TEKSING TOWARD STAAR
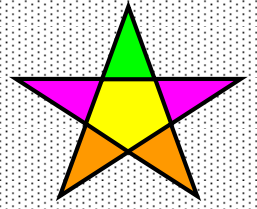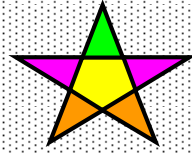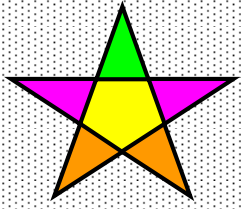
MATHEMATICS

GRADE 8

Student Book

Six Weeks 1 Lesson 1

Problem-Solving Model

Step	Description of Step
1	**Analyze the given information.** • Summarize the problem in your own words. • Describe the main idea of the problem. • Identify information needed to solve the problem.
2	**Formulate a plan or strategy**. • Draw a picture or diagram. • Guess and check. • Find a pattern. • Act it out. • Create or use a chart or table. • Work a simpler problem. • Work backwards. • Make an organized list. • Use logical reasoning. • Brainstorm. • Write a number sentence or an equation
3	**Determine a solution.** • Estimate the solution to the problem. • Solve the problem.
4	**Justify the solution.** • Explain why your solution solves the problem.
5	**Evaluate the process and the reasonableness of your solution.** • Make sure the solution matches the problem. • Solve the problem in a different way.

Problem-Solving Questions

Directions:
- **Work with a partner.**
- **Write your answers on notebook paper.**
- **Answer questions 1-3.**
- **Complete the solution to the problem(s).**
- **Answer questions 4-10.**

1. What is the main idea of this problem?

2. What are the supporting details in this problem?

3. What skills, concepts, and understanding of math vocabulary are needed to be able to answer this problem?

4. Did this problem involve mathematics arising in everyday life, society, or the work place?

5. What is a good problem solving strategy for this problem?

6. Can you explain how you used any math tools, mental math, estimation, or number sense to solve this problem?

7. Did this problem involve using multiple representations (symbols, diagrams, graphs, math language)?

8. Did you use any relationships to solve this problem?

9. How can you justify your solution to the problem?

10. How can you check for reasonableness of your solution to this problem?

Student Activity 1

Work with your partner to answer the following questions.

Problem 1: Complete the following statements by filling in the blank with an appropriate word or words.

A set of numbers is a _____ of numbers.

A subset is a _____ of a set.

The set {1, 2, 3, 4, 5, 6, …} is called the set of _____ _____.

The set {…-6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, …} is called the set of _____.

The set of numbers that can be expressed as the ratio of two integers is the set of _____ numbers.

A non-terminating, non-repeating decimal is a(n) _____ number.

A repeating decimal is a decimal that _____ and is a(n) _____ number.

4.01020304…. is a _____, _____ decimal and is a _____ number.

Problem 2: Place a √ in each column that names a set the given number belongs to.

	Irrational Number	Rational Number	Integer	Whole Number	Counting Number
-16					
0					
1.5					
$\dfrac{21}{4}$					
$-\sqrt{42}$					
$-35\dfrac{2}{3}$					
$1{,}250$					
$0.\overline{12}$					
$3.11121314\ldots$					
$-8.\overline{4}$					

Problem 3: Name 3 decimals that are irrational.

_____   _____   _____

Problem 4: Name 3 radical numbers that are irrational.

_____   _____   _____

Problem 5: Name a rational number that would be between 3 and 3.1 on a number line. _____

Name an irrational number that would be between 3 and 3.1 on a number line.

Problem 6: Draw a Venn diagram that shows the relationship of the subsets of the real numbers.

