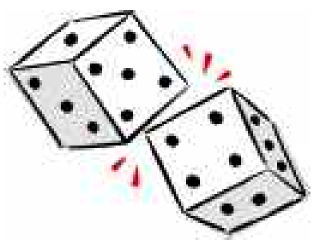
Two dice are rolled. What is the probability that the first one is less than 3 and the 2nd one is more than 4?

11

Two dice are rolled, what is the probability that the first one is even and the second one is odd?

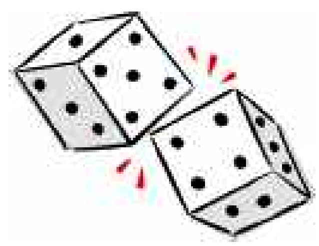
12

Two dice are rolled. What is the probability that the two dice show the same number?



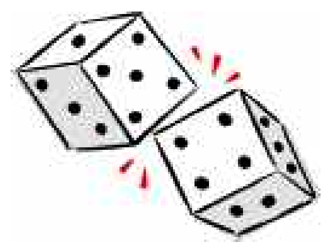
13

Two dice are rolled. What is the probability that the first one is 2 and the second one is greater than or equal to 2?



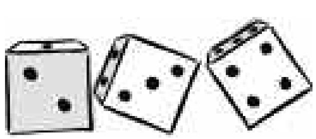
14

Two dice are rolled. What is the probability that the first one is less than 3 and the second shows an odd number?



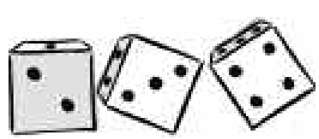
15

Three dice are rolled. What is the probability that all three show a number one?



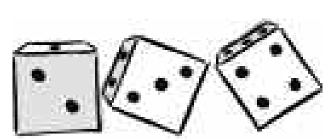
16

Three dice are rolled. What is the probability that all three dice show the same number?



17

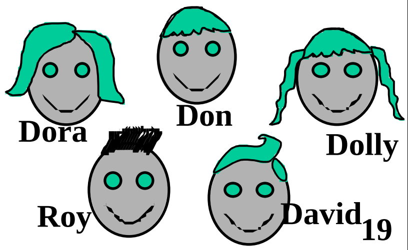
Three dice are rolled. What is the probability that the first one is even, the second one is a six, and the last one is greater than 4?



18

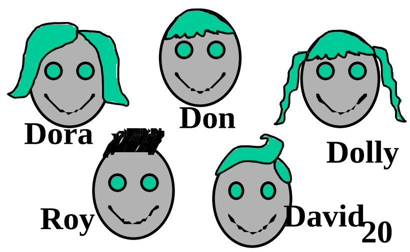
Oops!

Two of the five students below are chosen randomly to attend a meeting. What is the probability that Dora is first and a boy is 2^{nd}?



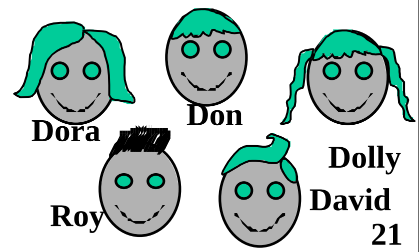
19

Two of the five students below are chosen randomly to attend a meeting. What is the probability that a boy is picked 1^{st} and a girl is 2^{nd}?



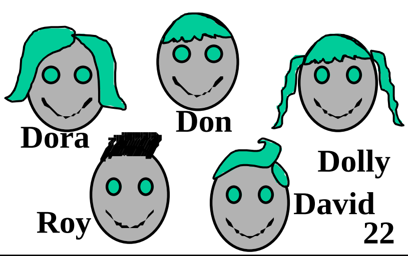
20

Two of the five students below are chosen randomly to attend a meeting. What is the probability both names begin with D?



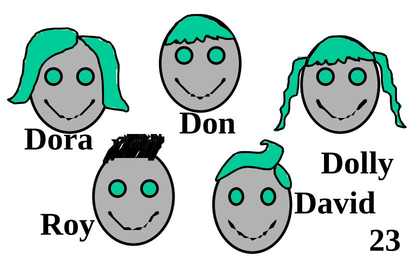
21

Two of the five students below are chosen randomly to attend a meeting. What is the probability both are girls?



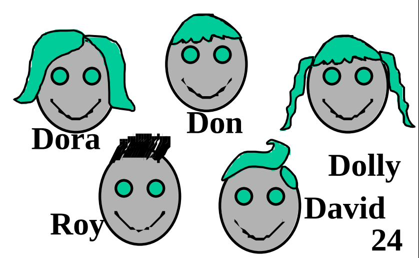
22

Two of the five students below are chosen randomly to attend a meeting. What is the probability that both are boys?



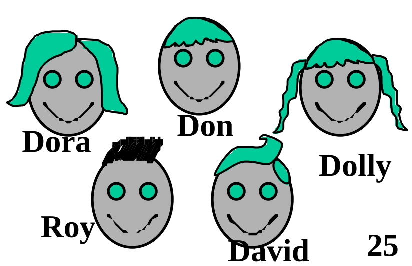
23

Two of the five students below are chosen randomly to attend a meeting. What is the probability that Don is first and Dolly is 2nd?



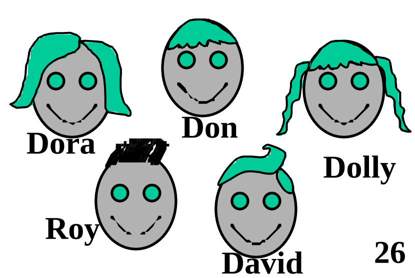
24

Three of the five students below are chosen randomly to attend a meeting. What is the probability that all 3 are boys?



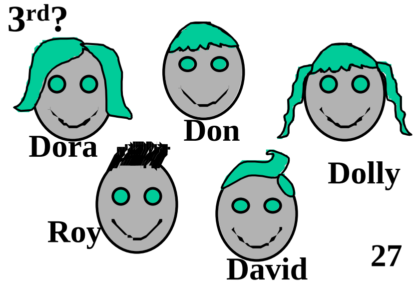
25

Three of the five students below are chosen randomly to attend a meeting. What is the probability all 3 have names beginning with D?



26

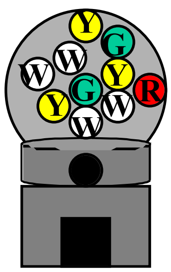
Three of the five students below are chosen randomly to attend a meeting. What is the probability that Roy is first, Dolly 2^{nd}, and David 3^{rd}?



27

Oops!

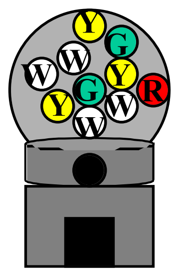
If two gumballs are purchased, what is the probability of both green?



Gumballs
1 Red
2 Green
3 Yellow
4 White

28

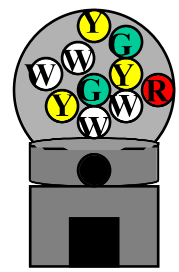
If two gumballs are purchased, what is the probability of both white?



Gumballs
1 Red
2 Green
3 Yellow
4 White

29

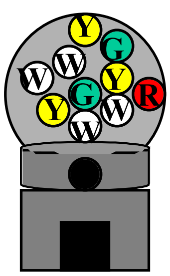
If two gumballs are purchased, what is the probability of both yellow?



Gumballs
1 Red
2 Green
3 Yellow
4 White

30

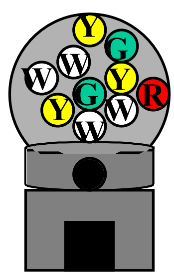
If two gumballs are purchased, what is the probability of red first and yellow second?



Gumballs
1 Red
2 Green
3 Yellow
4 White

31

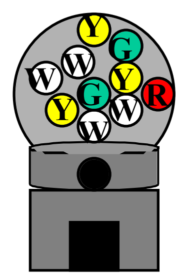
If two gumballs are purchased, what is the probability of yellow first and white second?



Gumballs
1 Red
2 Green
3 Yellow
4 White

32

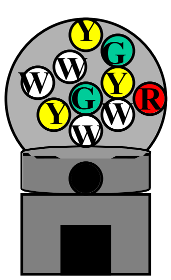
If two gumballs are purchased, what is the probability of red first and green second?



Gumballs
1 Red
2 Green
3 Yellow
4 White

33

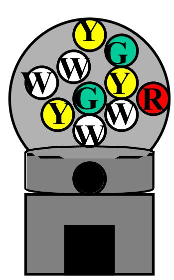
If three gumballs are purchased, what is the probability of all 3 yellow?



Gumballs
1 Red
2 Green
3 Yellow
4 White

34

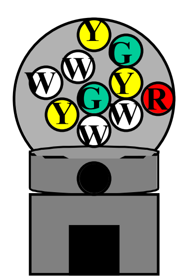
If three gumballs are purchased, what is the probability of all 3 white?



Gumballs
1 Red
2 Green
3 Yellow
4 White

35

If three gumballs are purchased, what is the probability of getting the red ball as one of the three?



Gumballs
1 Red
2 Green
3 Yellow
4 White

36

Oops!

If the cards are placed in a hat and two drawn out, what is the probability that both are blue cards?

E L A I N E — Blue cards

A L A N — White cards

37

If the cards are placed in a hat and two drawn out, what is the probability of a vowel first and a consonant second?

E L A I N E — Blue cards

A L A N — White cards

38

If the cards are placed in a hat and two drawn out, what is the probability of an E first and an A second?

E L A I N E — Blue cards

A L A N — White cards

39

If the cards are placed in a hat and two drawn out, what is the probability of an L first and an N second?

E L A I N E — Blue cards

A L A N — White cards

40

If the cards are placed in a hat and two drawn out, what is the probability of an E first and a vowel second?

E L A I N E — Blue cards

A L A N — White cards

41

If the cards are placed in a hat and two drawn out, what is the probability of an I first and a white card second?

E L A I N E — Blue cards

A L A N — White cards

42

If the cards are placed in a hat and two drawn out, what is the probability of a white card first and an E second?

E L A I N E — Blue cards

A L A N — White cards

43

If the cards are placed in a hat and three drawn out, what is the probability of all 3 A's?

E L A I N E — Blue cards

A L A N — White cards

44

If the cards are placed in a hat and three drawn out, what is the probability of all 3 white cards?

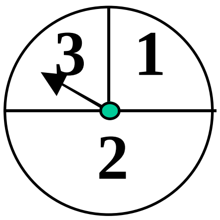
E L A I N E — Blue cards

A L A N — White cards

45

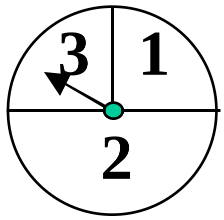
Oops!

If the spinner below is spun twice, what is the probability that it lands on a 3 first, and a 2 second?



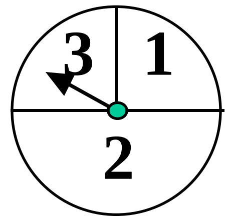
46

If the spinner below is spun twice, what is the probability that it lands a 2 both times?



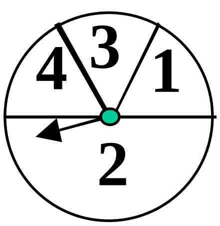
47

If the spinner below is spun twice, what is the probability that it lands on a 3 both times?



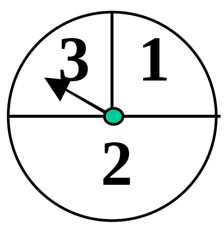
48

If the spinner below is spun twice, what is the probability that it lands on a 4 first and a 2 second?



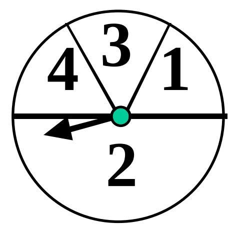
49

The spinner below was spun ten times, and it landed on 1 each time. What is the probability that it will land on a 1 the next time it's spun?



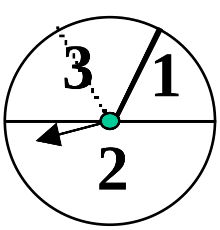
50

If the spinner below is spun 3 times, what is the probability that it will land on a 1 each time?



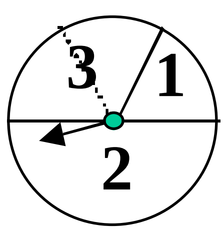
51

If the spinner below is spun twice, what is the probability that it lands on a 1 first, a 2 second, and a 3 third?



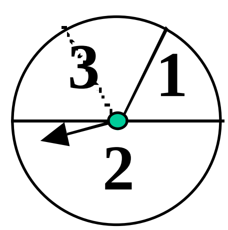
52

If the spinner below is spun 3 times, what is the probability that it lands on a 3 all 3 times?



53

If the spinner below is spun 3 times, what is the probability that it will land on 2 the first 2 times and on 3 the last time?



54

Name____Date________

Oops! Answers

1. $\frac{1}{4}$
2. $\frac{1}{2}$
3. $\frac{1}{8}$
4. $\frac{3}{8}$
5. $\frac{1}{4}$
6. $\frac{1}{8}$
7. $\frac{1}{16}$
8. $\frac{1}{4}$
9. $\frac{1}{6}$
10. $\frac{1}{36}$
11. $\frac{1}{9}$
12. $\frac{1}{4}$
13. $\frac{1}{6}$
14. $\frac{5}{36}$
15. $\frac{1}{6}$
16. $\frac{1}{216}$
17. $\frac{1}{36}$
18. $\frac{1}{36}$
19. $\frac{3}{20}$
20. $\frac{3}{10}$
21. $\frac{3}{5}$
22. $\frac{1}{10}$
23. $\frac{3}{10}$
24. $\frac{1}{20}$
25. $\frac{1}{10}$
26. $\frac{2}{5}$
27. $\frac{1}{60}$
28. $\frac{1}{45}$
29. $\frac{2}{15}$
30. $\frac{1}{15}$
31. $\frac{1}{30}$
32. $\frac{2}{15}$
33. $\frac{1}{45}$
34. $\frac{1}{120}$
35. $\frac{1}{30}$
36. $\frac{3}{10}$

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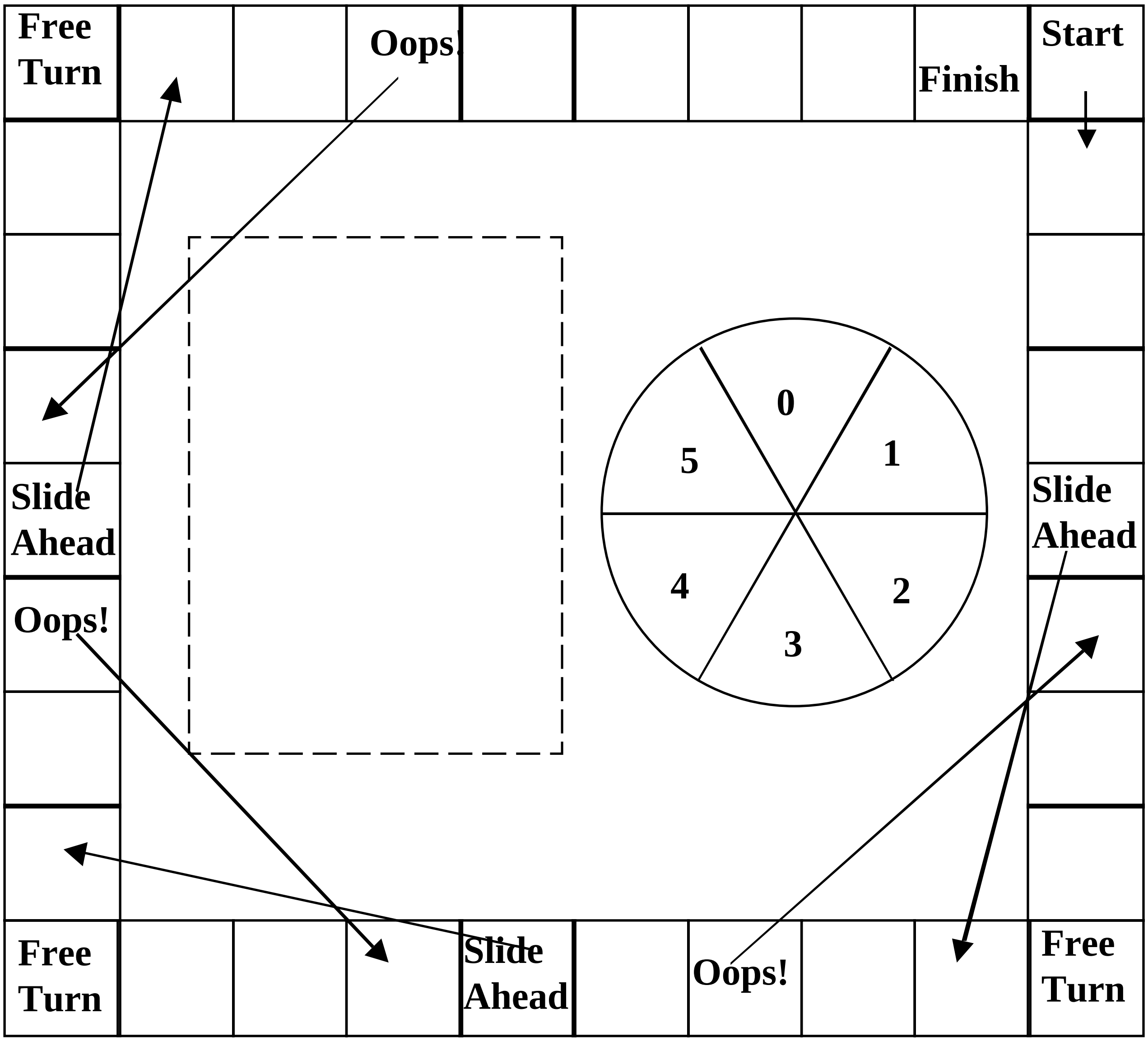
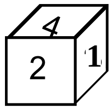
37. $\frac{1}{3}$
38. $\frac{4}{15}$
39. $\frac{1}{15}$
40. $\frac{2}{45}$
41. $\frac{1}{9}$
42. $\frac{2}{45}$
43. $\frac{4}{45}$
44. $\frac{1}{120}$
45. $\frac{1}{30}$
46. $\frac{1}{8}$
47. $\frac{1}{4}$
48. $\frac{1}{16}$
49. $\frac{1}{12}$
50. $\frac{1}{4}$
51. $\frac{1}{216}$
52. $\frac{1}{36}$
53. $\frac{1}{27}$
54. $\frac{1}{12}$

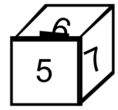
Oops! Game Board



Name____Date______________

Fraction Cubes and Probability





Numerator

Denominator	1	2	3	4	5	6
4	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$	$\frac{5}{4}$	$\frac{6}{4}$
5	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$	$\frac{6}{5}$
6	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	$\frac{6}{6}$
7	$\frac{1}{7}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{5}{7}$	$\frac{6}{7}$
8	$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{5}{8}$	$\frac{6}{8}$
9	$\frac{1}{9}$	$\frac{2}{9}$	$\frac{3}{9}$	$\frac{4}{9}$	$\frac{5}{9}$	$\frac{6}{9}$

Here is a fraction chart made from a numerator cube containing numbers from 1-6 and a denominator cube containing numbers from 4-9.

1. Find the probability that the fraction is not in lowest terms.____

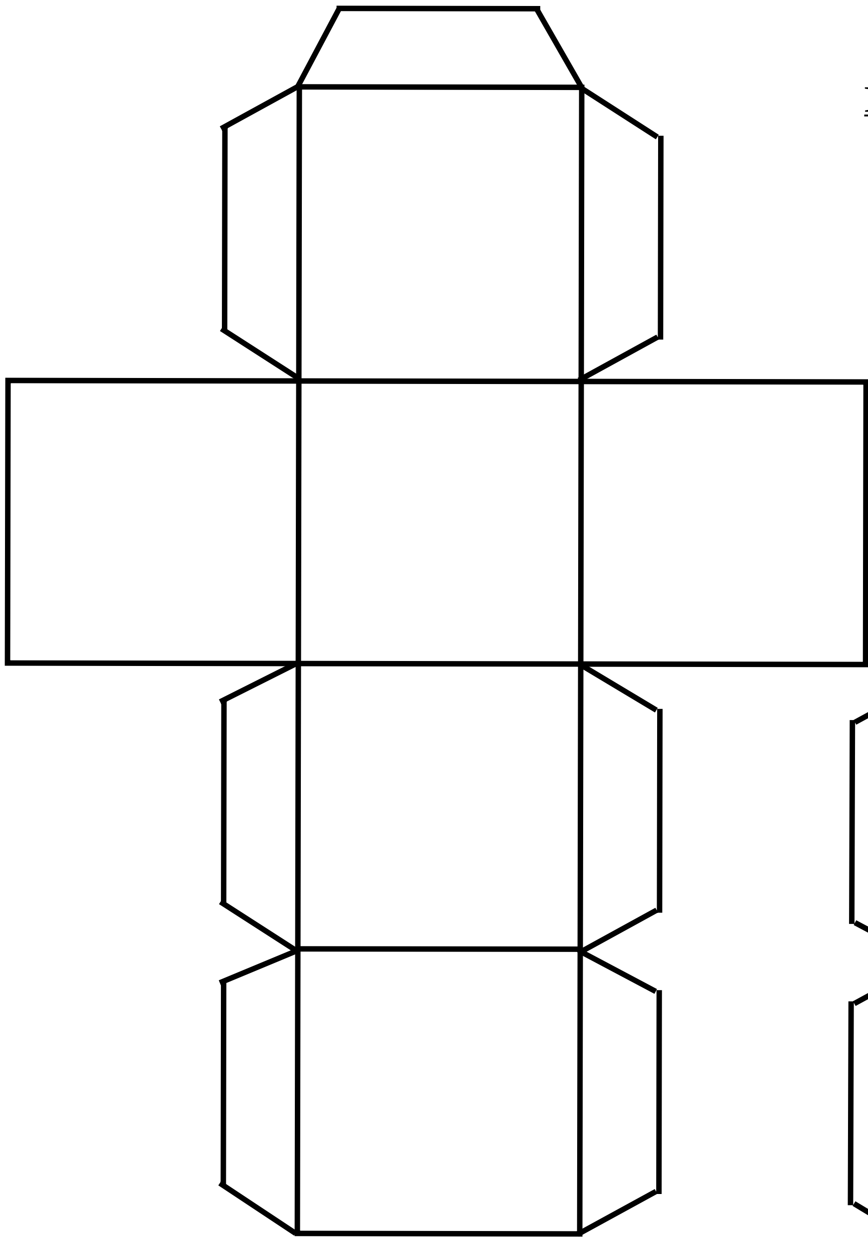
Numerator

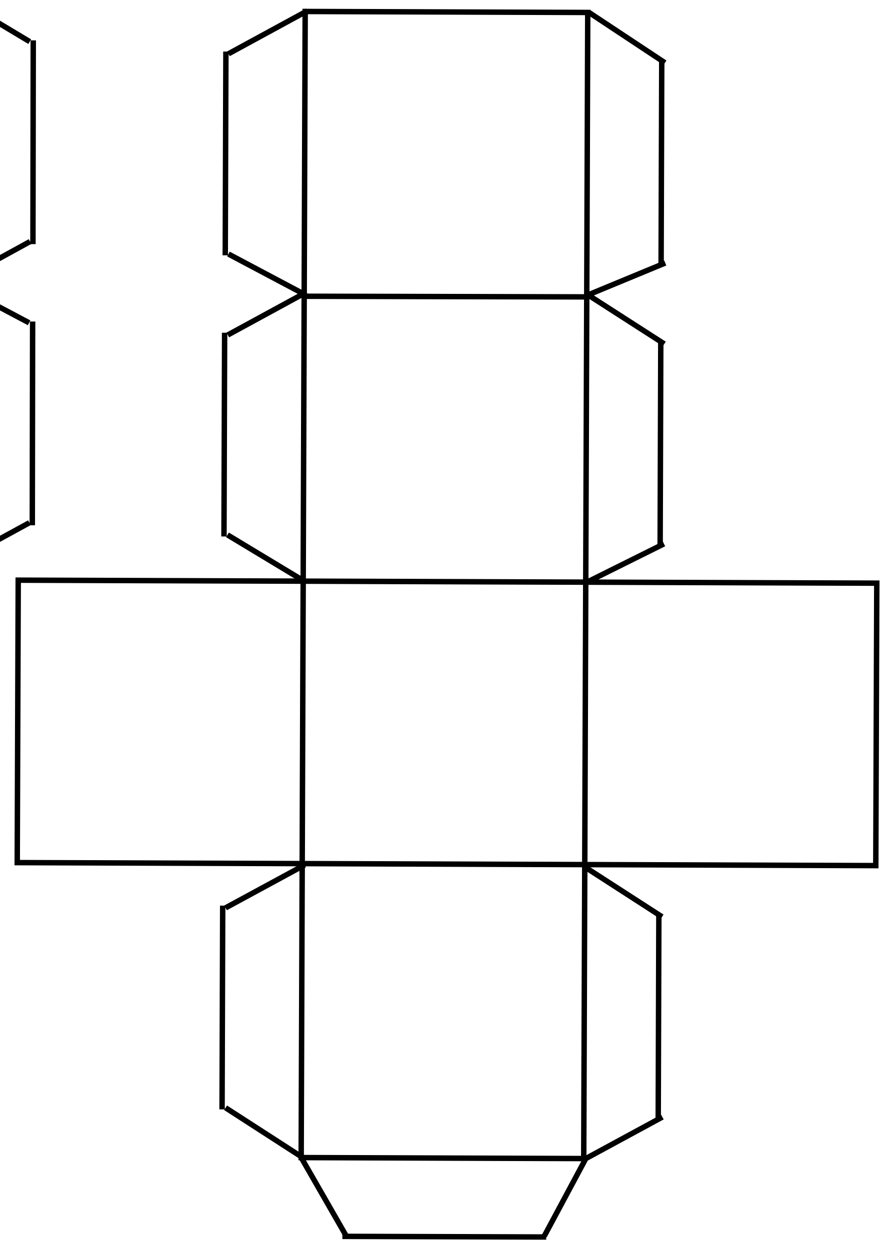
Denominator						

Make new number cubes. Let the numerator cube contain numbers 5-10 and the denominator cube contain numbers 5, 8, 10, 12, 17, 20. Complete the chart and answer the questions below.

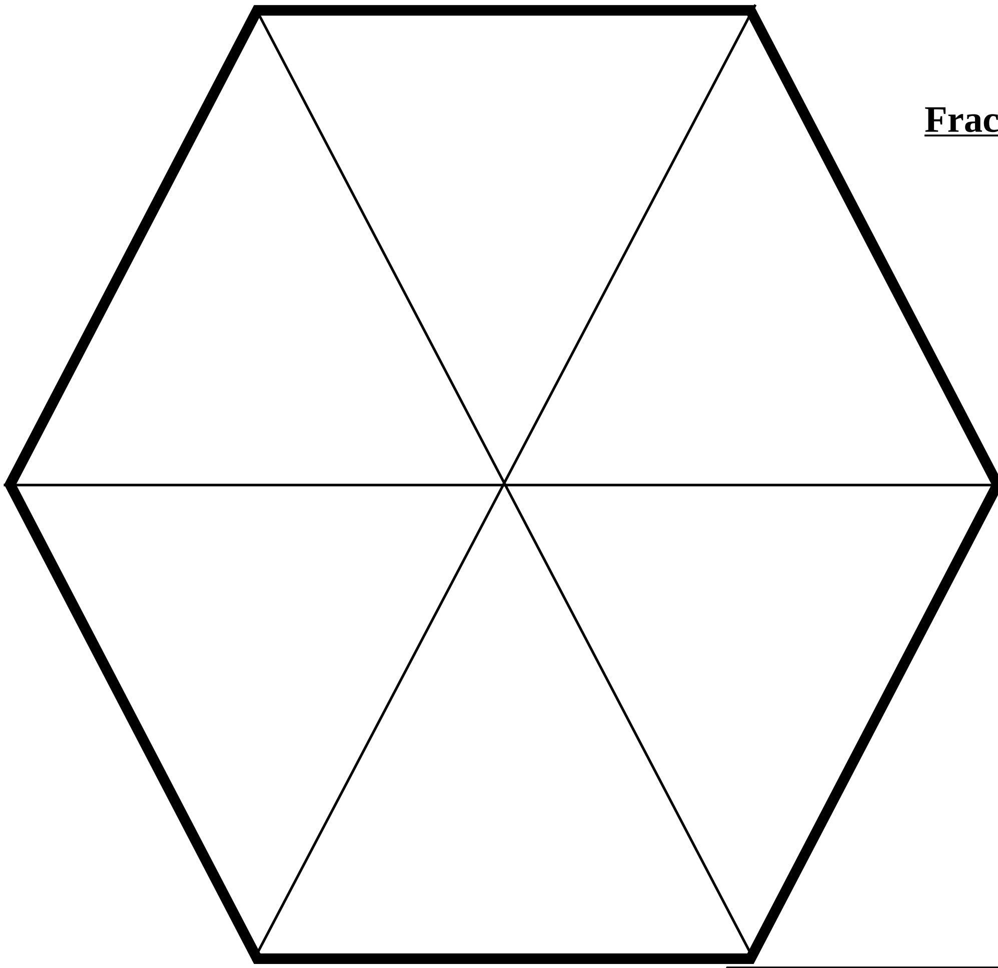
2. Find the probability that the numerator is divisible by 2. by 5. ______ _____
3. Find the probability that the denominator is divisible by 2. by 5. ______ _____
4. Find the probability that the numerator is divisible by 2 or 5. ______
5. Find the probability that the denominator is divisible by 2 or 5. ______
6. Find the probability that the numerator is divisible by 2 and 5. ______
7. Find the probability that the numerator is divisible by 2 and the denominator is divisible by 5. ______
8. Find the probability that the denominator is divisible by 2 and the numerator is divisible by 5. ______
9. Roll your number cubes 60 times and record the fractions you created. How do the experimental results compare with the theoretical probabilities?

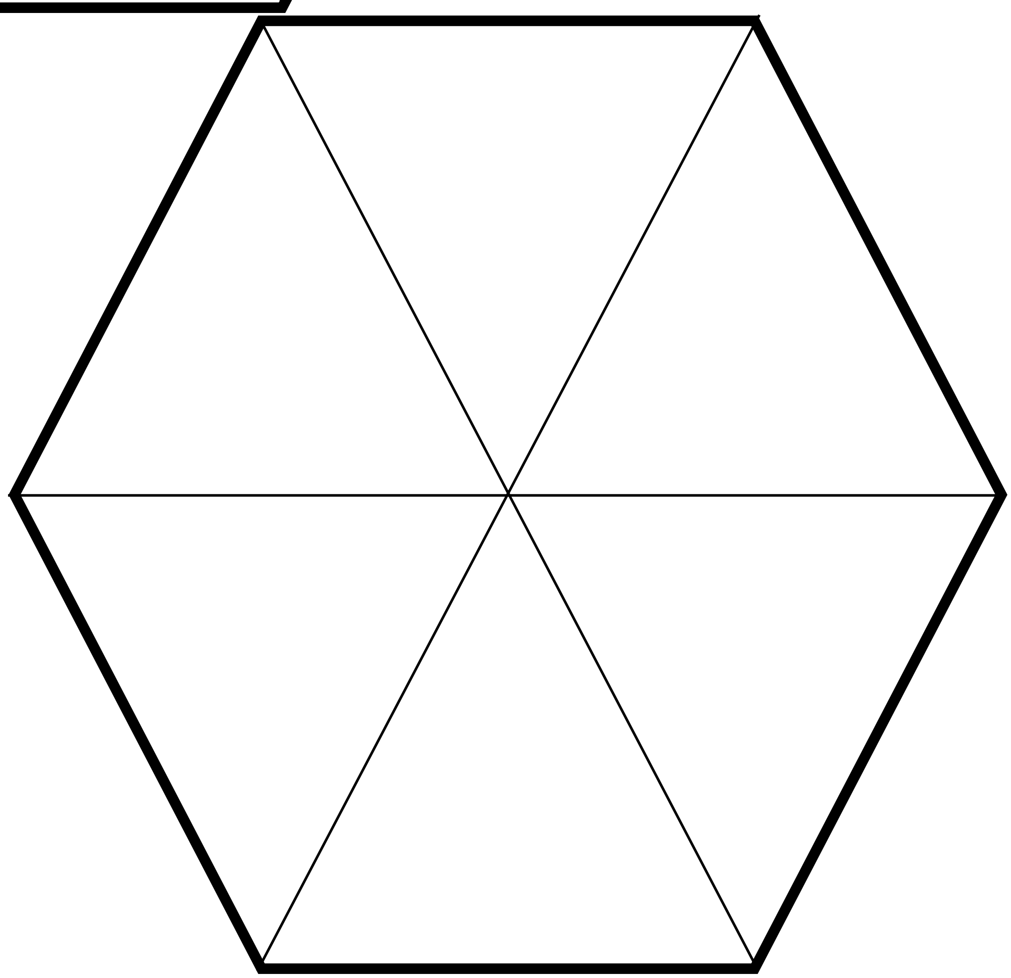
Fraction Cubes and Probability





Fraction Cubes and Probability





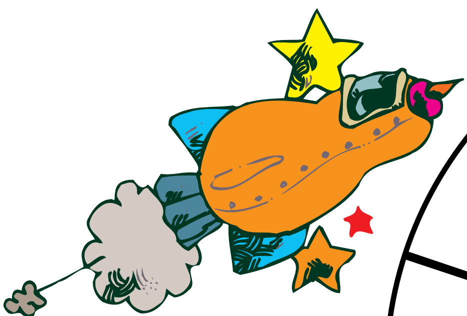
Name____Date__________

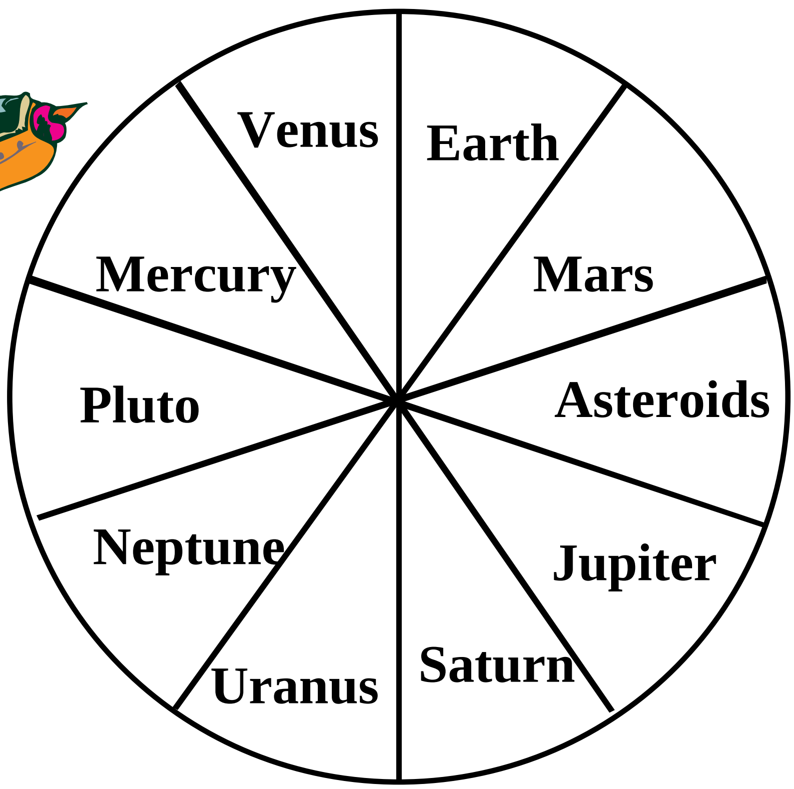
Planet Collector Cards

Captain Krypton cereal comes with a super-duper 3-d holographic planet picture card in each box. There are 10 cards in all, one for each planet, and one for the Asteroid Belt. You want to collect them all. How many boxes of cereal will you need to buy? Do you think you could get the entire set by buying only ten boxes? Do the experiment below to find out.

Use the spinner below to determine which card you get when you buy a box of Captain Krypton cereal. Each time you spin, put a tally mark by that planet's name. When you get at least one mark for each of the cards, count how many times you had to spin. This is an experimental result for how many boxes of cereal you would have to buy to get the entire set.

Do the experiment three times. Result from trial 1: _____ 2: ______ 3: ________





	Mercury	Venus	Earth	Mars	Asteroids	Jupiter	Saturn	Uranus	Neptune	Pluto
1)	_______	______	______	_____	______	______	______	______	______	______
2)	_______	______	______	_____	______	______	______	______	______	______
3)	_______	______	______	______	______	______	______	______	______	______

Name_______________________________________Date__________

Planet Collector Cards (cont.)

Combine your three trials with those of everyone else in the class.

What is the median number of boxes required?

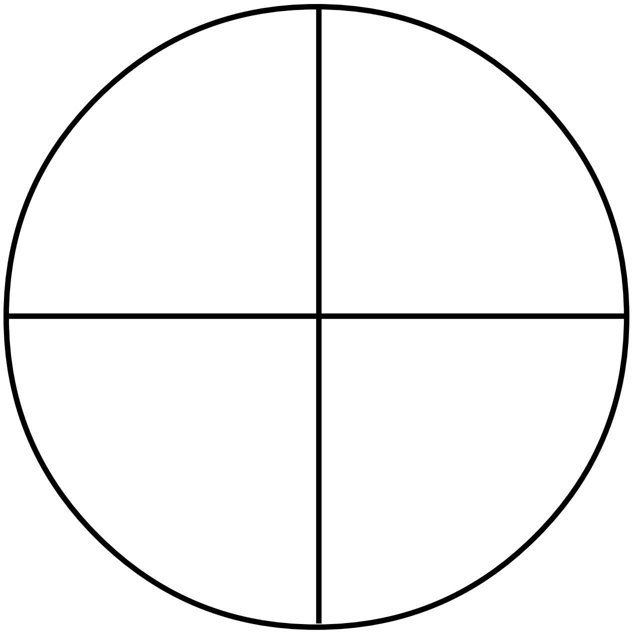
What is the mean number of boxes required?

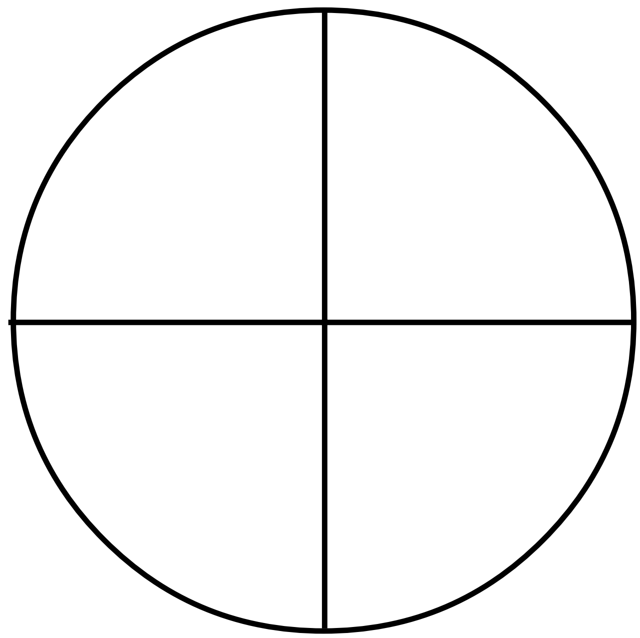
Is there a mode number of boxes required?

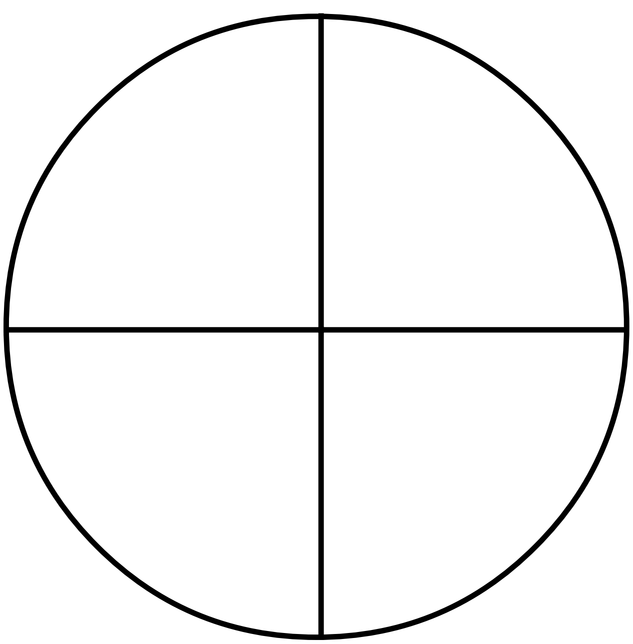
Complete the frequency distribution table below. If necessary, extend the chart.

Boxes bought	How many different cards?
10-14	___________
15-19	___________
20-24	___________
25-29	___________
30-34	___________
35-39	___________
40-44	___________
45-49	___________

Make a statement about how many boxes you could expect to buy to collect the entire set of cards.







Name____________________________________Date__________

HIGH ROLLERS

Complete the chart for the samplespace for rolling two, fair number cubes.

	1	2	3	4	5	6
1	(1,1)	(1,2)				
2						
3						
4						
5						
6						

Determine these probabilities:

1) P(rolling an even sum) = ___________

2) P(2 on a single cube)= ___________

3) P(a sum of 7) = ___________

4) P(sum is a prime) = ___________

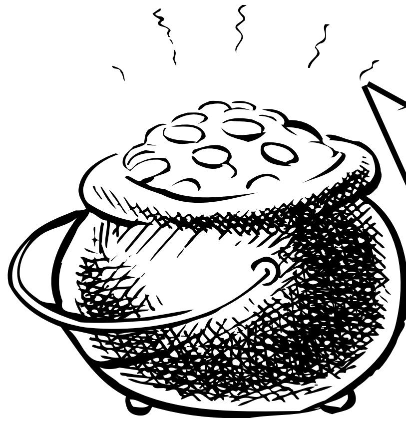
5) P(sum < 10) = ___________

6) P(sum is a perfect square) = ___________

7) P(sum is a power of 2) = ___________

8) P(sum is a factor of 100) = ___________

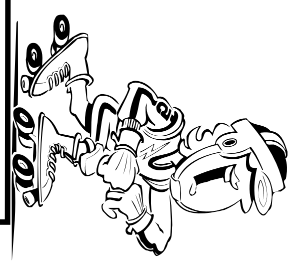
GO FOR THE GOLD!!



START

Spin **dots** and move ahead 2; spin **white** or **dashes** and mov ahead 1.

Spin **dashes** and move ahead 3; otherwise stay put.



Spin a **prime** to move ahead 2; spin any other number and move 1.

Spin a **power of 2** and go ahead 3; spin any other number and go back 2!

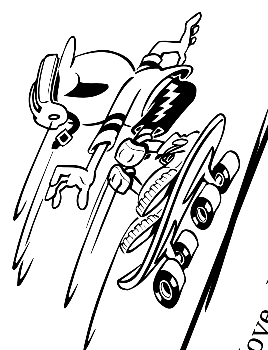
Spin **dots** and move up 2; otherwise move ahead 1.

Spin **dashes** and move up 4; otherwise stay put.

Spin **white** to move ahead 2; if not go back 1.

Spin a **prime** to stay put. Spin a **perfect square** and go 4. Spin a **power of 2** and go back 2.

Move ahead 3 if you spin **dots**; otherwise fall back 1.



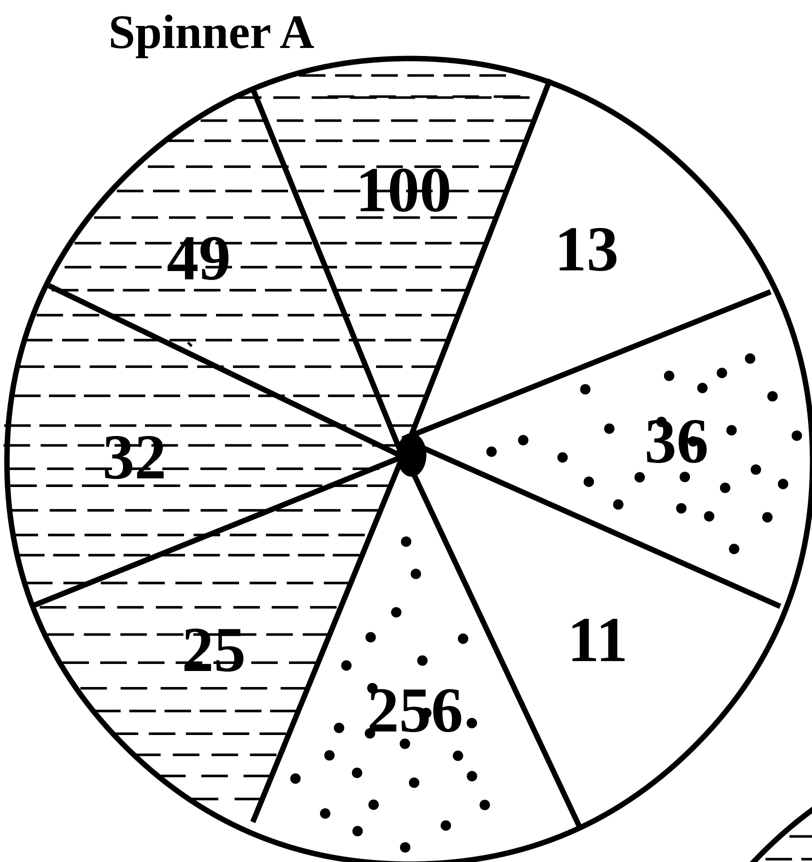
Spin a **prime** to zip ahead 2; anything else move up 1.