Real Numbers
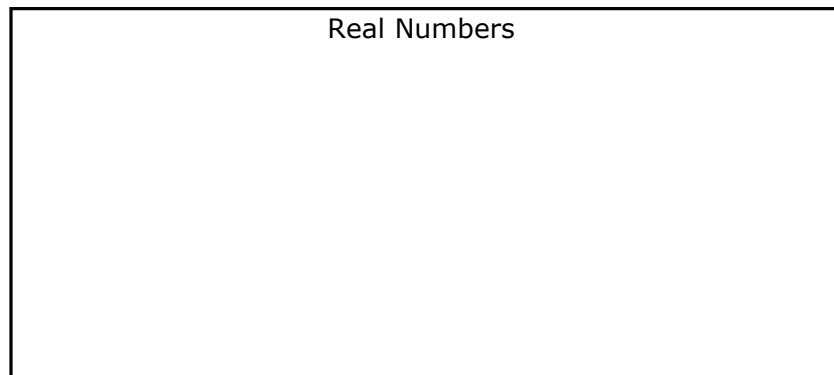
Problem 7: Place the following numbers in the appropriate set on the Venn diagram you drew in Question 6.

218   −4   1.1 $\dfrac{21}{3}$ $\sqrt{3}$ 125 $0.\overline{4}$ $-2\dfrac{1}{2}$

$-4.\overline{3}$ 2.3031323334... π $\pi + 6$ $\sqrt{49}$ $-3 + \sqrt{16}$

Problem 8: Identify each statement below as T(true) or NT(not true).

_____1. All prime numbers are integers.

_____2. All decimals are rational numbers.

_____3. All whole numbers are counting numbers.

_____4. All whole numbers are integers.

Problem 9: Name 2 counting numbers that will be between 3 and 6.5 on a number line.
_____ and _____

Name two radical numbers that would be between 4 and 5 on a number line.
_____ and _____

Problem 10: Using a C for counting numbers, W for whole numbers, I for integers, R for rational numbers, and IR for irrational numbers identify all the sets of numbers that have members in the given set.

$\{-1, \ -3, \ -14, \ -13\}$ _____

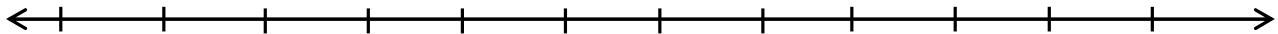$\left\{\dfrac{22}{7}, \ 3.\overline{14}, \ \sqrt{41}, \ 0\right\}$ _____

$\left\{-20, \ -1.1, \ \dfrac{4}{3}, \ -3, \ 2.121121112...\right\}$ _____

Problem 11: Read each statement below. Decide if the statement is true or false. If it is false, give an explanation for your decision.

- If a number is negative, it is an integer._____

  _____.

- If a decimal is irrational, it can not be written exact. _____

  _____.

Problem 12: Place the following numbers on the number line below.

$$\left\{-4, \ 3\dfrac{2}{3}, \ \sqrt{6}, \ 2.5, \ \dfrac{2}{5}, \ \dfrac{-11}{3}\right\}$$

$\longleftarrow\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!\longrightarrow$

Problem 13: Place the following numbers on the number line below.

$$\left\{-2, \ 1\dfrac{1}{3}, \ \sqrt{16}, \ \sqrt{24}, \ \dfrac{1}{4}, \ \dfrac{-12}{3}\right\}$$

$\longleftarrow\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!+\!\!\!\!\longrightarrow$

Student Activity 2

Work with your partner to answer the following questions.

Problem 1: Identify the set of numbers that best describes each situation.

- The height of an airplane as it descends to land

- The number of free throws made by the school's basketball team in their last game

- A board game has a spinner with 3 sections- Lose your Turn, Move Forward, and Move Backward and a number cube with the numbers 1-6. The number of moves you make after a spin and a roll

- The length of a side of a square whose area is a whole number between 10 and 15 square units.

- The whole numbers and their opposites

- The balance in a person's check register

- The amount of water in a rain gauge after a rain storm

Problem 2: How can you show the relationship among the subsets of the real numbers?

Problem 3: Fill in the following graphic organizer with the following numbers: Place the number in all the sets it belongs to.

$$\left\{0, \ -12, \ \sqrt{32}, \ \frac{3}{4}, \ 50\%, \ -1.2, \ 3.12345..., \ 0.\overline{8}, \ 125\right\}$$

Real Numbers	
Rational Numbers	**Irrational Numbers**
Integers	
Whole Numbers	
Counting numbers	

Problem 4: Name a negative number that is not an integer. _____

Problem 5: Name a negative number that is irrational. _____

Problem 6: What do you think the repeating decimal 0.999999…. represents?