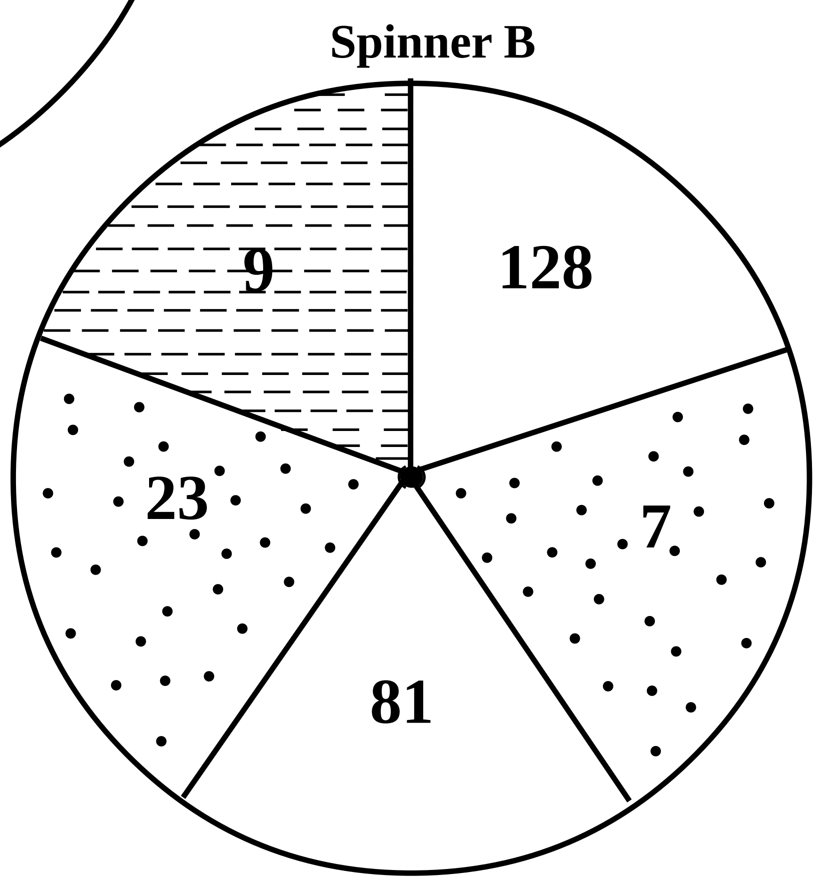
Spin a **perfect square** to move up 1; if not go back 2.

Spin **dashes** to finish; otherwise wait here.

FINISH!!

Practice your probability skills as you GO FOR THE GOLD!!
You may choose to use either spinner for each turn.





Name____Date___________

Spinner 1

Sample Space:

{__________________}

P(Spinning a 1)	
P(Spinning a number > 5)	
P(Spinning an even number)	
P(Spinning an odd number)	
P(Spinning a prime number)	
P(Spinning a number < 3)	
P(Spinning a 6)	

Spinner 2

Sample Space:

{__________________}

P(Spinning a 1)	
P(Spinning a number > 5)	
P(Spinning an even number)	
P(Spinning an odd number)	
P(Spinning a prime number)	
P(Spinning a number < 3)	
P(Spinning a 6)	

Name____Date____________

Ordered Pairs and Patterns

1. Gorp has planted some Venusian seeds in an Earth garden. Here is the chart showing how many plants have sprouted.

Day	Number of Sprouts
1	7
2	14
3	21
4	28

How many plants should Gorp expect to see on day 14?

A) 35 B) 56 C) 91 D) 98

2. Melop, from the planet Melos, is running a test on his space craft. He does this by typing in a number and then he listens for a number of beeps to return. The number of beeps depends on the number typed in. Here are his data.

Instrument Tested	Number Typed	Beeps Returned
ignition	3	15
fuel system	8	35
climate control	2	10
power drive	5	25
boosters	6	30

Which instrument seems to be out of order compared with the other tests?

A) ignition B) fuel system C) power drive D) boosters

3) Space ships made on planet Zygon can be different sizes. Below is a chart showing the number of ship pods and the passengers they can carry.

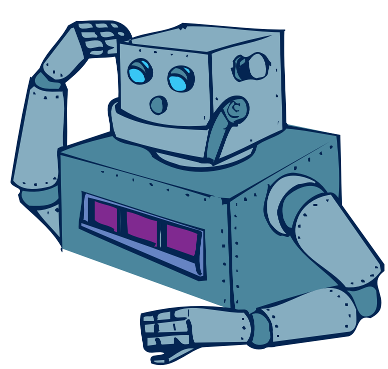
Number of Pods	Number of Passengers
1	4
3	10
5	16
7	22

What rule determines how many passengers a ship can carry?

A) Number of pods x 4
B) Number of pods squared, then add 1
C) Number of pods times 3, then add 1
D) Number of pods times 4, then subtract 6

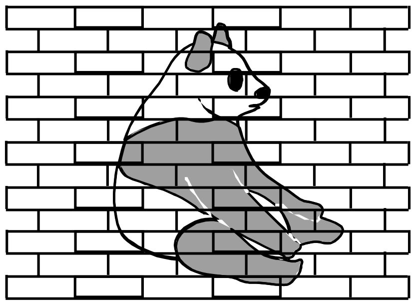
4) A dispatcher from the mother ship tells Gorp that he is carrying too much cargo. She tells him, "Cut your cargo in half and then add one ton." Which of the following indicates that he followed directions?

	Original Cargo (tons)	Cargo after following the rules(tons)
A)	7	4.5
B)	9	5.0
C)	12	6.5
D)	15	8.0

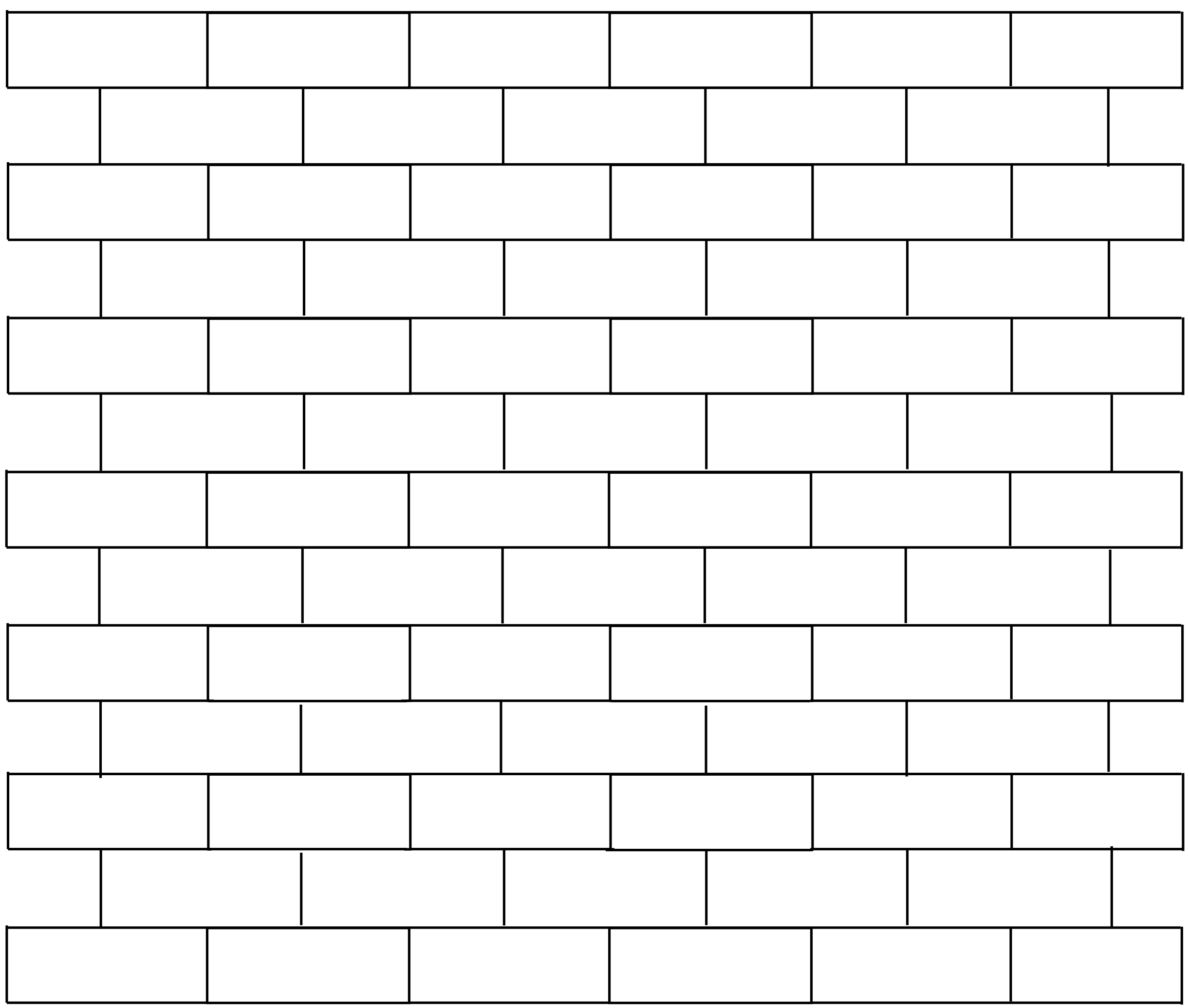


Name____**Date**________

MASCOT PAINTING



Use the picture on the left and enlarge it by using the grid below.



Name____Date___________

Using Rods and Squares

1. Draw a sketch to show how to represent each expression using Rods and Squares.

   a) 3   b) $3y$ c) $2y + 2$ d) $2y + 2x + 2$ e) $x + 5$ f) $4x + 3y + 1$

2. Write a way to name the collection.

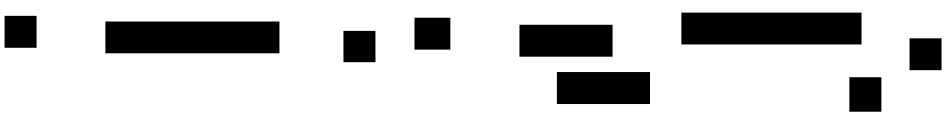
a) 

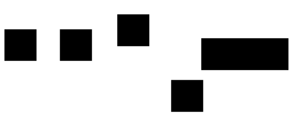
b) 

c) 

3. For each example, write the algebraic expression, then combine like terms and write the simplified algebraic expression.

a) 

b) 

c) 

4 Combine like terms, and then simplify. You may represent each expression using Rods and Squares.

   a) $x + x + y + y + x + 1 + 1 + x$ b) $1 + 1 + 1 + x$

   c) $y + 1 + x + 1 + x + x + 1$ d) $y + 1$

5. Write an algebraic expression that equals 4x + 9 when simplified.

Name____Date____________

Using Rods and Squares (continued)

6. For each example, write the new expression when 2 is added to the each of the following expressions. Sketch representations using Rods and Squares.

   a) 2 b) $2x$ c) $2y$ d) $2y + 4$

7. For each example, write the new expression for when you multiply each of the following expressions by 3. Sketch representations using Rods and Squares.

   a) 4 b) $x + 2$ c) $2y$

8. Write a simpler expression equivalent to each of the following. You may use Rods and Squares.

   a) $5x + 3x + 2x$
   b) $6x + 5y + x + 3y$
   c) $6 + 4y + 4 + y$

9. Identify which of the expressions a, b, c, or d are equal to the expression on the left. You may sketch representations using Rods and Squares. Explain your answer.

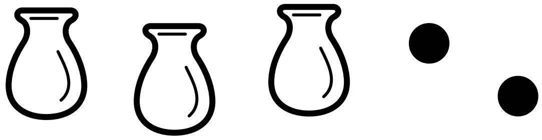
   i. $x + (3y + 2x)$
   - a) $6xy$
   - b) $x + (2x + 3y)$
   - c) $(x + 2x) + 3y$
   - d) $x + 5xy$

   ii. $3(x + 2)$
   - a) $3x + 2$
   - b) $3x + 6$
   - c) $x + 5$
   - d) $x + 6$

Name____Date____________

Using Bags and Balls

1. In the model below, there are three bags, each containing the same number of balls, plus two extra balls. Melissa wrote a rule for finding the total number of balls when you know the number of balls in each bag: $3s + 2$.

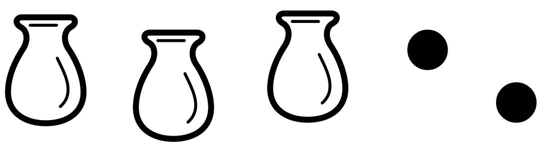


   a. What does the variable *s* stand for in Melissa's expression?
   b. What does the 3 stand for?
   c. What does the 1 stand for?
   d. If you know how many balls are in each bag, how can you figure out how many balls there are altogether?

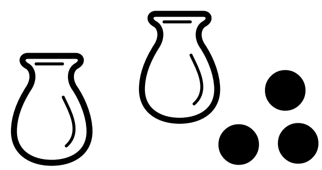
2. Any letter can be used to stand for the number of balls in a bag. Match each expression below with a drawing.

$2y + 3$ $5c + 4$ $3m + 2$ $4f + 5$

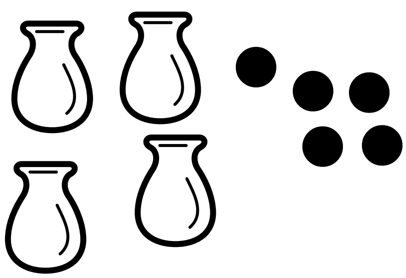
a)



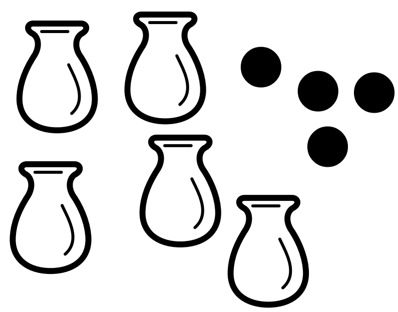
b)



c)



d)



3. To represent the number of balls in 2 bags plus 3 extra balls with the expression $2y + 3$, you need to assume that all of the bags contain the same number of balls. Why?

4. The expression $4n + 1$ describes the total number of balls in 2 bags, each with the same number of Balls, plus 1 extra square.
   a. Describe a bags and balls situation that can be represented by the expression: $5c + 3$.
   b. Make the bags and balls drawing that matches the expression $5c + 3$.

5. a) Make a bags and balls drawing
   b) Write an expression that describes your drawing.
   c) Explain how you know that your expression matches your drawing.

Name____Date__________

Using Variables

1. A car travels at 55 miles per hour. Write an expression for how far the car will have traveled:
   a. After 3 hours
   b. After 5 hours
   c. After *h* hours

2. A plain pizza costs $7.00. Each topping adds an extra cost of $.50. How much does a pizza cost:
   a. With one topping
   b. With two toppings
   c. With *n* toppings

4. Jeff uses this rule to determine how many scoops of ice cream he needs to plan for his friends.

   Number of Ice Cream Scoops = 2 x number of friends

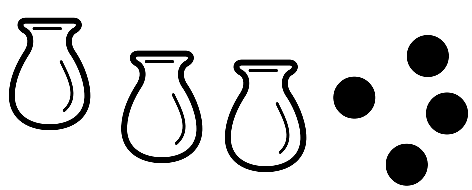
   If he has 7 friends, how many scoops of ice cream does he need for his friends and himself?

   Explain your reasoning.

5.

   a. Write the expression shown by the collection of rods and squares above.
   b. If $y = 4$, what value does the collection show?
   c. If $y = 8$, what value does the collection show?
   d. If $y = 3.2$, what value does the collection show?

6.



   a. Write the expression shown by the collection of bags and balls.
   b. If $x = 3$, what value does the collection show?
   c. If $x = 12$, what value does the collection show?
   d. If x = one-third, what value does the collection show?

Name____Date___________

Using Variables (continued)

7. a. Use the rods and squares to create <u>two</u> different algebraic expressions that, when simplified, equal $4y + 6$. Sketch and write the algebraic expression for each set of blocks.
   b. Evaluate each algebraic expression for $y = 3$
   c. Evaluate each algebraic expression for $y = -2$.
   d. What properties could you use to show that your two algebraic expressions are equivalent?

8. Use rods and squares to help you evaluate each expression below for $x = 3$ and $y = 2$.

a. $4x + 8$	f. $5(x + y)$
b. $4(x + 8)$	g. $5x + y$
c. $3x + 25 + x + 8$	h. $5x + 5y$
d. $4(x + 2)$	i. $2x + 2x + 32$
e. $x + x + y + y$	j. $4xy$

Which expressions are equivalent when $x = 3$ and $y = 2$? Explain why you think they are equivalent?

9. Use rods and squares to help you match each expression on the left with an equivalent expression on the right.

a. $6x + 1 + 2x + 3$	1) $2y + 7$
b. $(4y + 2x) + 9x$	2) $8x + 20$
c. $2(y + 7)$	3) $15xy$
d. $y + 7 + y$	4) $4y + 11x$
e. $3x + 5(x + 4)$	5) $8x + 4$
f. $7x + 8y$	6) $2y + 14$

One expression on the right does not have a match. Write an equivalent expression for it. Sketch the expression using rods and squares.

10. a. Write the rule from this flowchart.

$$\boxed{n} \xrightarrow{\times 4} \boxed{4n} \xrightarrow{+\,5} \boxed{4n + 5}$$

b. What is the output when the input is 3?
c. What is the output when the input is 7?

Name____Date__________

Using Variables (continued)

11. Consider the expression 6y + 3
    a) Create an input-output flowchart for the expression.
    b) What is the output when the input is 4?
    c) What are the outputs for three more values of *y*?

12. In a game of *Think of a Nu*mber, Charles said to Lakeshia:
    - *Think of a number.*
    - *Subtract 1 from your number.*
    - *Multiply the result by 2.*
    - *Add 6*

a) Draw an input-output flowchart to represent this game.
b) Write an algebraic expression that matches the flowchart.

13. Write these expressions algebraically.
    a) 15 subtracted from *x*
    b) *x* subtracted from 15
    c) twice the sum of a number and 6
    d) the product of *m* and 5 increased by 7
    e) the quotient of *t* and 3, decreased by 2

14. Write each algebraic expression in words:
    a) $k - 3$
    b) $3k$
    c) $k/3$
    d) $2(k + 3)$
    e) $2k + 3$

15. Toni gets paid $5.25 per hour to babysit.
    a) How much would she get paid to babysit for 12 hours?
    b) How much would she get paid for *y* hours?

16. Bill plans to take two sacks on his flight next week. One sack weighs 35 pounds.
    a) If the maximum baggage allowance is 66 pounds, how much can his second bag weigh?
    b) If the maximum baggage allowance is *w* pounds, how much can his second bag weigh?

17. A fried-chicken dealer makes special orders of boxes of chicken with as many pieces as the buyer wants. He charges 55 cents for each piece of chicken. He also charges 80 cents for the box, napkins, and handling.

    a) How much would you pay for a 9 – piece box?
    b) How much would you pay for an 11- piece box?
    c) Write an expression for the number of cents charged for a box containing *x* pieces of chicken.
    d) Suppose someone paid $12.35 for a box of chicken. How many pieces of chicken did the box contain?

Name____Date___________

Using Variables (continued)

18. Consider the expression $4n + 5$
    a. Draw a bags-and-balls picture for this expression.
    b. If there are 7 balls in each bag, how many balls are there altogether?
    c. If there are 2 balls in each bag, how many balls are there altogether?
    d. Copy and complete the table for the expression $4n + 5$.

N	**0**	**1**	**2**	**3**	**7**	**66**	
4*N* + 5	**5**						**321**

    e. Create and label an input-output flowchart that could be used to calculate the total number of squares for $4n + 5$ when n represents the input.

19. Read the expression $3a + 7$
    a. Draw a bags and balls picture to match the expression.
    b. If there are 3 balls in each sack, how many squares are there altogether?
    c. If $a = 8$, what is the value of $3a + 7$
    d. Draw and label an input-output flowchart that could be used to calculate the number of balls where a represents the input.

20. Jenny, Lauren, and Molly are each holding one bag and two extra balls.
    a. Draw a bags and balls picture to represent this problem.
    b. Find the total number of balls if eachbag contains
        - 6 balls
        - 20 balls
        - 100 balls
        - *b* balls
    c. How did you find your answers?
    d. Show two ways of finding the total number of squares the girls have.

Mental Math Using Properties

$\frac{3}{8} + \frac{5}{9} + \frac{5}{8} + \frac{2}{9}$ $\left(\frac{3}{8} + \frac{5}{8}\right) + \left(\frac{5}{9} + \frac{2}{9}\right)$	$1\ ^7/_9$ **Associative/Commutative Properties for Addition**
$15 \bullet \frac{1}{8} \bullet \frac{1}{5} \bullet 16$ $\left(\frac{1}{8} \bullet 16\right)\left(\frac{1}{5} \bullet 15\right)$	6 **Associative/Commutative Properties for Multiplication**
$\left(\frac{1}{8} + \frac{1}{6}\right)24$ $\left(\frac{1}{8} \bullet 24\right) + \left(\frac{1}{6} \bullet 24\right)$	7 **Distributive Property**
$\left(\frac{24 \bullet 599}{24 \bullet 599}\right) \bullet 5942$ $1 \bullet 5942$	5942 **Substitution**

Mental Math Using Properties

$24 + 17 + 95 + 13 + 26 + 5$	180
$(95 + 5) + (24 + 26) + (17 + 13)$	**Associative/Commutative Properties for Addition**
$25 \bullet 22 \bullet 3 \bullet 4$	6600
$(25 \bullet 4)(22 \bullet 3)$	**Associative/Commutative Properties for Multiplication**
$\frac{1}{6}(42 + 54)$	16
$\left(\frac{1}{6} \bullet 42\right) + \left(\frac{1}{6} \bullet 54\right)$	**Distributive Property**
$24 \bullet 599 \bullet 0 \bullet 278 \bullet 92$	0
$0(24 \bullet 599 \bullet 278 \bullet 92)$	**Associative/Commutative Properties for Multiplication**

Mental Math Using Properties

$\frac{1}{7} + \frac{1}{9} + \frac{2}{9} + \frac{6}{7}$ $\left(\frac{1}{7} + \frac{6}{7}\right) + \left(\frac{1}{9} + \frac{2}{9}\right)$	$1\ {}^{1}/_{3}$ **Associative/Commutative Properties for Addition**
$9 \bullet \frac{1}{7} \bullet \frac{2}{3} \bullet 50 \bullet 7$ $\left(\frac{2}{3} \bullet 9 \bullet 50\right)\left(\frac{1}{7} \bullet 7\right)$	300 **Associative/Commutative Properties for Multiplication**
$29 \bullet 74 + 29 \bullet 26$ $29(74 + 26)$	2900 **Distributive Property**
$19(21)$ $19(20 + 1)$	399 **Distributive Property**

<u>Mental Math Using Properties</u>

$75 + (-16) + 25 + (-4)$	80
$\left(75 + 25\right) + \left(-16 + (-4)\right)$	**Associative/Commutative Properties for Addition**
$4 \bullet \frac{1}{3} \bullet \frac{1}{10} \bullet 25 \bullet 6$	20
$\left(\frac{1}{10} \bullet 25 \bullet 4\right)\left(\frac{1}{3} \bullet 6\right)$	**Associative/Commutative Properties for Multiplication**
$36\ (\frac{1}{4} + \frac{2}{9})$	17
$\left(\frac{1}{4} \bullet 36\right) + \left(\frac{2}{9} \bullet 36\right)$	**Distributive Property** **Commutative Property for Multiplication**
15% of \$40	6
(10% + 5%)40	**Substitution**

Mental Math Using Properties

$399 + 407 + 201 + 393$	1400
$(399+201) + (407 + 393)$	**Associative/Commutative Properties for Addition**
$\frac{1}{9} \bullet 45 \bullet 2 \bullet 0.1 \bullet 6$	6
$(45 \bullet 2 \bullet \frac{1}{9} \bullet 0.1)(6)$	**Associative/Commutative Properties for Multiplication**
$36\left(70 \bullet \frac{1}{4}\right)$	630
$\left(36 \bullet \frac{1}{4}\right)(70)$	**Associative /Commutative Properties for Multiplication**
$12(49)$	588
$12(50 - 1)$	**Substitution**

Mental Math Using Properties

$3x + 2y + 4x + 9y$ $(3x + 4x) + (2y + 9y)$	$7x + 11y$ **Associative/Commutative Properties for Addition**
$4x \cdot 2y$ $(4 \cdot 2)(xy)$	$8xy$ **Associative/Commutative Properties for Multiplication**
$36(x + 2y)$ $(36 \cdot x) + (36 \cdot 2y)$	$36x + 72y$ **Distributive Property**
$75x + 25x$ $x(75 + 25)$	$100x$ **Distributive Property Commutative Property for Multiplication**

Mental Math Using Properties

$5x + 2x^2 + 3x + 5x^2$ $(5x + 3x) + (2x^2 + 5x^2)$	$8x + 7x^2$ **Associative/Commutative Properties for Addition**
$\frac{1}{2}(4x \cdot y)$ $(\frac{1}{2} \cdot 4)(xy)$	$2xy$ **Associative Property for Multiplication**
$\frac{1}{2}(4 + 2y)$ $(\frac{1}{2} \cdot 4) + (\frac{1}{2} \cdot 2y)$	$2 + y$ **Distributive Property**
$7x + (-5x) + 13x + (-15x)$ $(7x + 13x) + (-5x + (-15x))$	0 **Associative /Commutative Properties for Addition**

Name____Date___________

Alien Math

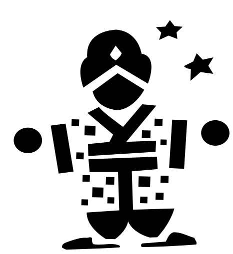
+	$	*	#	@	!
$	@	#	$	!	*
*	#	!	*	$	@
#	$	*	#	@	!
@	!	$	@	*	#
!	*	@	!	#	$

X	$	*	#	@	!
$	@	!	#	*	$
*	!	@	#	$	*
#	#	#	#	#	#
@	*	$	#	!	@
!	$	*	#	@	!

Wow! A family of aliens just had lunch in your back yard, and one of their kids left his homework for you to find. It seems they use the same symbols for addition and multiplication that we do, but different symbols for the numbers.

Use the addition and multiplication tables above to discover something about the alien math.

- Is there an additive identity? If so, what is it? How do you know?
- Is there a multiplicative identity? If so, what is it? How do you know?
- Is addition commutative? How do you know?
- Is multiplication commutative? How do you know?
- Make up some alien addition and multiplication problems to see whether the associative properties hold for this number system.
- Make up some problems to see whether the distributive property works in this system.
- What is the additive inverse of each number?
- Do all the numbers have a reciprocal? What is the reciprocal of each number?
- Can you figure out the Earth number that matches each symbol? How do these aliens do math?



Matching Game

Associative Property for Addition	$(4 + {}^{3}/_{5}) + {}^{2}/_{5} =$ $4 + ({}^{3}/_{5} + {}^{2}/_{5})$	$(a + b) + c =$ $a + (b + c)$
Associative Property for Multiplication	$(52 \times 4) \times 25 =$ $52 \times (4 \times 25)$	$a(bc) = (ab)c$
Additive Identity	$0 + 56 = 56$	$a + 0 = a$
Multiplicative Identity	$1 \bullet 75 = 75$	$1 \bullet a = a$
Additive Inverse	$3 + (-3) = 0$	$-a + a = 0$

Matching Game

Multiplicative Inverse	$3\left(\frac{1}{3}\right) = 1$	$\left(\frac{1}{a}\right) \bullet a = 1$ for $a \neq 0$
Distributive Property	$\left(\frac{1}{3}\right)(6 + 300) =$ $\left(\frac{1}{3}\right)6 + \left(\frac{1}{3}\right)(300)$	$a(b+c) = ab + ac$
Commutative Property for Addition	$25 + 62 = 62 + 25$	$a + b = b + a$
Commutative Property for Multiplication	$14 \bullet 5 = 5 \bullet 14$	$ab = ba$
Multiplicative Property of Zero	$7564 \bullet 0 = 0$	$a \bullet 0 = 0$

Matching Game

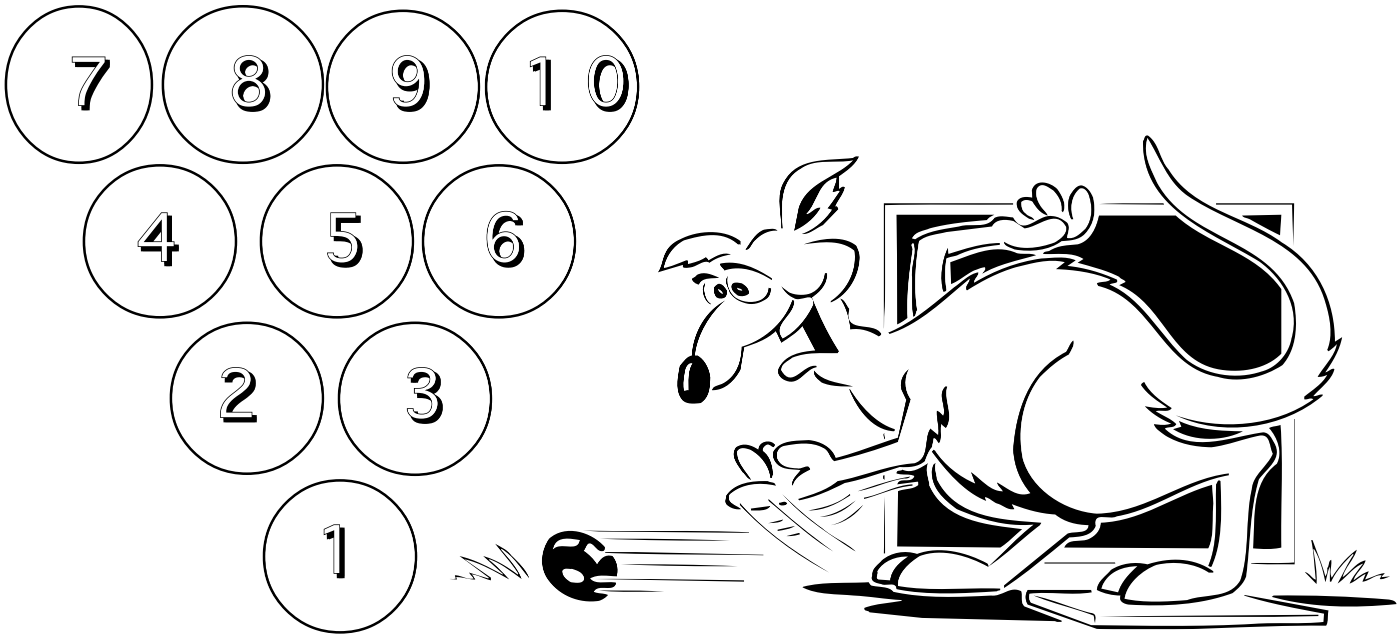
Associative Property for Addition	**$(17 + 89) + 1 = 17 + (89 + 1)$**	**$(x + 2y) + 3y = x + (2y + 3y)$**
Distributive Property	**$24(\,^1/_3 + \,^1/_8\,) = 24(\,^1/_3\,) + 24(\,^1/_8\,)$**	**$3(x+y) = 3x + 3y$**
Additive Identity	**$95 + 0 = 95$**	**$-4 + 0 = -4$**
Multiplicative Identity	**$1 \bullet 16 = 16$**	**$1 \bullet x = x$**
Additive Inverse	**$5 + (-5) = 0$**	**$-a + -(-a) = 0$**

Matching Game

Multiplicative Inverse	$7\,(\,^{1}/_{7}\,) = 1$	$(\,^{1}/_{x}\,) \bullet x = 1$ for $x \neq 0$
Associative Property of Multiplication	$^{1}/_{2}\,(4 \bullet {}^{1}/_{3}\,) =$ $(\,^{1}/_{2} \bullet 4) \bullet {}^{1}/_{3}$	$^{1}/_{5}\,(10x) =$ $(\,^{1}/_{5} \bullet 10)x$
Commutative Property of Addition	$16 + 40 = 40 + 16$	$x + x^2 = x^2 + x$
Commutative Property of Multiplication	$7 \bullet 22 = 22 \bullet 7$	$x(2) = 2x$
Multiplicative Property of Zero	$91 \bullet 0 = 0$	$x \bullet 0 = 0$

Order of Operations Square Puzzle

1 17 16•4 + 5•5 14 - (3 + 8) + 5^2	10 89 44 16 - 14 + 2	12 4•5 + 3 •2^3 51 5	6 3•5 + (3 •2)^2 15 14
28 25 16 + 4 - 5 ÷ 5 43 + (71 - 50) - 8	4 19 22 0	27 - (18 + 4) 16 +(23 - 5) ÷3 7 9	16 - 3^2 + 7 16 -(5^2 + 2) ÷3 18 48 - (8 + 4^2)
56 32 16 ÷ 4 • 2 - 6 3	16 - 3^2 - 7 2 8 76	24 - 11 - 4 16 ÷ (4 • 2 - 6) 13 (16 - 3)•5	24 16 -(1 + 2)^2 ÷3 23 18 + 2(8 + 4•3)
43 - 8(5) 40 12 + 4 • 6 ÷ 3 26	4^2 + 3 (71 - 51) 20 54 21	65 3 • (24 ÷ 2 + 6) 38 36	58 26 + (3 • 2)^2 ÷3 16 27



Score:

Round 1	Round 2	Round 3	Round 4	Round 5	Round 6

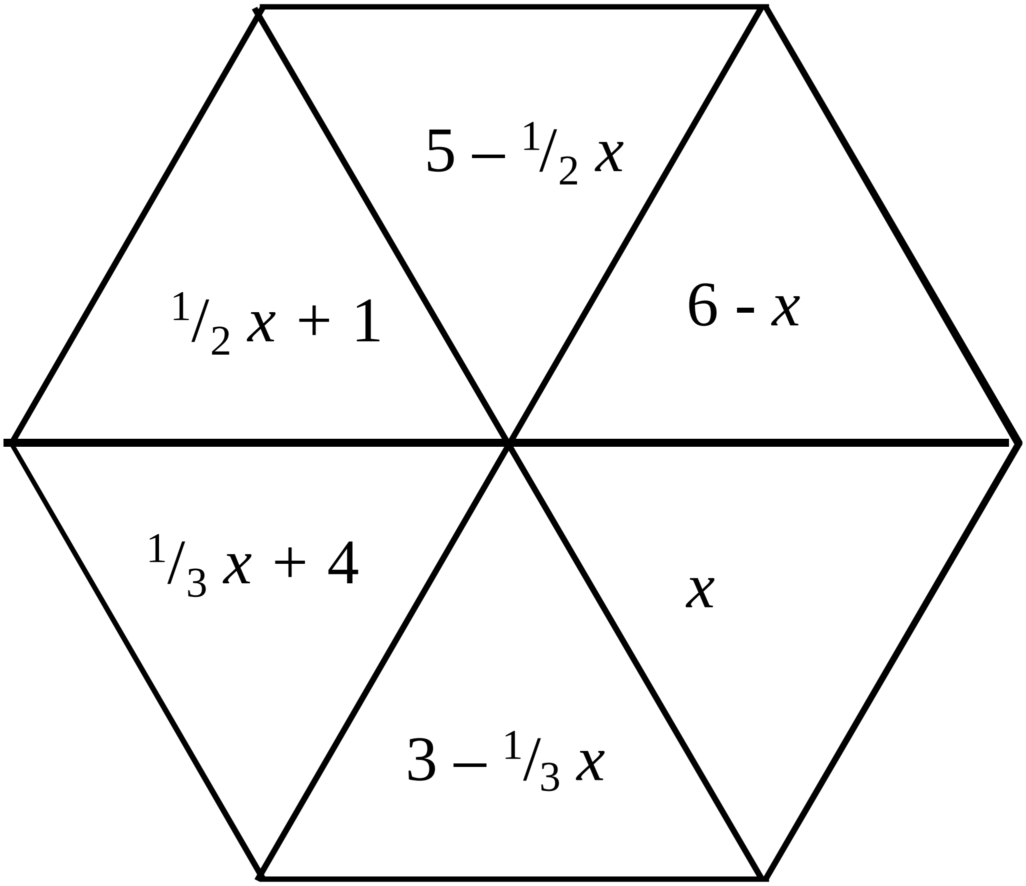
Round 7	Round 8	Round 9	Round 10	Total:

Score:

Round 1	Round 2	Round 3	Round 4	Round 5	Round 6

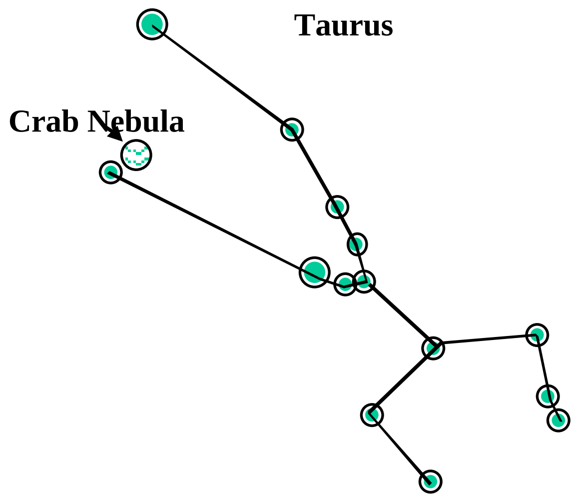
Round 7	Round 8	Round 9	Round 10	Total:

Function War



Name____Date____________

Star Travel



The constellation looks like a picture on a flat page, and you might think the stars are all about the same distance from us, but that is not true.

If we move around the bull's horns starting near the Crab Nebula, the stars are at the following distances from Earth.

1	520 light years
2	65 light years
3	320 light years
4	160 light years
5	------
6	150 light years
7	250 light years
8	150 light years

The star where the two legs of the bull join (Lambda Tauri) is estimated to be 1600 light years away from Earth.

Alien Commander Zorp has a super dooper space ship that can get him to the stars in Taurus quickly, as shown in the chart below. Can you complete the chart?

Star Number	Distance	Time needed by Commander Zorp
1	520	________
2	65	________
3	320	________
4	160	32 months (2 years 8 months)
6	150	30 months (2.5 years)
7	250	50 months (over 4 years)
8	150	30 months
Lambda Tauri	1600	____________

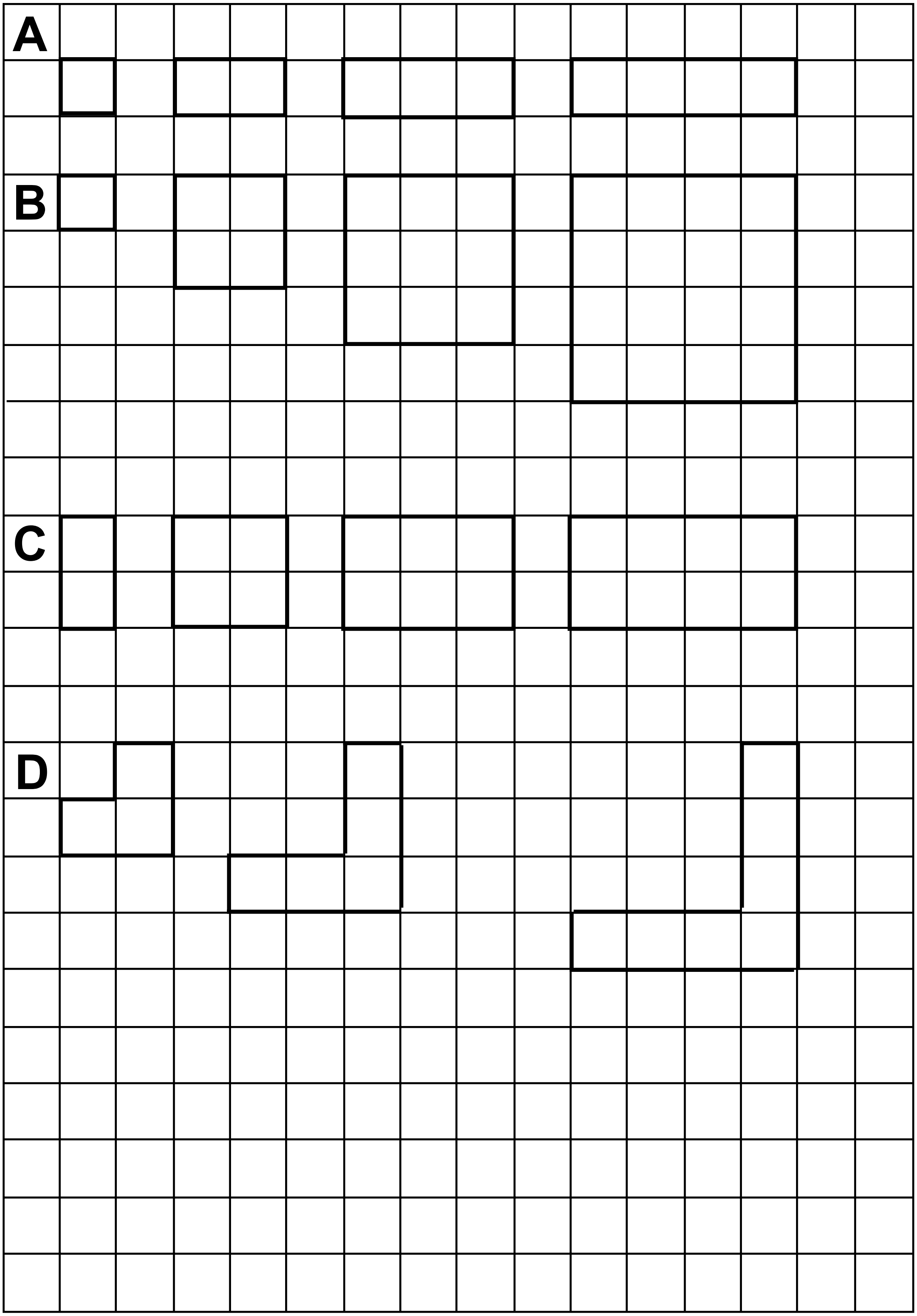
His brother, Colonel Zoom, has an even faster ship. Here is his table:

Star Number	Distance	Time needed by Col. Zoom
1	520 years	52 days
2	65 years	6.5 days
3	320 years	32 days
4	160 years	________
6	150 years	________
7	250 years	________
8	150 years	________
Lambda Tauri	1600 years	________

Which rule does Zoom use to calculate the time it will take to go to the stars?
(D = star distance)
Zoom says: Time = ...
1) 100 + D
2) 10 x D
3) D ÷ 10
4) D – 100

Name____Date___________

Perimeter and Area Patterns

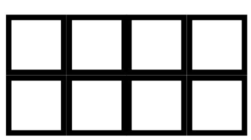


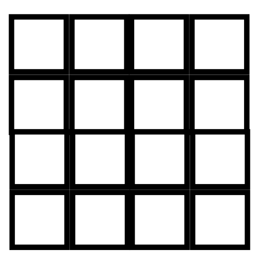
Name____Date____________

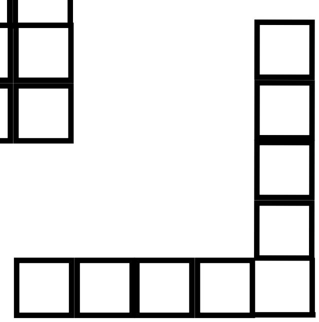
Perimeter and Area Pattern Recording Page

Complete the charts below for the four geometric patterns on the Perimeter and Area page.
Can you predict the areas and perimeters for the figures not shown? Can you find a formula for the *n*th figure in the pattern? That is, can you find a formula with *n* as a variable that will help you calculate the area or perimeter when you plug in a number for *n*, the figure number in the pattern?

Pattern	**Number**	**Perimeter**	**Area**	**Pattern**	**Number**	**Perimeter**	**Area**
A	**1**	_____	_____	**B**	**1**	_____	_____
A	**2**	_____	_____	**B**	**2**	_____	_____
A	**3**	_____	_____	**B**	**3**	_____	_____
A	**4**	_____	_____	**B**	**4**	_____	_____
A	**5**	_____	_____	**B**	**5**	_____	_____
A	**10**	_____	_____	**B**	**10**	_____	_____
A	**100**	_____	_____	**B**	**100**	_____	_____
A	**1000**	_____	_____	**B**	**1000**	_____	_____
A	***n***	_____	_____	**B**	***n***	_____	_____
Pattern	**Number**	**Perimeter**	**Area**	**Pattern**	**Number**	**Perimeter**	**Area**
C	**1**	_____	_____	**D**	**1**	_____	_____
C	**2**	_____	_____	**D**	**2**	_____	_____
C	**3**	_____	_____	**D**	**3**	_____	_____
C	**4**	_____	_____	**D**	**4**	_____	_____
C	**5**	_____	_____	**D**	**5**	_____	_____
C	**10**	_____	_____	**D**	**10**	_____	_____
C	**100**	_____	_____	**D**	**100**	_____	_____
C	**1000**	_____	_____	**D**	**1000**	_____	_____
C	***n***	_____	_____	**D**	***n***	_____	_____

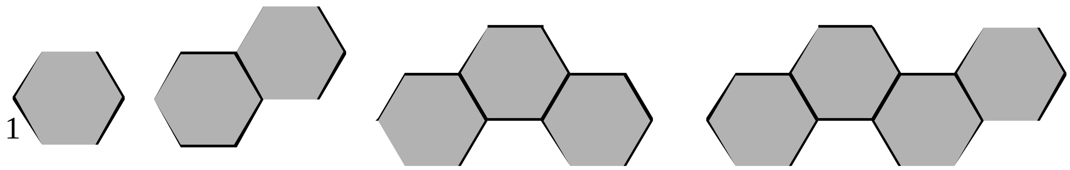






Name____Date____________

Block Patterns



1 2 3 4

Figure Number	Perimeter
1	6
2	________
3	________
4	________
5	________
6	________
10	________
100	________
n	________

1 2 3 4

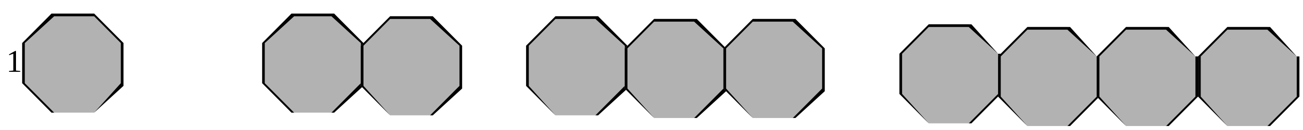
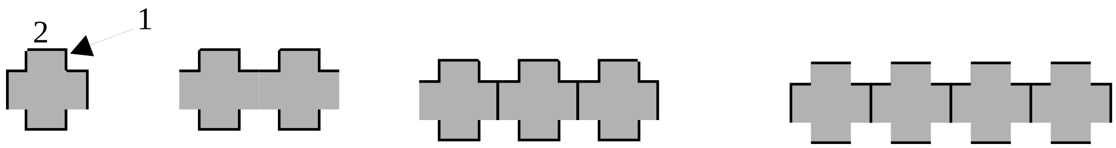


Figure Number	Perimeter
1	8
2	________
3	________
4	________
5	________
6	________
10	________
100	________
n	________

Name____Date___________

Block Patterns



1 2 3 4

Figure Number	Perimeter
1	16
2	________
3	________
4	________
5	________
6	________
10	________
100	________
n	________

1 2 3 4

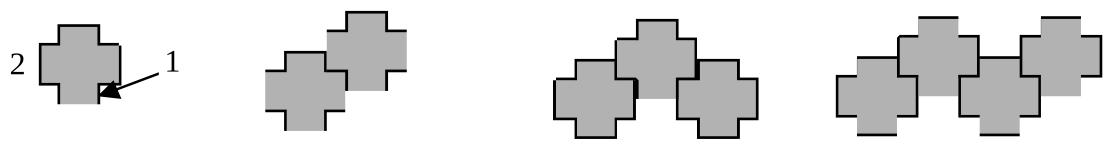
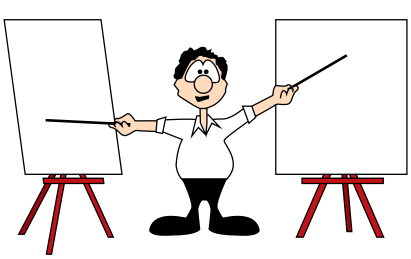


Figure Number	Perimeter
1	16
2	________
3	________
4	________
5	________
6	________
10	________
100	________
n	________



Name_______________________________________Date__________

X in the Mix

Variables are used to describe the following recipe for Chocolate Brownies.