Problem 7: Circle the irrational numbers below.

$\sqrt{64}$ 1.213141   1.213141…

$\sqrt{72}$ 8.1 3π

$-0.1234...$ $\dfrac{\sqrt{3}}{2}$ $\pi + 4$

Problem 8: To find the ratio of integers that a repeating decimal represents, look at the steps below.

Find the ratio of integers to represent 0.12121212….

Let $x = 0.12121212...$ Since there are two repeating digits, we multiply both sides by 100.
$100x = 12.121212...$

$100x = 12.12121212....$
$\quad x = \ \ 0.12121212...$ Then we subtract the first equation from the second.
_____

$99x = 12$ Divide both sides by 99

$\dfrac{99x}{99} = \dfrac{12}{99} = \dfrac{4}{33}$ 0.121212…… represents the rational number $\dfrac{4}{33}$.

Following those steps find the ratio of integers that represents 0.10101010…

NAME_____   DATE_____   SCORE ____/5

8.2A Skills and Concepts Homework 1

1. Draw a Venn diagram or graphic organizer to show the relationship of the subsets of the real numbers.

2. Place a √ in each column that the given number belongs to.

	Irrational Number	Rational Number	Integer	Whole Number	Counting Number
−32					
−8.123					
103					
$3\frac{5}{8}$					
0.343434…					
$\sqrt{7}$					
1.213141…					
0					

3. Name a whole number that is NOT a counting number. _____

4. Name 3 rational numbers that are NOT positive and are NOT integers.

_____   _____   _____

5. Name a irrational number that is located between 31.5 and 31.6 on a number line. How do you know it is irrational?

NAME_____   DATE_____   SCORE ____/5

8.2A Skills and Concepts Homework 2

1. Identify the subset of real numbers that best describes each situation.

    • The number of cups of sugar in a cake recipe

    • Possible number of cookies in a package

    • Number of eggs in an Easter basket

    • Scores of the top 5 golfers on a leader board

    • Square of a whole number that is not a perfect square

2. Explain how the set of irrational numbers differs from the set of rational numbers.

3. What is a perfect square number?

    Give an example of 5 perfect square numbers.

4. Write the prime factorization of the following numbers. Decide if the square root of the number will be a rational number or an irrational number.

    100 _____

    225 _____

    72 _____

    144 _____

5. Find the ratio of integers that is represented by the decimal 0.09090909….

Six Weeks 1 Review

Six Weeks 1 Review

Lesson 1: 8.2A

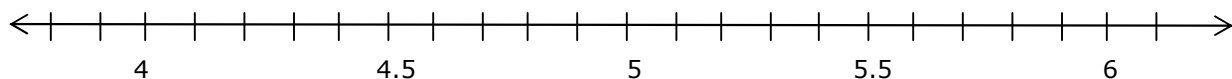1. Place a √ in each column that the given number belongs to.

	Irrational Number	Rational Number	Integer	Whole Number	Counting Number
−14					
−2.6					
113					
$\frac{5}{8}$					
$\sqrt{3}$					

2. What type of decimals are irrational numbers?

3. What type of decimals are rational numbers?

Lesson 2:   8.2B

1. What is a good rational approximation for $\sqrt{20}$?

    Graph $\sqrt{20}$ on the number line below.

2. Between what two counting numbers is $\sqrt{75}$ located on a number line?

    Which counting number is it closer to?   Why?

Lesson 3: 8.2D

1. Order the following sets of real numbers from least to greatest.

$$4 \qquad 3.8 \qquad \sqrt{15} \qquad \sqrt{17}$$

$$4 + \sqrt{2} \qquad 6 \qquad 5 \qquad 3 + \sqrt{17}$$

2. Place an inequality symbol between the following pairs of numbers to make a true statement.

- $4\frac{1}{2}$ _____ $\sqrt{17}$ $\qquad\qquad\qquad -3.2$ _____ $-\sqrt{8}$

Lesson 4: 8.10A   8.8D   8.3A

T or F

1. Two dilated figures in a coordinate plane with the origin as the center of dilation will always be similar. _____

2. Two dilated figures in a coordinate plane with the origin as the center of dilation will always have the same orientation in the plane. _____

3. An image is always larger than the preimage. _____

How many pairs of angles in two triangles must be congruent before you know the triangles are similar? _____

Triangle 1 has two interior angles that measure 37° and 79°. Triangle 2 has two interior angles that measure 37° and 64°. Are the two triangles similar?   Explain your answer.