S = number of servings
B = cups of butter
C = cups of cocoa
$\boldsymbol{X}$ = cups of oil
G = cups of sugar
V = teaspoons of vanilla
E = number of eggs
F = cups of flour
N = cups of nuts

If the recipe requires 1/4 cup of oil, use the formulas below to determine the remaining ingredients for the brownies.

$B = X + C$
$C = 3 \text{ x } X$
$G = 8 \text{ x } X$
$V = X + C + B$
$E = G + V$
$F = E \div 3$
$N = 1/2 \text{ x } V$
$S = 2 \text{ x } (E^3 \div V^3)$

This recipe makes _______ servings.
B = _____ cups butter
C = _____ cups cocoa
$^1/_4$ cup oil
G = _____ cups sugar
V = _____ tsp. Vanilla
E = _____ eggs
F = _____ cups self-rising flour
N = _____ cups nuts

Heat oven to 350°. Grease and lightly flour bottom of 8 or 9 inch square pan. In large saucepan, melt butter over low heat. Add cocoa and oil once butter is melted, stirring until completely blended. Blend sugar and vanilla. Beat in eggs, one at a time. Lightly spoon flour into measuring cup; level off. Stir in flour and remaining ingredients. Spread into pan. Bake 20-25 minutes, or until set in center. Cool completely. Cut into bars.

If the pan is 8 x 8 inches, how big would each bar be?

Name____Date___________

Mini Review - Patterns

Write the next 3 terms in the pattern. Describe the rule that each pattern follows.

1. 7.3, 8.0, 8.7, 9.4, …

2. 40, 20, 10, 5, ….

3. 360, 36, 3.6, .36, …

4. 4.5, 4.55, 4.555, 4.5555, …

Use the rule given in each problem below to write 3 ordered pairs (x, y).

5. The sum of x and y is 1.

6. The first number is one more than the second number.

7. The product of x and y is 1.

8. $y = 2x + 1$

9. $x - y = 4$

Pattern Problem Discussion Cards

Problem 1

A frog is stuck at the bottom of a well. Each day, the frog can climb up five feet but each night he slides back down 2 feet. The table below lists his distance from the bottom of the well.

Day 1	5 feet	Night 1	3 feet
Day 2	8 feet	Night 2	6 feet

and so on …

If the well is 65 feet deep, when will the frog get out of the well and join his sweetheart?

Problem 2

Mark has a small business selling plants. The greater his profit, the more plants he can produce for the next year. He always pays the same amount to rent his greenhouses. Here is a chart of his profits for the first four years.

Year 1: $400
Year 2: $700
Year 3: $1300
Year 4: $2500

What will his profit be for Year 5? What do you think he pays to rent his greenhouse?

Problem 3

The following chart shows the price of an item and the sales tax required on the item.

Cost	Tax
$7.50	$0.75
$112.00	$11.20
$0.60	$0.06
$2,450	$245

What is the tax on an item costing $25.30?

If an item requires a tax of $35.20, how much did it cost originally?

If an item costs $350.60, how much will you have to pay for it including tax?

Problem 4

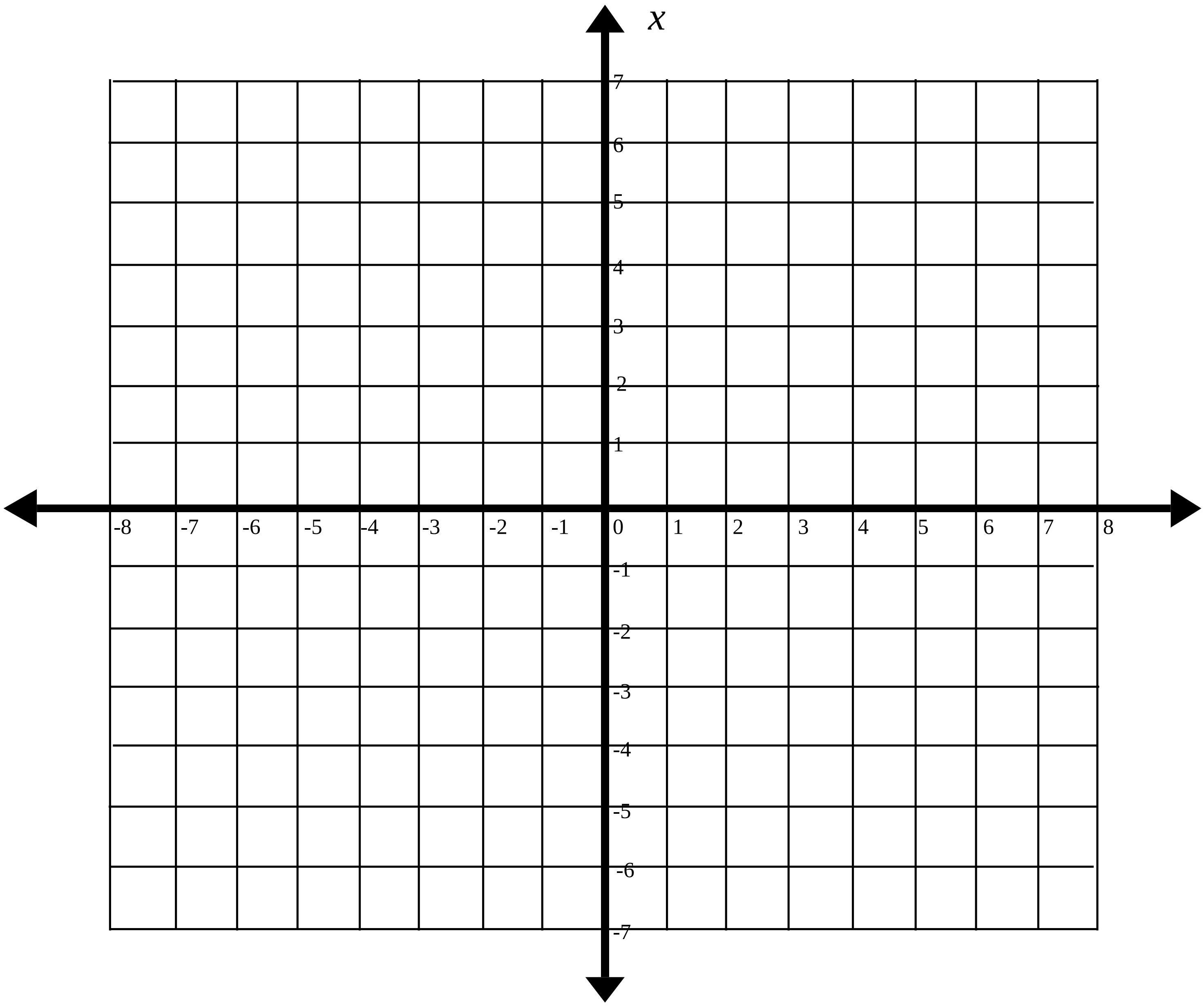
The following chart lists calories in a serving of chicken tenders based on how many pieces are eaten.

Number eaten	Calories
4	168
5	210
6	252
8	336

How many calories are in 17 chicken tenders?

Name____Date___________

Four in a Row



Algebraic Expression

Suggested expressions: $x + y$ $x - y$ $-x + 2y$ $|x - y|$ $-(x + y)$ $2x - 3y$ $y + \frac{1}{2}$

Name____Date___________

X-Racing

y - xz	y(x + z)	-x + yz	$\frac{x}{z - y}$	Finish	Start ↓
x(y - z)					x - y
x - y - z					x + y + z
$\frac{x}{y}$					x(y + z)
x + y					x - yz
xy + z					x + yz
z - xy	z(x - y)	-y - xz	z(x + y)	$\frac{x - y}{z}$	y(x - z)

$\square$	$\square$	$\square$
X	Y	Z

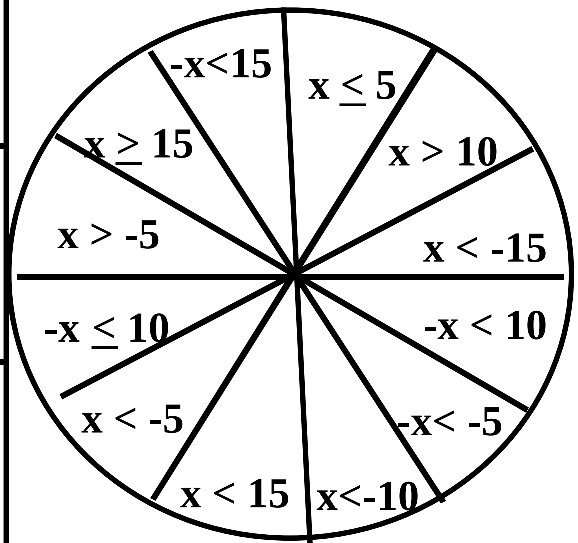
-1	2	3	-4	4	5	-5	6	-10	12

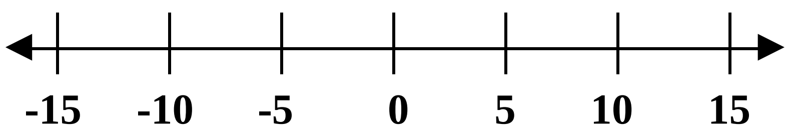
Name____Date____________

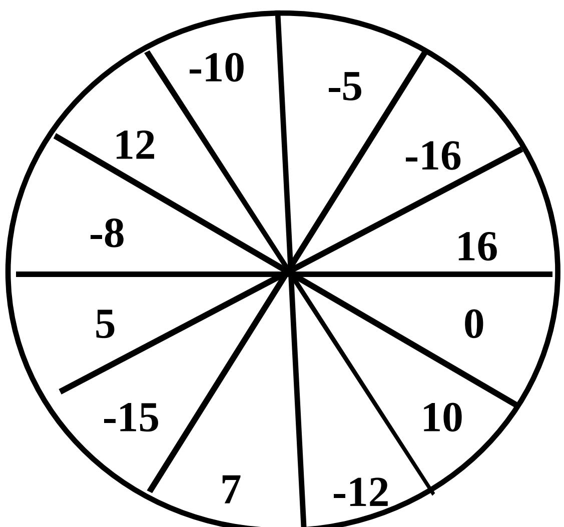
Start

Finish

Inequality Race







He Grew and He Grew!

Age	Height (cm)	Weight (kg)
Birth	51	3.4
3 months	60	5.7
6 months	66	7.6
9 months	71	9.1
12 months	75	10.1
15 months	79	10.8
18 months	82	11.4
2 years	88	12.6
2.5 years	92	13.6
3 years	96	14.6
4 years	103	16.5

Name____Date____________

He Grew and He Grew!

Situation: Mrs. Parker, a sixth-grade mathematics teacher, kept records of her son James' height and weight from birth to age four years. We will use these numbers to learn about the *rate of change.*

1. Make a graph to represent height as a function of age. *(Note that the ages given are not evenly spaced.)*

2. What is the increase in height between:

   a. birth and three months?

   b. 15 months and 18 months?

   c. birth and one year?

   d. three years and four years?

3. Did Joshua's height grow faster or more slowly as he grew older? Explain you answer by referring to:

   a. the answers to problem 2

   b. the shape of the graph

4. If Joshua had grown the same number of centimeters every month, what would his average rate of growth be, in centimeters per month, between:

   a. birth and three months

   b. 15 months and 18 months

   c. birth and one year

   d. three years and four years

5. What was Joshua's average rate of growth in centimeters per month during his first four years? Compare this average with the averages you found in problem 4.

6. Write a short paragraph summarizing the relationship between Joshua's age, his height, and the rate of this growth. In particular, explain the idea of average rate of growth and how it changed with his age.

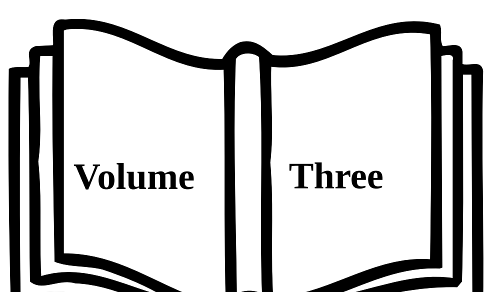
GRADE SIX INDICATORS

FOR THE

MATHEMATICS

STANDARD COURSE OF

STUDY



The Indicators for Grade Six Mathematics

What are Indicators?

Indicators are measures to determine mastery of a concept, procedure, or application within a specific objective or group of objectives. The Indicators illustrate and elaborate each objective with sample problems and tasks, vocabulary, and related concepts and skills. They are written to provide a fuller explanation of the objectives in the Grade Six Mathematics Standard Course of Study. Whenever possible they are couched in a context to further illustrate the scope of the objectives. Indicators are summative in nature, that is, they are intended to show the kind of mathematical problem solving that is appropriate to indicate a student's mastery of the curriculum after an extended period of instruction and practice.

The items contained in this document are not intended to represent sample end-of-grade test questions. Students are encouraged to explain or defend their responses and not merely give an answer. Communication is an important part of mathematics and mathematics education. Writing in mathematics helps students solidify their thinking and gives teachers an insight into the thought process of their students.

It is hoped that teachers will find this material useful in understanding both the intent of the 2003 revised Mathematics Standard Course of Study and the thinking of their students.

Questions and comments should be directed to Linda Patch at the Department of Public Instruction (lpatch@dpi.state.nc.us or 919.807.3841).

Grade 6

Number and Operations

1.01 Develop number sense for negative rational numbers.
a) Connect the model, number word, and number using a variety representations including the number line.
b) Compare and order.
c) Make estimates in appropriate situations.

1.02 Develop meaning for percents.
a) Connect model, number word, and number using a variety of representations.
b) Make estimates in appropriate situations.

1.03 Compare and order rational numbers.

1.04 Develop fluency in addition, subtraction, multiplication and division of non-negative rational numbers.
a) Analyze computational strategies.
b) Describe the effect of operations on size.
c) Estimate the results of computations.
d) Judge the reasonableness of solutions.
.
1.05 Develop fluency in the use of factors, multiples, exponential notation, and prime factorization.

1.06 Use exponential, scientific, and calculator notation to write very large and very small numbers.

1.07 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

Measurement

2.01 Estimate and measure length, perimeter, area, angles, weight, and mass of two- and three-dimensional figures, using appropriate tools.

2.02 Solve problems involving perimeter/circumference and area of plane figures.

Geometry

3.01 Identify and describe the intersection of figures in a plane.

3.02 Identify the radius, diameter, chord, center, and circumference of a circle; determine the relationships among them.

3.03 Transform figures in the coordinate plane and describe the transformation.

3.04 Solve problems involving geometric figures in the coordinate plane.

Data Analysis and Probability

4.01 Develop fluency with counting strategies to determine the sample space for an event. Include lists, tree diagrams, frequency distribution tables, permutations, combinations, and the Fundamental Counting Principle.

4.02 Use a sample space to determine the probability of an event.

4.03 Conduct experiments involving simple and compound events.

4.04 Determine and compare experimental and theoretical probabilities for simple and compound events.

4.05 Determine and compare experimental and theoretical probabilities for independent and dependent events.

4.06 Design and conduct experiments or surveys to solve problems; report and analyze results.

Algebra

5.01 Simplify algebraic expressions and verify the results using the basic properties of rational numbers.
a) Identity.
b) Commutative.
c) Associative.
d) Distributive.
e) Order of operations.

5.02 Use and evaluate algebraic expressions.

5.03 Solve simple (one- and two-step) equations or inequalities.

5.04 Use graphs, tables, and symbols to model and solve problems involving rates of change and ratios.

1.01 Develop number sense for negative rational numbers.

Vocabulary and Resources

a) Connect the model, number word, and number using a variety of representations including the number line.
b) Compare and order.
c) Make estimates in appropriate situations.

To achieve this objective, students should be able to:

- *Use integers to represent real-life situations.*
- *Represent integers on the number line.*
- *Compare integers using the symbols =, ≠, >, <, ≥, ≤.*
- *Understand that an integer and its additive inverse are called opposites.*

A. When keeping scores in golf, reference is made to "par", a designated number of strokes. A score of 2 under par can be written as -2 and a score of 3 over par can be written as 3. For a given round of golf, a group of six golfers had the following scores: Charlie -4, Tom 1, Frank 5, George -2, Andy 3, and Mike -1. Graph each score on a number line.

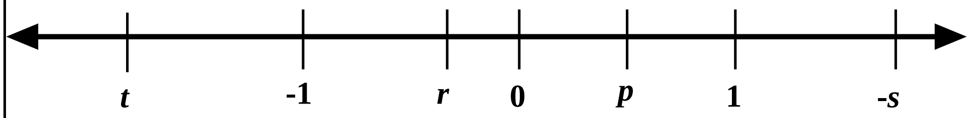
Vocabulary
and
Resources

additive inverse
opposites
negation
integers
number line
equal
less than or equal to
≤
greater than or equal to
≥
compound inequality
(ex. $a < b < c$)

ascending order
descending order

rounding
place value
benchmark values

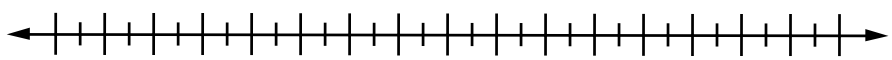
B.



Using the number line above, insert the symbol <, >, or = in each of the following to make a true statement.

a. p ______ $-p$	f. $-p$ ______ 0	k. $-s$ ______ r
b. t ______ $-t$	g. t ______ r	l. $-(-s)$ ______ r
c. p ______ r	h. $-r$ ______ $-t$	m. 0 ______ $-s$
d. $-s$ ______ p	i. $-p$ ______ t	n. -1 ______ $-p$
e. $-r$ ______ 1	j. $-(-s)$ ______ s	o. $-r$ ______ $-s$

C. The lowest daily temperatures for the first eight days of the month were –10°F, -5°F, 5°F, -13°F, 2°F, 22°F, 7°F, and -4°F. Set up an appropriate scale on the number line below and graph these integers.



1.02 Develop meaning for percents.

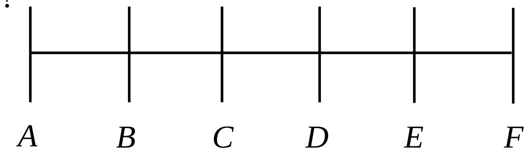
a) Connect the model, number word, and number using a variety of representations.
b) Make estimates in appropriate situations.

Vocabulary and Resources

To achieve this objective, students should be able to:

- *Use the "out of 100" interpretation to develop an understanding of the concept of percent.*
- *Write percents, decimals, and fractions for shaded parts of figures.*
- *Build an understanding of the relationship among the concepts of fractions, decimals, and percents and their representations.*
- *Develop ways to model situations involving fractions, decimals, and percents.*
- *Move flexibly between and among fraction, decimal, and percent representations.*
- *Use number lines to represent equivalent fractions, decimals, and percents.*
- *Use percent, decimal, and fraction benchmarks to make estimates in appropriate situations.*

A. The line segment *AF* is marked off into five equal parts. If you start at point *A* and go 77% of the way to point *F*, between which two points will you be?



(Adapted from SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

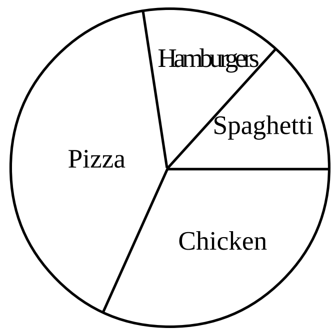
Vocabulary and Resources

part/whole
ratio
proportion
cross product

hundred grid
circle graph

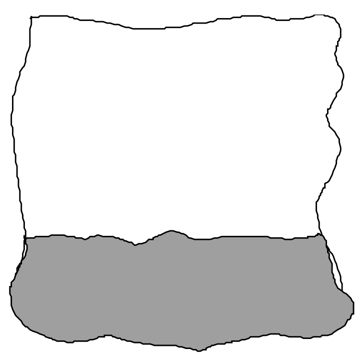
B. At a school health fair, the technician recorded the weights of 265 sixth grade students. According to national health statistics, 40% of the students would be classified as overweight. What fractional part of the students are overweight? How many students are overweight? Shade the portion of the rectangle to represent the overweight students in the sixth grade.

C. Favorite Cafeteria Choices



a) Which two choices would represent about 25% of the total graph?
b) What percent would represent the remaining choices?
c) Estimate what percent of students like spaghetti or chicken nuggets?

D. Estimate the percent of the figure that is shaded. What percent of the figure is not shaded?



E. Lunch for two friends cost \$25.35 and the 6% tax was \$1.52. Use what you know about the 6% tax to estimate an 18% tip to leave the server.

F. Mary is looking for the lowest price to pay for a hair dryer. Which store would have the lowest price?

Store A	\$8 off \$20.95
Store B	25% off \$20
Store C	$\frac{1}{3}$ off \$18
Store D	10% off \$25

Vocabulary and Resources

Vocabulary and Resources

1.03 Compare and order rational numbers.

To achieve this objective, students should be able to:

- *Graph, compare, and order positive and negative numbers.*
- *Use* $0, \frac{1}{2}, 1, 1\frac{1}{2}, 2$ *and so on as benchmarks to estimate the values of other fractions.*

fractions
decimals
percents

number line
equal to
greater than
less than
less than or equal to
≤
greater than or equal to
≥

compound inequality
a < b < c

ascending order
descending order

common denominator
least common denominator
multiple
least common multiple (LCM)
factor

numerator
denominator
improper fraction
mixed number
simplify fraction

A. Circle the equivalent numbers in each set.

a)	$\frac{2}{3}$	$\frac{18}{27}$	66.7%
b)	0.070	70%	0.70
c)	48%	$\frac{48}{100}$	$\frac{12}{25}$
d)	0.33	$\frac{1}{3}$	33.3%
e)	\$0.35	.35¢	$\$\frac{7}{20}$

B. Latroy was bragging to his friend Antonio that he ate six out of eight pieces of his pizza at Marios. Antonio told him that wasn't a big deal because he had eaten 75% of his pizza at The Italian Kitchen. Kaneisha overheard the conversation and told the boys they had both eaten the same amount. Was Kaneisha correct? Explain.

C. Annette and Robin were eating lunch together. When they finished eating, Annette stated that she had eaten half of her sandwich. Robin said, "I ate 50% of my sandwich but I ate more than you." Explain how this is possible.

D. Sophia has $\frac{1}{10}$ of a dollar, Juan has \$0.45, Dwayne has 5% of a dollar, and Alex has one 50 cent piece. Who has the most money?

E. Place a rational number in each blank so that the three numbers are arranged in order from smallest to largest.

a) $-\frac{3}{4}$, ____________, $-\frac{1}{2}$

b) $\frac{1}{4}$, ____________, $\frac{3}{8}$

c) $33\frac{1}{3}\%$, ____________, 0.75

d) - 5.67, ____________, $-5\frac{1}{10}$

e) $-3\frac{5}{6}$, ____________, $-3\frac{3}{4}$

Vocabulary and Resources

Vocabulary and Resources

1.04 Develop fluency in addition, subtraction, multiplication and division of non-negative rational numbers.

a) Analyze computational strategies.
b) Describe the effect of operations on size.
c) Estimate the results of computations.
d) Judge the reasonableness of solutions.

To achieve this objective, students should be able to:

- *Explore the relationship between two numbers and their product to generalize the conditions under which the product is greater than both factors, between the factors, or less than both factors.*
- *Use* $0, \frac{1}{2}, 1, 1\frac{1}{2}, 2$ *and so on as benchmarks to make sense of the size of a sum difference, product or quotient.*
- *Develop strategies to estimate the results of fraction and decimal operations.*
- *Make sense of whether a situation requires an overestimate or an underestimate.*
- *Examine the patterns of quotients (products) when numbers are divided (multiplied) by powers of 10.*

- *Develop ways of modeling addition and subtraction of fractions and decimals.*
- *Develop ways of modeling multiplication of fractions and decimals, including use of the area model.*
- *Develop ways of modeling division of fractions and decimals.*
- *Use fact teams to develop an understanding of the relationship between addition and subtraction or multiplication and division of fractions and decimals.*
- *Develop algorithms for fraction and decimal operations.*
- *Apply knowledge of decimal and fraction operations to solve problems.*

A. At Deli Extravaganza, salads are $0.21 per ounce and an empty plate weighs three ounces. What is the cost of the salad if the scale reads 1.25 pounds?

B. Ground beef is on sale for $1.89 per pound. Kelly has found a package that weights 1.25 pounds. If Kelly has $2.00, does she have enough money to purchase this package of ground beef?

C. Roberto works for two hours. Lee works $2\frac{3}{4}$ times as long as Roberto. Jack works $1\frac{1}{4}$ hours less than Jedd. Jedd works $2\frac{1}{2}$ times as long as Lee. How long does each person work?

Vocabulary and Resources

decimals
fractions
numerator
denominator
improper fractions
simplify fractions
factors
products
least common multiple (LCM)
greatest common factor (GCF)
like/unlike denominators
common denominator
least common denominator
mixed number

sum
difference
product
quotient

inverse operation
multiplicative inverse

rounding
benchmark numbers

Vocabulary and Resources

D. The following table gives the number of hours Dylan worked and the amount of money he earned each day.

Day	Hours (H)	Earnings (E)
Monday	2	\$13.30
Tuesday	$3\frac{2}{3}$	\$24.38
Wednesday	$1\frac{1}{5}$	
Thursday	3	\$19.95
Friday		\$43.23

a) What is Dylan's hourly wage?
b) Write an equation that can be used to determine his earnings.
c) How much did Dylan earn on Wednesday?
d) How many hours did Dylan work on Friday?
e) What are Dylan's total earnings for the week?

E. I have three brothers who really love pizza and have eaten some of the pizza I ordered for a friend and myself. One ate one-fifth of the pizza, one at one-fourth of the pizza, and the other ate one-eighth of the pizza. How much pizza remains? Is there at least half of the pizza left?

F. At the deli counter, Mr. Jones asks for $1\frac{3}{4}$ pounds of sliced ham.

The clerk says, “Twenty ounces, OK?” What should you reply? Explain

G. Jake has five pieces of wood that are each 12 feet long. He plans to make two bookcases and each bookcase will have six shelves of length 57 inches. Jake claims he has enough wood for the shelves. Do you agree or disagree? Explain.

Vocabulary and Resources

Vocabulary and Resources

1.05 Develop fluency in the use of factors, multiples, exponential notation, and prime factorization.

To achieve this objective, students should be able to:

- *Classify numbers as prime or composite.*
- *Recognize that factors come in pairs and that once one factor is found, another can also be found.*
- *Understand the connection between division and finding factors of a number.*
- *Recognize that a number may have several different factorizations, but, except for order, each number greater than 1 has exactly one prime factorization.*
- *Use primes, factors, and multiples to solve problems.*
- *Develop strategies for finding factors and multiples of whole numbers.*
- *Use and interpret exponential notation to represent numbers.*
- *Apply knowledge of factors, multiples, exponential notation, and prime factorization to solve problems. The formal use of the laws of exponents is not expected until Algebra1 (1.01a): Apply the laws of exponents.*

A. Simplify each of the following:

a. $(2.3)^2 + (0.5)^4$

b. $(6)^2 \bullet (5)^0 + (\frac{1}{2})^3$

c. $3 + (11)^2 \bullet (0.3)^4$

d. $5^6 \div 5^2$

e. $2^2 \bullet 3^2 \bullet 2 \bullet 2^3 \bullet 3$

f. $\frac{4^6}{4^6}$

g. $\frac{2^3 \bullet 7^5}{2 \bullet 7^3}$

h. $(3 \bullet 5^2)^3$

B. Write the prime factorization for 72 in two different ways (include exponential notation).

C. Shanika and Jarvis are making bead bracelets to sell in a booth at the fair. They have 15 yellow beads, 30 blue beads, and 40 red beads. How many blue beads should be on each bracelet if they want to make the bracelets so they are all the same and they use all the beads. How many bracelets will they make?

D. Jason is filling grab bags for the school festival. Two hundred bags are lined up on a long table. He has already placed crackers and other food items in each bag and now has a limited amount of prizes to add to some of the bags. If he places prize A in every 8th bag, prize B in every 12th bag, and prize C in every 15th bag, which bag will have all three prizes?

E. A clockmaker must wind his clocks on a regular schedule. He winds some of his clocks every two days, some of his clocks every three days, and the remainder of his clocks every five days. How often does he wind all of his clocks on the same day?

F. A class of 28 students stood in a circle and counted off by ones. Those students identified with a multiple of four sat down. The remaining students who were standing counted by ones again and this time those identified with a multiple of three sat down. Once again the remaining students counted off and this time the multiples of two sat down. When the third count off was completed, how many students were still standing?

G. The Peterson family is planning a picnic for 16 people. They will be serving hotdogs. If hotdogs come in packages of eight and hotdog buns come in packages of six, what is the minimum amount of each that they should purchase so they have an equal number of hotdogs and hotdog buns and each person can have the same number of hotdogs?

H. The national debt of a country is approximately 10^9 dollars. If the debt could be reduced by 10^6 dollars per year, about how many years would it take to eliminate the entire debt?

Vocabulary and Resources

exponent
base
power
square
square root
(of perfect square)
cube
cube root
(of perfect cube)

operations with exponents
(x and ÷)

order of operations

factor tree
divisibility rules
greatest common factor
least common multiple

prime number
composite number

Vocabulary and Resources

1.06 Use exponential, scientific, and calculator notation to write very large and very small numbers.

To achieve this objective, students should be able to:

- *Relate negative powers of 10 as used in scientific notation to repeated multiplication of the fraction* $\frac{1}{10}$ *(e.g.* $10^{-3} = \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10} = \frac{1}{1000}$*)*
- *Relate positive powers of 10 as used in scientific notation to repeated multiplication of ten (e.g.* $10^{3} = 10 \times 10 \times 10 = 1000$*)*
- *Convert numbers written in scientific notation to standard notation and numbers written in standard notation to scientific notation*
- *Use calculators to explore contexts in which numbers are expressed in scientific notation*

place value
standard form
powers of ten

exponent
base

A. The population of a certain country has reached 4.29×10^8. Which of the following is another way to represent the population?

A 429 million
B 4.29 million
C 4.29 billion
D 429 billion

B. The Diplococus dinosaur is believed to have become extinct approximately 1.38×10^8 years ago, The Oviraptor is believed to have become extinct approximately 7×10^7 years ago. About how many years were there between the extinctions of these two dinosaur types?

Vocabulary and Resources

C. The figure below shows the display on a scientific calculator. The value of the displayed number is between which of the following pairs of numbers?

4.752	**E -02**

a) 0.04 and 0.05
b) 0.4 and 0.5
c) 4.0 and 5.0
d) 40.0 and 50.0
e) 400.0 and 500.0

(From SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

D. Write the following numbers in scientific notation:

a) 2,379,000
b) 0.0000000005
c) 8,000,000,000
d) 0.0000786
e) 489,500,000,000
f) 0.00000206

Vocabulary and Resources

1.07 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

To achieve this objective, students should be able to:

- *Use strategies such as making a table or diagram, using guess-and-check, looking for patterns, simplifying the problem, and working backwards to solve problems.*
- *Use strategies such as decomposing numbers, estimation, and compensation to solve problems using mental computation.*
- *Use calculators or computer and paper and pencil as appropriate to aid in problem solving.*

guess and test
make a table/chart/graph
make a diagram/picture
make an organized list
work backwards
solve a simpler problem
find a pattern
extraneous information

A. The gasoline gauge of John's car was on empty when he filled the gasoline tank of his car. The price of the gasoline was about \$1.53 per gallon. If he paid \$32.65 for the gasoline, about how many gallons must his tank hold?

B. Two runners start running at the same time from the start/finish line of a 400-meter oval track. One runner runs laps of 1 minute 15 seconds and the other runs laps of 1 minute 45 seconds. How long will it be before the runners cross the start/finish line at the same time? How many laps will each have run? Explain your answer.
(From SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

C. Of the 90 people in a room, two-thirds are men and three-fifths of the people have brown hair. What is the least number of men in the room who could have brown hair?
(Adapted from SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

D. Tate has two dogs, Tucker and Britney. Britney consumes 0.75 of a can of dog food each day and Tucker consumes 1.5 cans of dog food each day. The price for dog food this week is 3 cans for $2.00. How much will it cost Tate for a 20-day supply of dog food for his two dogs?

E. Kim has a recipe for 36 cupcakes that requires 5 cups of flour, 3 eggs, and 2 cups of sugar. If she wants to make 24 cupcakes, how much of each of these ingredients will she need? How much of each ingredient will she need for 54 cupcakes?

F. Place a row of 100 pennies all heads up. Now turn every second penny heads down. Next, change the position of every third penny (if it is heads up, make it heads down; if it is heads down, make it heads up). Now change the position of every penny that is a multiple of four. Next change the position of every penny that is a multiple of five. If you continue this pattern with multiples of 6, 7, 8, ..., which pennies would be heads up?

Vocabulary and Resources

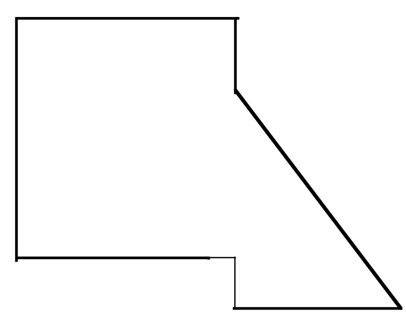
Vocabulary and Resources

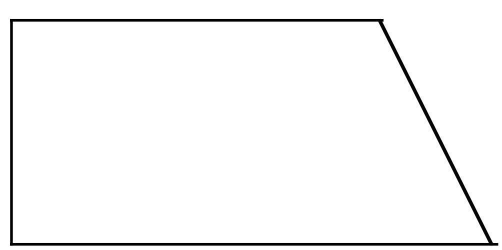
2.01 Estimate and measure length, perimeter, area, angles, weight, and mass of two- and three-dimensional figures using appropriate tools.

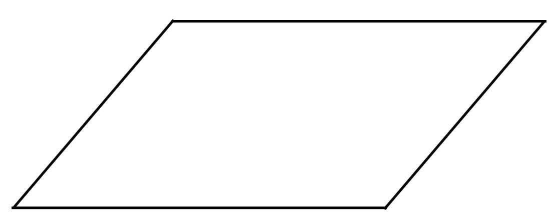
To achieve this objective, students should be able to:

- *Estimate angle measures using benchmarks and find precise angle measures of two-dimensional figures using appropriate tools.*
- *Estimate length measures using benchmarks and find precise length measures of two-dimensional figures using appropriate tools.*
- *Estimate weight/mass measures using benchmarks and find precise weight/mass measures of three-dimensional objects using appropriate tools.*
- *Understand and find perimeter and area of simple and composite two-dimensional figures.*

A. Use your centimeter ruler to determine the perimeter and area of each figure below.

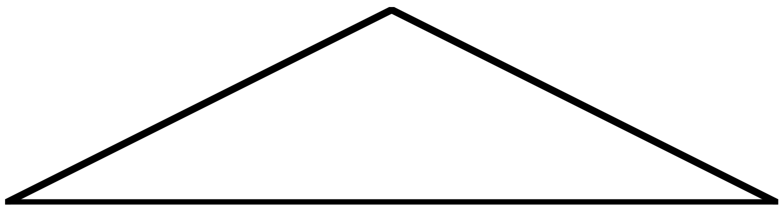


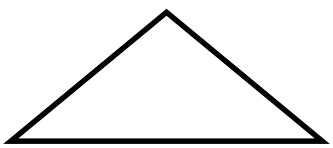


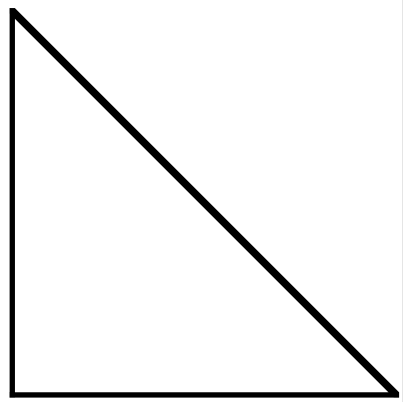


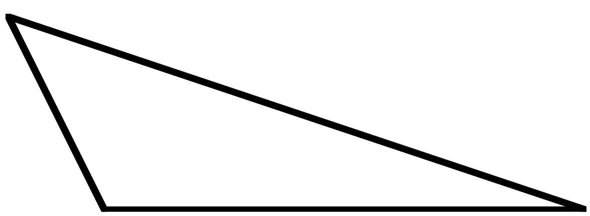
B. For the triangles below give the measures of the angles and the sides. Determine if the triangle is

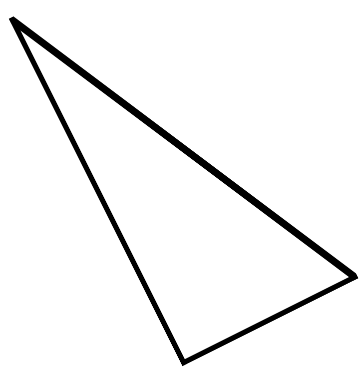
- right, obtuse, or acute
- equilateral, isosceles, or scalene

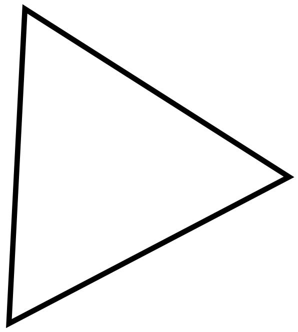












Vocabulary and Resources

protractor
degree
vertex
acute angle
obtuse angle
right angle
complementary angles
supplementary angles

balance scale

metric system
meters
centimeters
kilometers
grams
kilograms

customary system
feet
inches
yards
miles
ounces
pounds

square units

parallelogram
triangle
trapezoid
height
altitude

Vocabulary and Resources

C. Using a protractor, measure each angle in each figure below. State whether each angle is acute, obtuse or right.

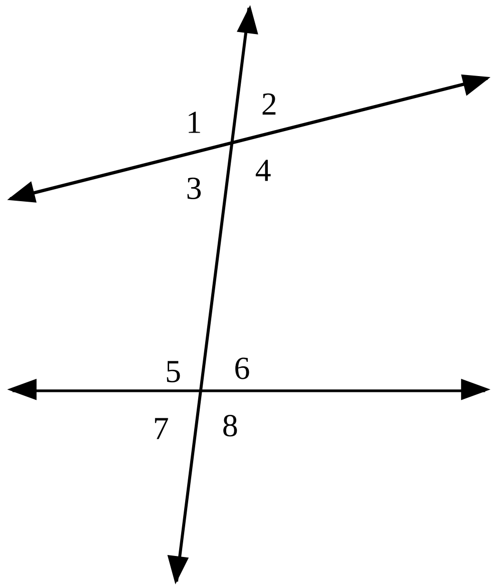


Figure 1

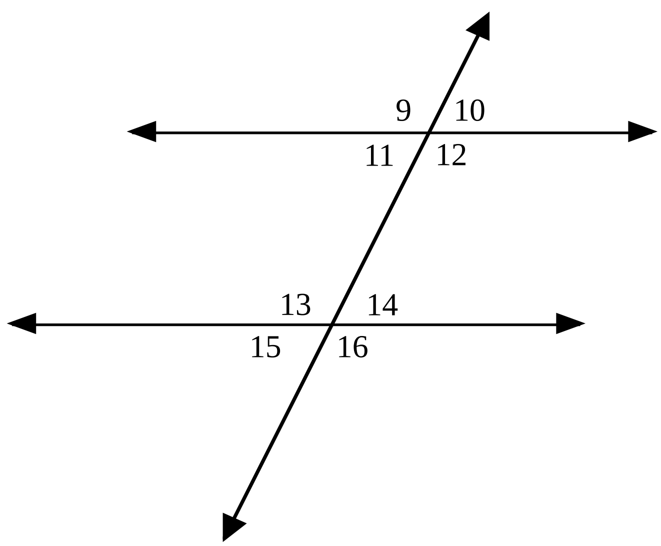


Figure 2

D. Find containers that are represented by the shapes below.

- Measure the dimensions of each container.
- Measure the mass of each empty container .
- Estimate what mass of rice would be needed to fill each container.
- Plan a strategy to find the actual mass of the rice .
- Compute the actual mass of the rice needed to fill the container.

Figure A

Length _____
Width _____
Height _____
Mass ______

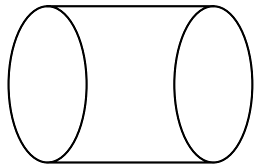


Figure B

Radius _____
Diameter _____
Height _____
Circumference _____
Mass _____

Estimated mass of rice _____

Actual mass of rice ______

Estimated mass of rice _____

Actual mass of rice ______

Vocabulary and Resources

Vocabulary and Resources

2.02 Solve problems involving perimeter/circumference and area of plane figures.

To achieve this objective, students should be able to:

- *Understand that the area of an object is the number of unit squares needed to cover it and the perimeter of an object is the number of units of length needed to surround it.*
- *Understand that the circumference of a circle is the number of units of length needed to surround it.*
- *Develop techniques for estimating the area of a circle.*
- *Discover that it takes slightly more than three (π) times the square of the radius to equal the number of square units in the area of a circle.*
- *Understand that two figures with the same area may have different perimeters and that two figures with the same perimeter may have different areas.*
- *Understand how the area of a rectangle is related to the area of a triangle and of a parallelogram.*
- *Develop formulas – stated in words or symbols – for finding areas and perimeters of rectangles, parallelograms, triangles, and circles and then use these formulas to solve problems.*

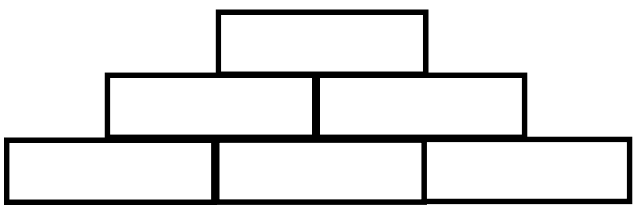
A. Carlos paid $8.99 for a large pizza (16-inch diameter). Tameka bought two rectangular pan pizzas, each of which measured 11 inches by 13 inches. She paid a total of $10.99 for the two pizzas. Which pizza is the better buy based on the number of square inches per pizza?

B. Plastic edging for flower beds comes in 50-foot rolls and costs $6.85 per roll. What is the cost to completely edge two rectangular flower beds 40 feet by 15 feet and one circular flower bed 16 feet in diameter?
(From SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

C. The area of a square is 196 square meters. If one-half of the perimeter of the square is the same as the perimeter of a regular pentagon, what is the length of one side of the pentagon?

D. Which has the smallest area, a circle with a diameter of 3 yards, a triangle with a base of 20 feet and a height of 11 feet, or a square with a side of 10.5 feet?

E. In the given diagram each rectangle is centered on the two rectangles directly below any given rectangle. If each rectangle has a length of 13 centimeters and a width of 4 centimeters, determine the perimeter and area of the given figure. If two more rows of rectangles are added, determine the perimeter and area of the new figure.



F. Mr. Evans is going to replace the carpet in his family room. The dimensions of the room are 22.5 feet by 26.5 feet. If the cost of the carpet, pad, and installation is $28.75 per square yard, what will be the total cost excluding tax?

G. One pipe has a 1.25 centimeter diameter. A second pipe has a two and one-half centimeter diameter. What is the difference in the area of the openings of the two pipes?

H. An eight inch diameter pizza costs $6.95. Kate asserts that a 16-inch diameter pizza (same toppings, same crust) should cost $13.90. Explain her reasoning and determine if this is a fair price. If not, what would be a fair price?

Vocabulary and Resources

pi
radius
diameter
circle

polygon
triangle
quadrilateral
pentagon
hexagon
octagon
nonagon
decagon

square units

height
altitude

Vocabulary and Resources

3.01 Identify and describe the intersection of figures in a plane.

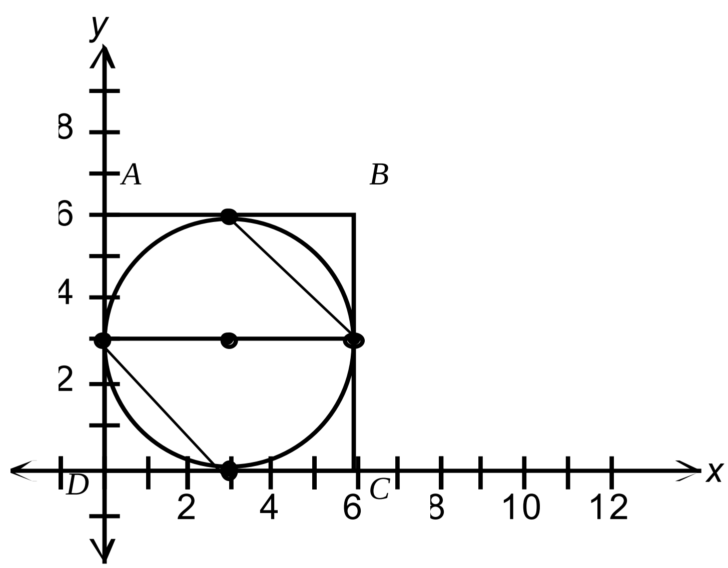
To achieve this objective, students should be able to:

- *Understand and know that the intersection of figures and/or lines in a plane create interior and exterior regions and/or angles.*
- *Understand and know that two different lines in a plane either intersect or are parallel and that perpendicular lines intersect at a 90º angle.*
- *Understand and know that two lines intersect if they have a common point.*

vertex
interior region
exterior region
interior angles
exterior angles

parallel
perpendicular

A. Give the coordinates of the intersection of the circle, the square and the indicated diameter. Give the coordinate of the point located on the indicated diameter, on the circle, on the square and in the first quadrant. What is the length of the diameter?