If triangle *ABC* is similar to triangle *FGH*, write the three ratios that must be equal.

Lesson 5: 8.8A 8.8C

1. The school choir is selling fruit cakes to earn money for new robes. The fruit cakes sell for $30 each. The company charges a $125 delivery fee and $9 per cake. Write an inequality that can be used to determine the number of cakes the choir must sell to make a profit.

2. If these two figures have the same perimeter, what is the perimeter of each figure?

$x+7$

$x+1$

$x+10$

$x+12$

$x+15$
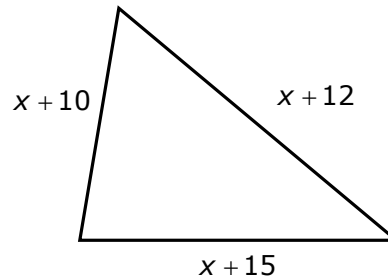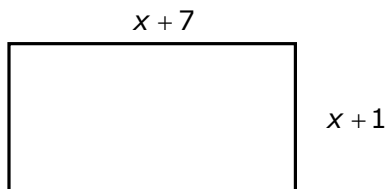
Lesson 6: 8.6A 8.6B 8.7A

1. Write the expression that represents the volume of a cylinder if its radius is 7 inches and its height is 12 inches.

2. A cone and a cylinder have congruent bases and heights. The volume of the cone is approximately 20 cubic inches. What is the approximate volume of the cylinder?

3. a)A cone has a diameter of 12 inches and a height of 10 inches. Draw and label a model of the cone.
    Find the volume of the cone.

b)
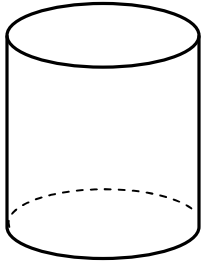
- The cylinder at the left has a radius of 6 inches and a height of 14 inches. What is the volume of the cylinder?

- If the cylinder at the left has a volume of 300π cubic inches and a height of 12 inches, what is the radius of the cylinder?

What is the diameter of the cylinder?

Lesson 7: 8.2C

1. Write the following numbers in scientific notation.

36, 200   0.0045   12 billion

_____   _____   _____

2. Write the following numbers in standard decimal notation.

4.13×10^{3} 7.1×10^{-4} 8.423×10^{5}

_____   _____   _____

Lesson 8: 8.8D

1. The angles of a triangle measures of 88°, 53° and 39°. What are the measures of the three exterior angles?

2. What is the sum of the measures of the three angles of any triangle?

3. If two angles of a triangle measure 54° and 72°. What is the measure of the third angle of the triangle?

   True or false: One exterior angle of the triangle will measure 126°. _____

Lesson 9: 8.5A   8.5E

1. In a linear proportional relationship, what is the constant of proportionality?

2. If (5, 10) belongs to a linear proportional relationship, name two more ordered pairs that would belong to the relationship.

   _____   _____

3. If y varies directly with x and $y = 20$ when $x = 4$, what is the value of y when $x = 20$?

   The graph of a direct variation will be a _____ that passes through the _____.

Lesson 10: 8.12A

1. What does APR stand for?

   Why is it important to know the APR when borrowing money or using a credit card?

2. Joseph can get a bank loan for $5,000 at 8% for 2 years with a monthly payment of $226.14. He can also borrow the money from an uncle who will charge him 8% but he wants to term of the loan to be 18 months. His monthly payment to the uncle would be $295.70.

   a. What is the payoff amount if he borrows the money from the bank?

   b. What is the payoff amount if he borrows the money from his uncle?

   c. Which will have the smaller payoff amount?   How much less?

   d. If he figures the largest monthly payment he can afford is $300, which loan should he take?

Six Weeks 3 Lesson 8

Student Activity 1

Work with your partner to answer the following questions.

Problem 1:
- Explain how you determine the mean of a data set.