B. Determine all the possibilities for the intersection of a circle and a quadrilateral in a plane. What are the maximum number of points of intersection for these two figures?

C. Three different lines, l_1, l_2, and l_3 are located in a given plane. Sketch different possibilities for the intersection of these lines.

Vocabulary and Resources

D. Two parallel lines are located 6″ apart. A circle with a diameter of 2″ is drawn. Give a diagram to illustrate each of the following:

a) Two points of intersection
b) One point of intersection
c) No point of intersection

E. Two parallel lines are located 5″ apart. A circle with a diameter of 8″ is drawn. Give a diagram to illustrate each of the possibilities for the intersection of the two parallel lines with the circle.

F. Two pairs of parallel lines, l_1 and l_2 located 2 cm apart, and l_3 and l_4 located 5 cm apart, intersect in a plane. What are the possible figures determined by their intersection?

G. Graph triangle *ABC* with coordinates (7, -2), (-2, 2), (-1, -3) and rectangle *RSTU* with coordinates (6, -1), (6, 1), (-4, 1), and (-4, -1).

a) Give the coordinates of points that satisfy each of the following conditions:
- in the interior of both the triangle and the rectangle
- in the interior of the rectangle only
- in the interior of the triangle but in the exterior of the rectangle
- in the interior of the rectangle but in the exterior of the triangle

b) Shade the region in the first quadrant that is formed by the intersection of the two figures.

Vocabulary and Resources

3.02 Identify the radius, diameter, chord, center, and circumference of a circle; determine the relationships among them.

To achieve this objective, students should be able to:

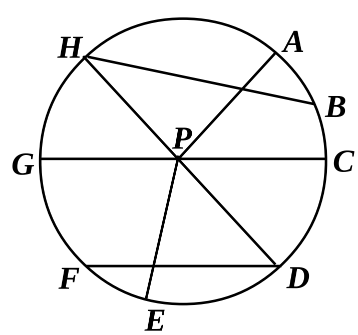
- *Know that the perimeter of a circle is called its circumference.*
- *Discover that it takes slightly more than three (π) diameters to equal the circumference of a circle.*
- *Know that the circumference is greater than the diameter ($C = \pi d$), and the diameter is greater than the radius ($d = 2r$).*
- *Know that the diameter is the longest chord in a circle.*

A. The circumference of a truck wheel is 9.5 meters. How would you find the diameter of the wheel?

pi (π)
ratio
proportion

B. A circle has a radius of 15 centimeters. How do you find the diameter and circumference of the circle. What is the maximum length of any chord of this circle?

C. For circle *P*, name the following:
- the center
- a radius
- a diameter
- a chord that is not a diameter



Vocabulary
and
Resources

D. Select five circular objects and complete the table with the required information.

Object	Circumference	Diameter	$\frac{c}{d}$	r	r^2	Area

Note any relationships that you observe.

E. If a chord of a circle measures 8 centimeters, what is the minimum area the circle could have. Explain.

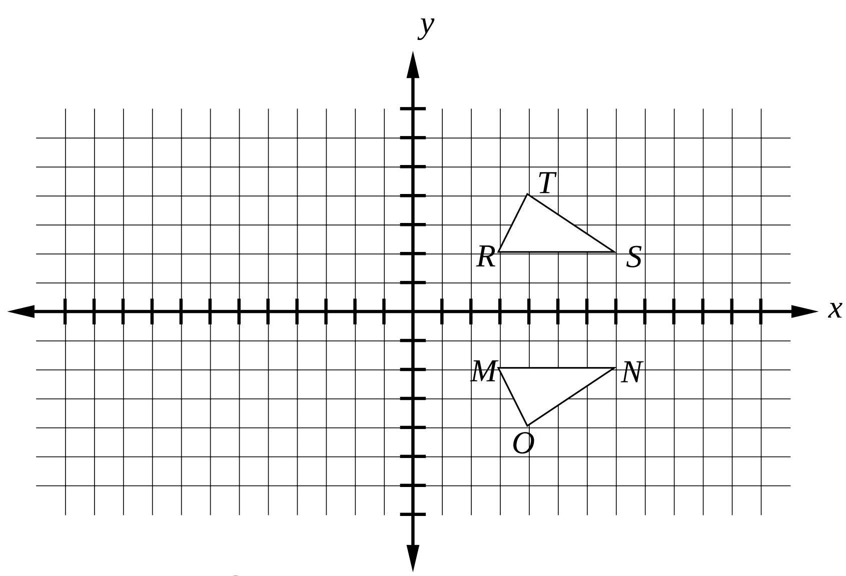
Vocabulary and Resources

3.03 Transform figures in the coordinate plane and describe the transformation.

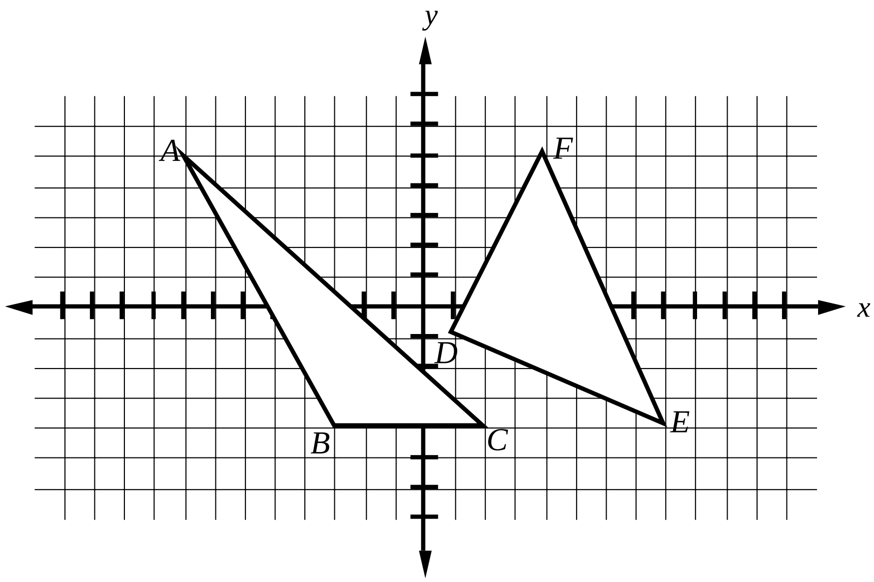
To achieve this objective, students should be able to:

- *Plot points in the four quadrants of a coordinate grid.*
- *Understand that translations, reflections, and rotations produce a second figure (image) congruent to the original figure (pre-image).*
- *Use sample notation (see side bar) to describe transformations.*
- *Recognize that a transformation of the form* $(x', y') = (x + a, y + b)$ *is a translation which moves the point (x, y) a units horizontally and b units vertically.*
- *Reflect a figure over a given line in the plane and name the coordinates of the image.*
- *Translate a figure in the plane and name the coordinates of the image.*
- *Rotate a figure in the plane about a given point (angle of rotation a multiple of 90º) and name the coordinates of the image.*

A. $\Delta RST \longrightarrow \Delta MNO$ Identify the transformation that occurred. Give the coordinates of points *M*, *N*, and *O*. Write in words a description of this transformation.



B. Triangle ABC is translated 4 units to the right and two units down. Give the coordinates of triangle $A'B'C'$. Is triangle $A'B'C'$ congruent to triangle ABC? Using the same rule, give the coordinates of triangle $D'E'F'$.



C. Graph a figure in the coordinate plane. Describe a reflection of this figure that will produce the same result as a translation of the figure, and graph the resulting figure.

D. Triangle ABC is rotated 90˚ clockwise about the origin. If the coordinates of B are (-4, 4), what are the coordinates of B'?
(Adapted from SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

E. Triangle ABC: $A(4, 5)$, $B(3, 7)$, $C(5, 7)$ is reflected over the line containing (2, 7) and (6, 7). The image and pre-image together form which polygon?

F. Graph the quadrilateral: $P(5, 6)$, $Q(6, 4)$, $R(3, 2)$, $S(2, 4)$. If the polygon is transformed according to the rule $(x', y') = (x + 2, y + 1)$, where will the diagonals of the new polygon $P'Q'R'S'$ meet? Is figure $PQRS$ congruent to figure $P'Q'R'S'$?

Vocabulary and Resources

reflection (flip)
translation (slide)
rotation (turn)
line of reflection
center of rotation
angle of rotation
pre-image
image

x-axis
y-axis
quadrants
Quadrant I
1st Quadrant
Quadrant II
2nd Quadrant
Quadrant III
3rd Quadrant
Quadrant IV
4th Quadrant

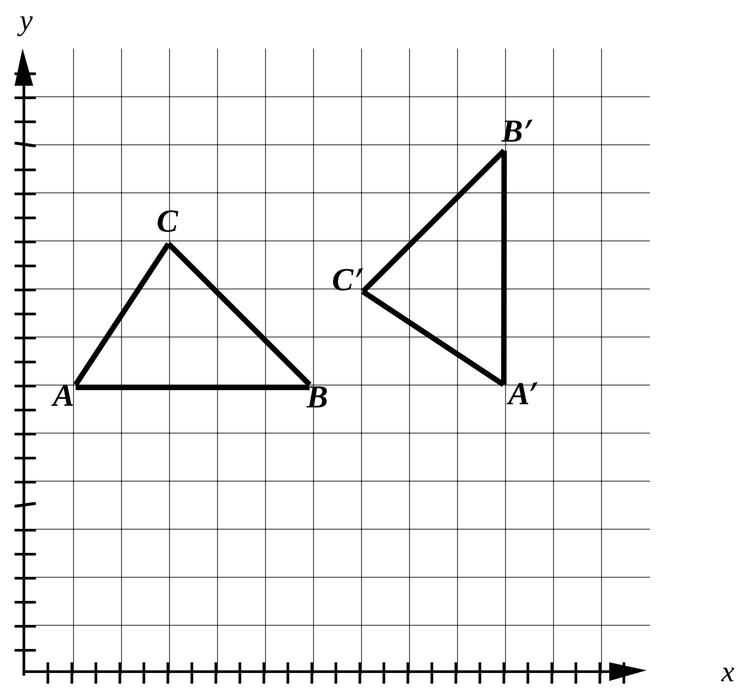
clockwise
counterclockwise

notation:
$\Delta ABC \rightarrow \Delta DEF$
$\Delta ABC \rightarrow \Delta A'B'C'$
$A \rightarrow A'$
$(x, y) \rightarrow (x', y')$
$(x', y') = (x + a, y + b)$

mirrors
patty paper

Vocabulary and Resources

G. What transformations were performed to move triangle *ABC* to triangle *A′B′C′*?



H. What is the image of triangle *ABC*: *A*(1, 4), *B*(3, 2), *C*(1, 2) if it is translated to the left five units and down six units?

I. Trapezoid *DEFG*: *D*(1, 7), *E*(3, 9), *F*(7, 9) *G*(8, 7) is reflected over its longer base. Name polygon *DEFGF′E′* .

3.04 Solve problems involving geometric figures in the coordinate plane.

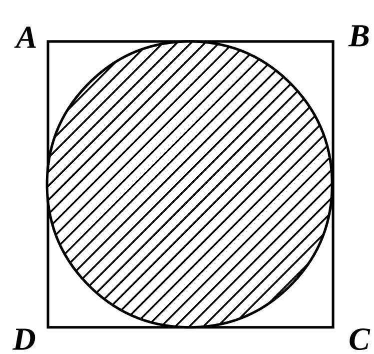
A. Given the points *A* (3, 1), *B* (3, 6), and *D* (7, 1), what are the coordinates of *C* if figure *ABCD* is a rectangle? Determine the perimeter and area of figure *ABCD*.

B. Graph triangle *ABC*: *A*(4, 9), *B*(1,3), *C*(8, 3). Determine the area of the triangle. Give the coordinates for a triangle *DEF* that has an area twice that of triangle *ABC*.

C. Graph figure *PQRS*: *P*(-4, 5), *Q*(10, 5), *R*(10, -3), *S*(-4, -3).

a) Determine the area and perimeter of the figure.
b) Give the coordinates of a figure that has a perimeter half that of figure *PQRS*.
c) Give the coordinates of a triangle that has an area half that of figure *PQRS*.

D. Figure *ABCD* is located in the coordinate plane with the following vertices: *A* (-2, 3), *B* (6, 3), *C* (6, -5) and *D* (-2, -5). A circle is drawn in the figure as shown below. Give the radius, diameter, and circumference of the circle. Find the area of the unshaded region.



Vocabulary and Resources

reflection (flip)
translation (slide)
rotation (turn)
line of reflection
center of rotation
angle of rotation
pre-image
image

x-axis
y-axis
quadrants
Quadrant I
1st Quadrant
Quadrant II
2nd Quadrant
Quadrant III
3rd Quadrant
Quadrant IV
4th Quadrant

clockwise
counterclockwise

notation:
$\Delta ABC \rightarrow \Delta DEF$
$\Delta ABC \rightarrow \Delta A'B'C'$
$A \rightarrow A'$
$(x, y) \rightarrow (x', y')$

Vocabulary and Resources

4.01 Develop fluency with counting strategies to determine the sample space for an event. Include lists, tree diagrams, frequency distribution tables, permutations, combinations, and the Fundamental Counting Principle.

To achieve this objective, students should be able to:

- *Develop a variety of strategies to find sample spaces in order to determine theoretical probabilities; strategies include using:*
    - *Organized lists of all possible outcomes*
    - *Frequency distribution tables*
    - *Tree diagrams: Find all possible outcomes involving a limited number of choices*
    - *Permutations: Find all possible arrangements involving a limited number of choices*
    - *Combinations: Find all possible combinations and arrangements involving a limited number of choices*
- *Use the Fundamental Counting Principle to determine the number of possible outcomes for combinations of independent events.*

sample space
favorable outcomes
possible outcomes

A. John, Paul, George and Roger were all listening to the same radio station when it was announced that there were free tickets being given away to the latest movie. All four placed a phone call. List all possibilities for the order in which these four calls could be received.

B. Nancy will choose one salad, one dessert, and one drink for her lunch. The salad choices are: chicken, tuna, or ham. The dessert choices are: chocolate cake, ice cream, or cookie. The drink choices are milk or juice. How many different lunch combinations are possible?

Vocabulary and Resources

C. Count the total number of letters in the first and last names for each student in your class and record the information in a frequency distribution chart similar to the one below.

Number of Letters in Name	Tally	Frequency
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

- How many students have 5 letters in their name? 12 letters? 16 letters?
- What is the probability that a new student added to your class will have 12 letters in his/her name? 5 letters?
- Find the median, mode and range for this set of data.

D. Clay has three pairs of shorts and five coordinating shirts. How many days can Clay wear a different combination of shirt and shorts.

E. The swim coach needs to select four swimmers from a group of six who are qualified to swim in the freestyle relay. How many different relay teams are possible?

Vocabulary and Resources

4.02 Use a sample space to determine the probability of an event.

To achieve this objective, students should be able to:

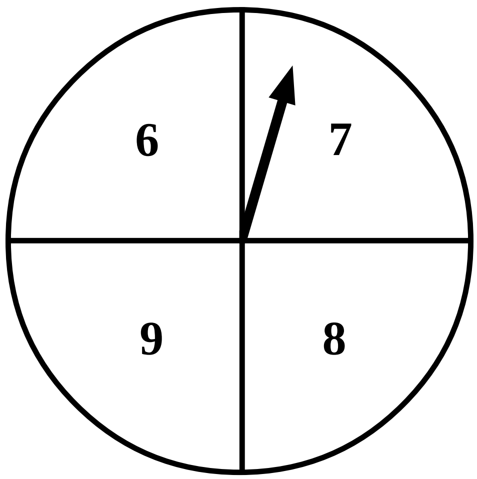
- *Understand that probabilities are useful for predicting what will happen over the long run.*
- *Understand the concepts of equally likely and not equally likely outcomes.*
- *Understand the idea that probability, p, is always $0 \le p \le 1$. Probability, p, can be written as a common fraction, decimal fraction, or percent.*
- *Understand that the sum of the probabilities of all possible outcomes for a given event is always 1.*
- *Understand that an event is the outcome of a trial.*
- *Use counting strategies in contexts involving counting discrete events (e.g., tosses of coins or number cubes; drawing objects from bag), determining areas (e.g., grids), and measuring angles (e.g., using spinners) to determine the probability of an event.*

possible outcomes
favorable outcomes
geometric probability

A. T. K. Chance tossed four fair coins. List the ways he could get one head and three tails. What is the probability that he will get exactly three tails when he tosses four fair coins? Predict the number of times he would get exactly three tails when tossing four fair coins 500 times.

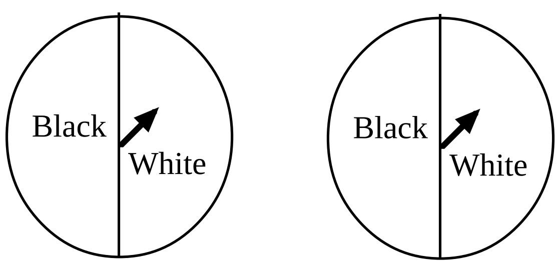
B. A fair coin is to be tossed three times. What is the probability that two heads and one tail in any order will result?
(Adapted from SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

C. Blake is helping his younger brother Ben with his addition facts. Ben spins the fair spinner twice and determines the sum of the two numbers.
a) What is the probability that the two numbers will produce the smallest possible sum? the largest possible sum?
b) What is the probability that the sum will be greater than 13?
c) What is the probability that the sum will be an even number?
d) Is there one sum that is more likely to occur than any other sum? Explain.



D. Suppose you toss two fair number cubes with faces labeled zero to five and then determine the sum of the two numbers. What is the probability of obtaining a sum of seven?

E. The two fair spinners shown below are part of a carnival game. A player wins a prize only when both arrows land on black after each spinner has been spun once. James thinks he has a 50-50 chance of winning. Do you agree? Justify your answer.



(Adapted from SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

F. Rebecca is throwing darts at a square dart board that measures 3 feet on a side and has a blue circular region in the center with a diameter of 2 feet. What is the probability that the dart will land on the dart board in the blue region?

Vocabulary and Resources

Vocabulary and Resources

4.03 Conduct experiments involving simple and compound events.

To achieve this objective, students should be able to:

- *Recognize that simultaneous trials and trials conducted one at a time give the same information.*
- *Understand that simple events are those which consist of a single outcome. Rolling a 5 when rolling a die is a simple event (only one way for this to occur: 5).*
- *Understand that compound events are those which consist of more than one outcome. Rolling an even number when rolling a die is a compound event (three ways for this to occur: 2, 4, and 6).*
- *Understand the distinction between simple events and compound events.*

experimental results
sample space
outcomes
favorable outcomes
possible outcomes

tree diagrams
organized lists
Fundamental Counting Principle

A. Conduct an experiment using a styrofoam cup by tossing the cup and recording how it lands.

- How many trials did you conduct?
- How many times did it land right side up?
- How many times did it land upside down?
- How many times did it land on its side?
- Can you determine the probability for each of the above results?

B. Devise an experiment using a coin to determine whether a baby is a boy or a girl. Conduct the experiment ten times to determine the gender of ten births. How could you use a die to simulate whether a baby is a girl or a boy?

C. Is the probability of getting two heads greater if you toss three coins at the same time or toss one coin three times in succession? Explain your answer.

D. You and a friend are going to play a game where you each roll a fair number cube labeled with the numbers 1 through 6. If the resulting two numbers determine a rational number in lowest terms , your friend gets a point; however, if the numbers determine a rational number that is not in lowest terms, you get the point. Repeat this 20 times and record the data in a table with the following headings.

Rational Number	Points	
	Player 1 (Lowest Terms)	Player 2 (Not in Lowest Terms)

Based on the results, decide if this is a fair game and explain why or why not. How do these experimental results compare with the theoretical probability of getting a rational number in lowest terms under these conditions?

E. Identify each of the following as a simple or compound event. Determine the probability of each.

a) rolling a 4 on a fair number cube
b) rolling a prime number on a fair number cube
c) drawing a vowel from a bag of 26 alphabet cards
d) drawing the letter *p* from a bag of 26 alphabet cards
e) selecting a red jelly bean from a bag containing six red, two green, and four orange jelly beans

Vocabulary and Resources

Vocabulary and Resources

4.04 Determine and compare experimental and theoretical probabilities for simple and compound events.

To achieve this objective, students should be able to:

- *Understand that experimental probability is determined by gathering data from experiments and theoretical probability is determined by analyzing all possible outcomes.*
- *Understand that a small number of trials may produce a wide variation in results.*
- *Understand the relationship between experimental and theoretical probabilities: when an experimental probability is based on a large number of trials, it is a good estimate of the theoretical probability.*

A. What is the probability of getting two heads when you toss two fair coins, a quarter and a nickel, at the same time?

B. Your teacher has a bag of Starburst™ candies. There are six cherry, four orange, and ten lemon candies in the bag. If you close your eyes and select one piece of candy from the bag, what is the probability it will be orange? Which flavor are you most likely to select?

experimental results
sample space
outcomes
favorable outcomes
possible outcomes
goemetric probability

tree diagrams
organized lists
Fundamental Counting Principle

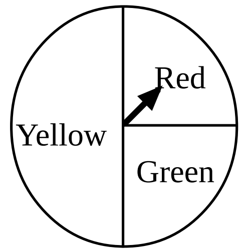
C. If you are tossing a fair coin and recording the results as heads or tails, which of the following is more likely:

a) two heads if you toss the coin three times
b) twenty heads if you toss the coin thirty times?

Explain your answer.

Vocabulary and Resources

D. Charmaine is using this spinner to play a game. When playing the game, she spun the spinner 120 times and it landed on red ten times. Assuming that this is a fair spinner, are these results unusual?



E. Jason is tossing a fair coin. He tosses the coin ten times and it lands on heads eight times. If Jason tosses the coin an eleventh time, what is the probability that it will land on heads?

F. When tossing a pair of fair dice, what is the probability that the sum of the two numbers will be even? What is the probability that the sum of the two numbers will be 12? What sum is most likely to occur?

G. With a tied score and five seconds left in the basketball game, the coach has to decide on the best player to send to the foul line. Simpson made 150 of the last 206 free-throw shots he has attempted, Sandman made 78 of the last 95 free-throw shots he has attempted, and Vincent made 84 of the last 123 free-throw shots has has attempted. Who do you think the coach should select? Explain your reasoning.

H. A bag contains 100 marbles, some red and some purple. Suppose a student, without looking, chooses a marble out of the bag, records the color, and then places the marble back in the bag. The student has recorded 9 red marbles and 11 purple marbles. Using these results, predict the number of red marbles in the bag.
(Adapted from SREB publication *Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do*)

Vocabulary and Resources

4.05 Determine and compare experimental and theoretical probabilities for independent and dependent events.

To achieve this objective, students should be able to:

- *Understand that two events are independent if they do not influence each other.*
- *Understand that if two events are not independent they are dependent.*

experimental results

sample space
favorable outcomes
possible outcomes

with replacement
without replacement

A. Charlie received a miniature gumball machine for his birthday. The machine holds ten large gumballs. Currently there are two yellow, three blue, one white and four red gumballs in the machine. Assuming the gumballs have an equal chance of being released, what is the probability that the gumball machine releases a blue gumball followed by a yellow gumball if Charlie does not put the first gumball back in the machine? Does the probability of the situation change if Charlie puts the first gumball back into the machine after seeing what color it is? Explain.

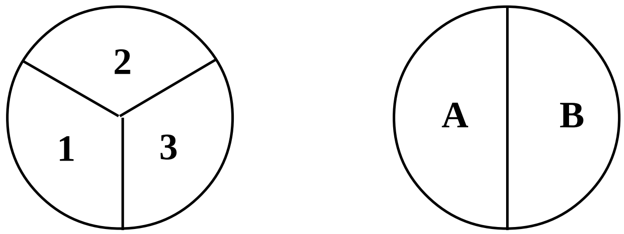
B. Janet is tossing a fair coin and rolling a fair number cube numbered 1 to 6. What is the probability that the coin will land on heads and she will roll a factor of 6?

C. There are three green, four red, five orange, and six brown M&M's™ in a bag. Without looking, you pick one M&M™ out of the bag and eat it. You then pick another M&M™ out of the bag. What is the probability that both M&M's™ will be red? What is the probability that one will be orange and the other will be green?

D. There are three blue chips and two red chips in a bowl.
a) List the sample space if you draw two chips in succession, without replacement. What is the probability of drawing two blue chips?
b) List the sample space if you draw two chips in succession, with replacement. What is the probability of drawing two blue chips?
c) Explain why the probabilities are different.

Vocabulary and Resources

E. Given the following two spinners:



List the sample space when you spin both spinners. What is the probability of spinning a 2B?

F. A bowl contains three pieces of paper labeled with the numbers 1, 2, and 3.
a) Suppose you draw two pieces of paper out of the bowl, without replacing the first piece before drawing the second piece, and add the numbers. List the sample space. What is the probability of a sum of five?
b) Suppose you draw two pieces of paper out of the bowl, replacing the first piece before drawing the second piece, and add the two numbers. List the sample space. What is the probability of a sum of five?
c) Explain why these two probabilities are not the same.

G. Jamal is playing "Pick-A-Fish"at the carnival. There are ten fish in the pond. Two of the fish are worth 15 points, three are worth 10 points and five are worth 8 points. The prize he would like requires two 15-point fish. What is the probability he will win the prize with only two picks if he does not put the first fish he selects back in the pond? What is the probability he will win the prize with only two picks if he does put the first fish he picks back in the pond?

H. Your teacher has a bag of M&M's™. The bag contains 12 red M&M's™, 10 blue M&M's™, 15 orange M&M's™, and 10 green M&M's™. If you are the first person to select candy from the bag and the teacher allows you to keep the first piece you select and then select a second piece, what is the probability that you will select one red M&M™ and one orange M&M™? What is the probability that you will select one red M&M™ and then one orange M&M™? Are these answers the same? Explain.

Vocabulary and Resources

4.06 Design and conduct experiments or surveys to solve problems; report and analyze results.

To achieve this objective, students should be able to:

- *Pose questions, collect and analyze data, and make interpretations of the results to answer questions.*
- *Understand and evaluate different methods for selecting a sample for a survey.*

sample space

representative sample

theoretical probability
experimental results

A. Design and conduct a survey. Explain the purpose of the survey, question(s) used, and procedure you followed. Display the data collected in an appropriate format and analyze the results.

B. Jenn is the head cheerleader at her school. She is thinking of running for student council and decides to survey the other cheerleaders and ask them if they would vote for her in the upcoming student council election. Will this sample give her the information she needs? Explain.

C. Taylor is playing a game that requires her to roll four fair number cubes and record the sum of the four numbers. Design an experiment to determine:

- the probability that the sum will be less than 15;
- the probability that the sum will be an even number.

How many trials do you think you would need to conduct to be fairly confident of your results?

5.01 Simplify algebraic expressions and verify the results using the basic properties of rational numbers.

Vocabulary and Resources

a) Identity.
b) Commutative.
c) Associative.
d) Distributive.
e) Order of operations.

To achieve this objective, students should be able to:

- *Simplify first-degree algebraic expressions involving operations with non-negative numbers.*
- *Build an understanding of identity, commutative, associative, and distributive properties with first-degree algebraic expressions involving operations with non-negative numbers.*
- *Use the order of operations to simplify symbolic first-degree algebraic expressions that involve operations with non-negative numbers.*
- *Use the three forms of standard notations for multiplication. Ex. Two times three:*
  $2 \times 3 = 2 \cdot 3 = 2(3)$

A. Simplify each of the following expressions and write the property that allows you to complete each step:

a. $w + 4(y + 8w)$
b. $3(m + 5) + 5(2m + 6)$
c. $7(x + y) + 3x - 5y$
d. $2(x + 19) + 3(x - 10)$

Vocabulary and Resources

term
like terms
combining like terms
equivalent expressions
coefficient
variable
exponents
operations with exponents (x and ÷)
multiplicative identity
additive identity
multiplicative inverse
additive inverse
grouping symbols
order of operations
parentheses
brackets
braces

Students need to be familiar with a variety of notations for multiplication:
2 x 3
2 • 3
2(3)

B. Rewrite $8 \bullet 6z + 8 \bullet 7y$ using the distributive property.

C. Simplify each of the following:

a. $80x + 2y - 15x + 3y$
b. $80y \div 2 \bullet 6 + 4y$
c. $6x \bullet 3 \div 9 - 1$
d. $3x + 10(2x - 4) + 32x \div 2^4$
e. $3x + 10 \bullet 2x - 4 + 32x \div 2^4$

D. In the blank write the property that allows you to go from one step to the next in the example below.

$3(w + 5) + 5w + 2$
$3w + 15 + 5w + 2$ ____________________
$3w + 5w + 15 + 2$ ____________________
$(3w + 5w) + (15 + 2)$ ____________________
$8w + 17$

5.02 Use and evaluate algebraic expressions.

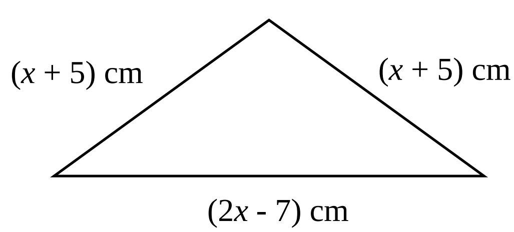
Vocabulary and Resources

To achieve this objective, students should be able to:

- *Evaluate algebraic expressions involving operations with non-negative numbers.*
- *Develop understanding of equivalent expressions involving operations with non-negative numbers.*
- *Translate phrases into algebraic expressions and algebraic expressions into phrases.*
- *Use algebraic expressions to describe situations in problem-solving contexts.*

A. Jeff was told that he is allowed to check a maximum of *w* pounds of luggage on an airplane. If one of his bags weighs 55 pounds, write an expression to represent the amount of additional weight he can check.

B. Give a simplified expression to represent the perimeter of the figure below. If x has a value of 22, what is the perimeter of the figure?



C. Evaluate each of the following expressions if $m = 5$, $x = 7$, and $y = 12$.

a) $6.5(m + y)$ b) $\frac{10x + m}{y}$ c) $18 \div y + x$

d) $\frac{15m - 3y}{x + 6}$ e) $5(y - m)$ f) $49 \div (x + m)$

g) $15xy$

combining like terms
coefficient
variable
equivalent expressions
exponents
operations with exponents (x and ÷)
order of operations

Vocabulary and Resources

D. Vernon wants to buy 3 CD's and 2 DVD movies. Write an expression that represents the amount of money Vernon needs if c is the cost of one CD and m is the cost of one DVD movie. If each CD costs \$18 and each DVD movie costs \$22, what will be the total cost?

5.03 Solve simple (one- and two-step) equations or inequalities.

A. Solve each of the following equations or inequalities:

a. $w + 2.97 = 13.5$	e. $0.5s \le 64.5$
b. $3m + 5 = 28$	f. $12w > w + 583$
c. $7x - 18 = 10.56$	g. $4.8z - 9.02 \ge 8.74$
d. $\frac{2}{3}(x + 2.5) = 18$	h. $\frac{3}{4}t < 16.05$

B. Zara wants to buy her mother a birthday gift that costs $60. She has saved $45. Write and solve an equation to determine how much more money, *m*, Zara needs for the gift.

C. Mr. Ames rented a car from One-Stop-Rent-A-Car. They charge a daily rate of $42 plus $0.35 per mile. The bill for a one-day rental was $84.70. Write and solve an equation to determine how many miles, *m*, Mr. Ames drove?

D. The charter bus company we are renting from will get us buses that seat 55 students. If there are 250 students and 9 teachers, what is the minimum number of buses we need to charter for the sixth grade trip? Write an inequality that represents this situation. What is the minimum number of buses required?

E. Hector wants a new CD Player and some new CDs. The best price he has found for the CD Player is $30 and the CDs are $15 each. What is the maximum number of CDs he could buy with $110? Write an inequality that represents this situation.

Vocabulary and Resources

variable
additive inverse
multiplicative inverse
distributive property
equivalent expressions
order of operations

less than
$<$
greater than
$>$
less than or equal to
$\le$
greater than or equal to
$\ge$

When working with inequalities, students should be exposed to various models including a balance.

Vocabulary and Resources

5.04 Use graphs, tables, and symbols to model and solve problems involving rates of change and ratios.

To achieve this objective, students should be able to:

- *Analyze the relationship between variables on a graph.*
- *Make a graph that shows the relationship between two variables by identifying the two variables, choosing an axis for each, and selecting an appropriate scale for each axis.*
- *Read data given in a table and make a graph from the table.*
- *Read data given in a graph and make a table from the graph.*
- *Describe rates of change algebraically and verbally using data from tables and graphs.*
- *Recognize and write ratios to describe different situations.*

equivalent ratios
proportions

A. There are 25 students in Ms. Simple's class. If the ratio of boys to girls is 2:3, how many boys and girls are there in Ms. Simple's class?

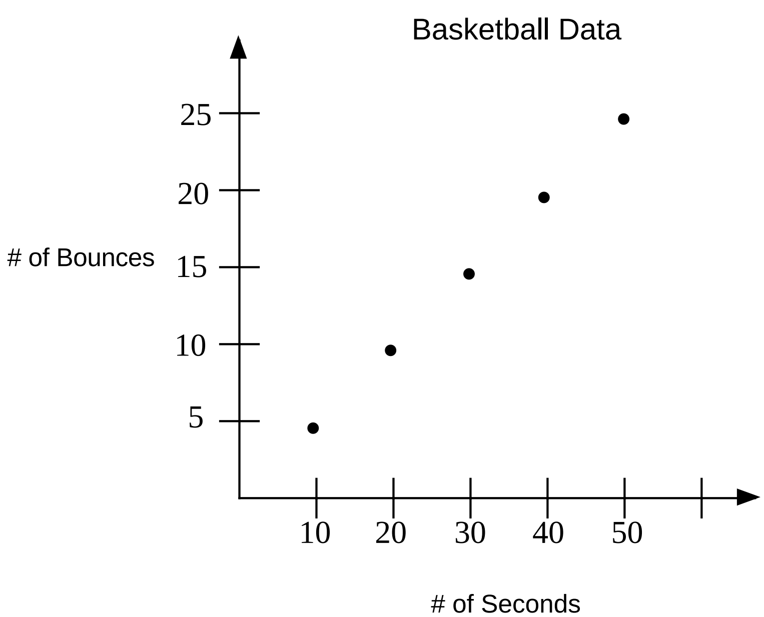
B. Use the information in the table below to predict how many wins Allison would have after she plays 32 matches of tennis assuming the rate of wins stays the same.

Vocabulary and Resources

Allison's Tennis Record

Matches Won	Matches Lost	Matches Tied
4	1	3
8	2	6
12	3	9
$\boxed{?}$	4	12

C. The graph below shows how many bounces of a basketball can occur based on the number of seconds it is bounced. Based on the data in the graph below, what is the rate of change?



Vocabulary and Resources

D. Study the pattern below. Draw the next three figures in this pattern. Then fill out the chart below. Describe the fifteenth figure in this series. Write an expression that models this pattern. If the squares are made of toothpicks, how many toothpicks would be needed for the 50th figure?

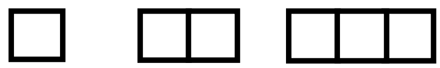


Figure 1 Figure 2 Figure 3 Figure 4 Figure 5 Figure 6

Figure Number	Number of Toothpicks
1	4
2	
3	
4	
5	
6	

Comments:

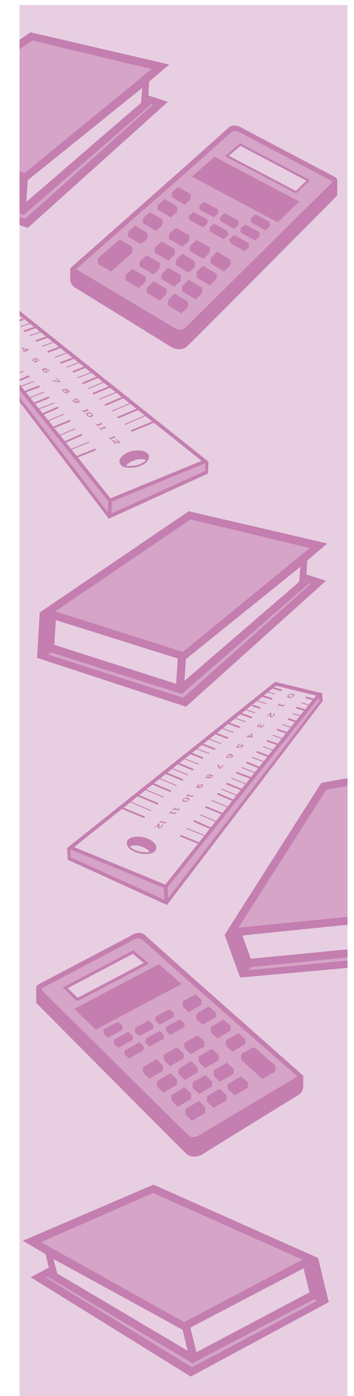
Inquiries or complaints should be directed to:
the Office of Curriculum and School Reform Services, 6307 Mail Service Center, Raleigh, NC 27699-6307
Telephone: (919) 807-3761; Fax: (919) 807-3767

6

MATHEMATICS

Sixth Grade Observation Profile

for On-Going Assessment and End of the Year Evaluation



This profile is designed as a recording sheet for monitoring an individual student's progress throughout the school year. Sixth grade Indicators and the Strategies for Instruction in Mathematics suggest tasks and questions that can be used for on-going and summative assessment.

Directions for use:

The five mathematical goals and the specific objectives from the state of North Carolina Standard Course of Study are listed on this profile chart. Six boxes are provided for recording a student's performance level (1,2,3, or 4) at each grading period as some school systems have six grading periods, while others have four grading periods. Teachers have additional space to comment on student progress.

It is suggested that teachers record an evaluation (performance level) for each objective that is taught during a particular grading period; it is not necessary to record an evaluation for objectives that have not been addressed. Student work, conversations with the student, and observations provide evidence for the evaluation of performance. Evaluations are based on the student's abilities to explain, model, and apply learning. Student work folders (or portfolios) will support the evaluation.

PUBLIC SCHOOLS OF NORTH CAROLINA | State Board of Education | Department of Public Instruction

Student Name ________________ ID # ________ Teacher's Name ________________ School ________________ Year ________

Sixth Grade Observation Profile for On-Going Assessment and End of the Year Evaluation

• Number & Operations

1.01 Develop number sense for negative rational numbers.

a) Connect the model, number word, and number using a variety of representations, including the number line.

b) Compare and order.

c) Make estimates in appropriate situations.

1.02 Develop meaning for percents.

a) Connect the model, number word, and number using a variety of representations.

b) Make estimates in appropriate situations.

1.03 Compare and order rational numbers.

1.04 Develop fluency in addition, subtraction, multiplication, and division of non-negative rational numbers.

a) Analyze computational strategies.

b) Describe the effect of operations on size.

c) Estimate the results of computations.

d) Judge the reasonableness of solutions.

1.05 Develop fluency in the use of factors, multiples, exponential notation, and prime factorization.

1.06 Use exponential, scientific, and calculator notation to write very large and very small numbers.

1.07 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

• Measurement

2.01 Estimate and measure length, perimeter, area, angles, weight, and mass of two- and three-dimensional figures, using appropriate tools.

2.02 Solve problems involving perimeter/circumference and area of plane figures.

• Geometry

3.01 Identify and describe the intersection of figures in a plane.

3.02 Identify the radius, diameter, chord, center, and circumference of a circle; determine the relationships among them.

3.03 Transform figures in the coordinate plane and describe the transformation.

3.04 Solve problems involving geometric figures in the coordinate plane.

• Data Analysis & Probability

4.01 Develop fluency with counting strategies to determine the sample space for an event. Include lists, tree diagrams, frequency distribution tables, permutations, combinations, and the Fundamental Counting Principle.

4.02 Use a sample space to determine the probability of an event.

4.03 Conduct experiments involving simple and compound events.

4.04 Determine and compare experimental and theoretical probabilities for simple and compound events.

4.05 Determine and compare experimental and theoretical probabilities for independent and dependent events.

4.06 Design and conduct experiments or surveys to solve problems; report and analyze results.

• Algebra

5.01 Simplify algebraic expressions and verify the results using the basic properties of rational numbers.

a) Identity.

b) Commutative.

c) Associative.

d) Distributive.

e) Order of operations.

5.02 Use and evaluate algebraic expressions.

5.03 Solve simple (one- and two-step) equations or inequalities.

5.04 Use graphs, tables, and symbols to model and solve problems involving rates of change and ratios.

NAME

Level IV (Exceeds expectations)

- consistent performance beyond grade level
- works independently
- understands advanced concepts
- applies strategies creatively
- analyzes and synthesizes
- shows confidence and initiative
- justifies and elaborates responses
- makes critical judgements
- makes applications and extensions beyond grade level; applies Level III competencies in more challenging situations

Level III (Proficient)

- **exhibits consistent performance**
- **shows conceptual understanding**
- **applies strategies in most situations**
- **responds with appropriate answer or procedure**
- **completes tasks accurately**
- **needs minimal assistance**
- **exhibits fluency and applies learning**
- **shows some flexibility in thinking**
- **works with confidence**
- **recognizes cause and effect relationships**
- **applies, models, and explains concepts**

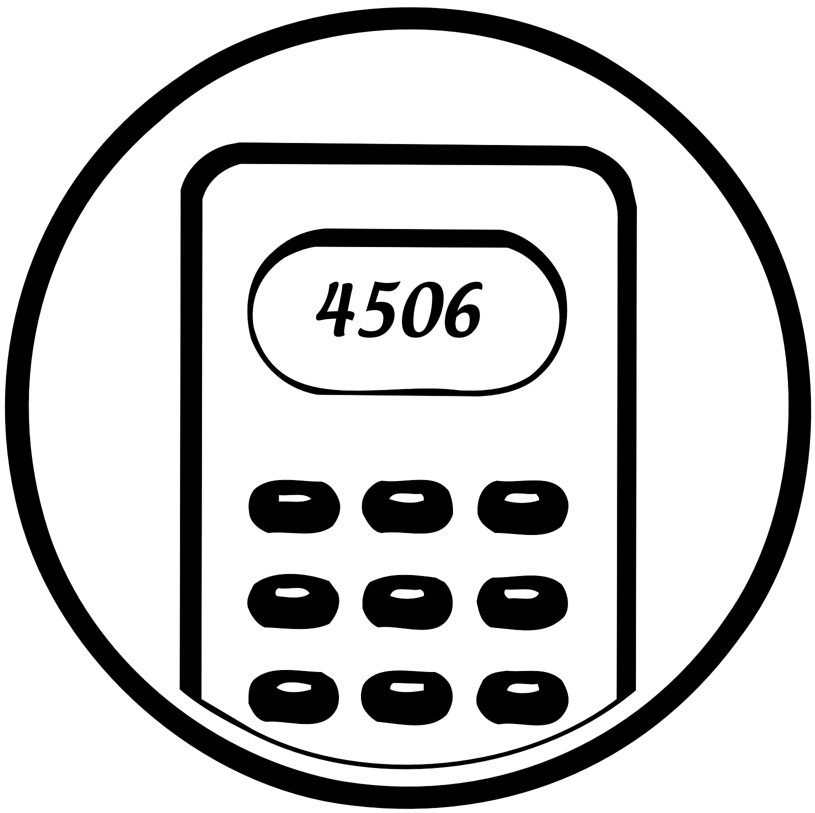
Level II (Not yet proficient)

- exhibits inconsistent performance and misunderstandings at times
- shows some evidence of conceptual understanding
- has difficulty applying strategies or completing tasks in unfamiliar situations
- responds with appropriate answer or procedure sometimes
- requires teacher guidance frequently
- needs additional time, opportunities
- demonstrates some Level III competencies but is inconsistent

Level I (Limited performance)

- exhibits minimal performance
- shows very limited evidence of conceptual understanding and use of strategies
- responds with inappropriate answer and/or procedure frequently
- very often displays misunderstandings
- completes task appropriately and accurately infrequently
- needs assistance, guidance and modified instruction

CALCULATOR RIDDLES
FOR GRADES 4-6



To the teacher:
It is hoped that these riddles will be a catylyst to your class in developing more riddles that encourage problem solving and the accurate and appropriate use of calculators by your students. As you and your classes create more riddles you can send them to the mathematics staff at DPI and we will be happy to add them to these files and make them available to other students. Enjoy!

Note: To find the answer to each riddle, solve the problem with a calculator. When you turn the calculator upside down, you will have the answer to the riddle.

8 = B, 7 = L, 6 = g, 3 = E, 5 = S, 0 = O, 1 = I and 4 = h

1. What do you use to keep that wet look? Find 8 times the difference of a century and a decade increased by one fourth of 76.

2. Izeta and John have flown across the ________________. John has flown the product of 3 and 714 kilometers. Izeta's journey is thirty-three cubed. Find the total km flown by John and Izeta.

3. If one fisherman uses 247 pounds of bait to catch____________, how much bait would be needed by 15 fishermen?

4. Eight hundred children screamed when they saw the green ___________on stage. These children were one fourth of the group at the concert. How many children were at the concert?

5. Verna ordered 200 cases of strawberry jam for her supermarket. There were 48 jars in each case. On delivery, Verna found that one third of her order was broken. She was very upset as jam began to _______out of the boxes. How many jars were broken?

6. Anita and Jill are identical twins, except that they differ in their _________. To find out how they differ, take 2149.1815 from 6.8 times the sum of 462.81 and 326.085.

7. The sixth grade class took a trip to the local fast food burger chain for lunch. They bought 1950 hamburgers at $ 1.49 each, 1075 orders of french fries at $0.69 each, 960 milk shakes at $1.75 each, and 769 ice creams at $0.75 each. The manger said they ate like a bunch of _________. To find out what the manager said, find the total bill.

8. Sheila's social studies report had 216,701 words. Jane's social studies report had 163,207 words. Will reading the two reports __________ the teacher's mind? To find out, determine how many words the teacher read when she graded the two reports.

9. Farmer Jeanne planted 219 rows of corn, each with 16 ears. If she wanted to water her garden, she needed a very good _________. To find out what Farmer Jeannne needed, find the total number of ears of corn planted

10. The cook could not make us breakfast because he was all out of ___________. Add 213 to the product of 68 and 85 to find out what he was missing.

11. The new musical _________ is a lot of laughs. Find the sum of 600 squared and 19,919.

12. When going out to dine, don't leave home without a _____________. To find the answer, start with the square of 10. Multiply by the number of sides in an octagon and then add the voting age.