- Explain how you determine the distance each data point is from the mean.

- Explain how you determine the mean of the distances the data points are from the mean.

- What is the mean of the distances the data points are from the mean called?

- What does a small mean absolute deviation tell you about the data set?

Problem 2: Seven friends' scores on their unit test in math class are:

$$83, 85, 88, 85, 85, 87, 88$$

What is the mean absolute deviation of the data set?

1. Find the mean of the set.

2. Find the distance each data point is from the mean.

3. Find the mean of the distances.

What does the MAD tell you?

Does the data set support that conclusion?

Problem 3: A data set has a mean of 55 and a MAD of 0.75.   What do you know about the data set?

Problem 4: A data set has a mean of 105 and a MAD of 10.   What do you know about the data set?

Problem 5: Compare the mean absolute deviations of the following two data sets.

Data Set 1: 12, 12, 14, 15, 11, 13, 10, 15   Data Set 2: 32, 35, 20, 31, 33, 33, 34, 35

Data Set 1:
1. Find the mean of the set.

2. Find the distance each data point is from the mean.

3. Find the mean of the distances.

Data Set 2:
1. Find the mean of the set.

2. Find the distance each data point is from the mean.

3. Find the mean of the distances.

What conclusion can you make about the two data sets based on the comparison of the MADs?

Problem 6: A history teacher compared scores for her first period class for the pretest and posttest for a unit. She found a mean of 65 and a MAD of 5.6 for the pretest and a mean of 85 and a MAD of 2.3 for the posttest. What conclusion can she make about the scores?

Student Activity 2

Problem: Did we create a data set with a small mean absolute deviation?

Materials: 1 graphing calculator per student, 2 1-6 number cubes per 2 students, a marker per group of 2

Procedure: Work in groups of 2 for this activity. Decide who will be Student 1. Decide who will Student 2. The teacher will assign you a group number.

Part I:

Round 1: Each student will roll the two number cubes.

- Student 1 rolls the 2 number cubes and finds the sum of the two numbers. Both students record the sum on the data point table as data point 1.

- Student 2 rolls the 2 number cubes and finds the product of the two numbers. Both students record the product of the data point table as data point 2.

Round 2:

- Student 1 rolls the 2 number cubes and finds the product of the two numbers. Both students record the product on the data point table as data point 3.

- Student 2 rolls the 2 number cubes and finds the sum of the two numbers. Both students record the sum of the data point table as data point 4.

Round 3:

- Student 1 rolls the 2 number cubes and finds the sum of the two numbers. Both students record the sum on the data point table as data point 5.

- Student 2 rolls the 2 number cubes and finds the product of the two numbers. Both students record the product of the data point table as data point 6.

Round 4:

- Student 1 rolls the 2 number cubes and finds the product of the two numbers. Both students record the product on the data point table as data point 7.

- Student 2 rolls the 2 number cubes and finds the sum of the two numbers. Both students record the sum of the data point table as data point 8.

Round 5:

- Student 1 rolls the 2 number cubes and finds the sum of the two numbers. Both students record the sum on the data point table as data point 9.

- Student 2 rolls the 2 number cubes and finds the product of the two numbers. Both students record the product of the data point table as data point 10.

Data Points									
Data Point 1	Data Point 2	Data Point 3	Data Point 4	Data Point 5	Data Point 6	Data Point 7	Data Point 8	Data Point 9	Data Point 10

Part II:

1. Both students work together to find the mean of their data set. _____(nearest tenth)

2. Both students work together to find the distance each data point is from the mean.

Data Point										
Distance from mean										

3. Both students work together to find the mean of the distances. _____(nearest tenth)

   This value is called the mean _____   _____ or MAD.

4. Student 1 will record their data on the class projection page.

5. After all the groups' have posted their data, which group had the smallest MAD?

   How did your MAD compare to their MAD?

8.11B Skills and Concepts Homework 1

1. What are the measures of center for a data set?

2. What are the measures of variability or spread for a data set?

3. Find the mean absolute deviation for the following set of data:

    Calories in energy bars: 125, 90, 150, 100, 100, 125, 125, 110, 100, 100

    Step 1:

    Step 2:

    Step 3:

4. What does a small MAD tell you about your data?

5. Which group of data has the smaller MAD?

    Group 1:   10, 12, 15, 12, 12, 16
    Group 2:   22, 23, 24, 35, 25, 24

NAME_____   DATE_____   SCORE ____/5

8.11B Skills and Concepts Homework 2

1. What is the mean of this data set (nearest tenth)? {160, 158, 172, 140, 160}

How far is 160 from the mean? _____ units
How far is 158 from the mean? _____units
How far is 172 from the mean? _____ units
How far is 140 from the mean? _____units
How far is 160 from the mean? _____ units

What is the average of these distances?   _____ ÷5 = _____

2. What is the mean of this data set (nearest tenth)? {50, 52, 48, 51, 55, 50}

How far is 50 from the mean? _____ units
How far is 52 from the mean? _____units
How far is 48 from the mean? _____ units
How far is 51 from the mean? _____units
How far is 55 from the mean? _____ units
How far is 50 from the mean? _____ units

What is the average of these distances?   _____ ÷6 = _____

3. Look at the table below. It shows a data set of 8 points. Find the mean and the fill in the second row of the table.

Data	0	0.5	1	1	3	3.5	4	4.5
Distance from Mean								

What is the mean of the distances?

4. Which data set has the smallest MAD? Show your work.

   Set 1:   5, 6, 5, 6, 5, 7, 8

   Set 2:   4, 5, 6, 5, 4, 7, 5

   Set 3:   6, 4, 6, 7, 6, 8, 3

5. The table below shows the average number of hours 7 members of the basketball team   practiced shooting 3-point shots per week. Find the mean of the data to the nearest tenth of an hour. Then complete the second row of the table.

Hours	1	2	1	2	3	3	4
Distance from Mean							

   What is the MAD for the data set?

Six Weeks 3 Review

Six Weeks 3 Review

Lesson 1: 8.5B/8.5F

1. How do you know a graph represents a non-proportional linear relationship?

2. Write the equation that describes the graph below. Show your work.
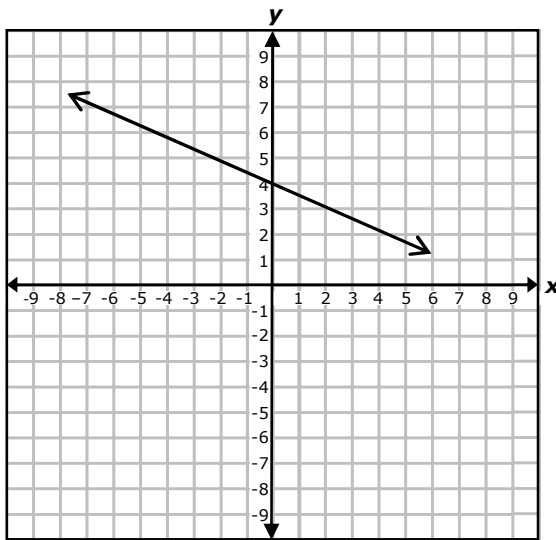
3. Draw a graph of a proportional relationship on the grid on the left. Draw a graph of a non-proportional linear relationship on the grid on the right.
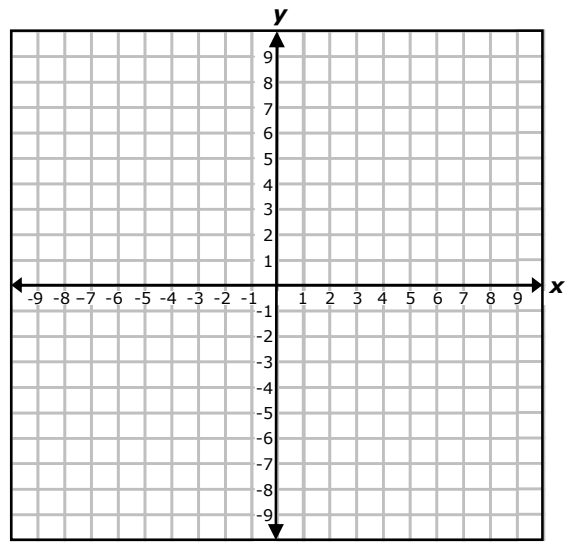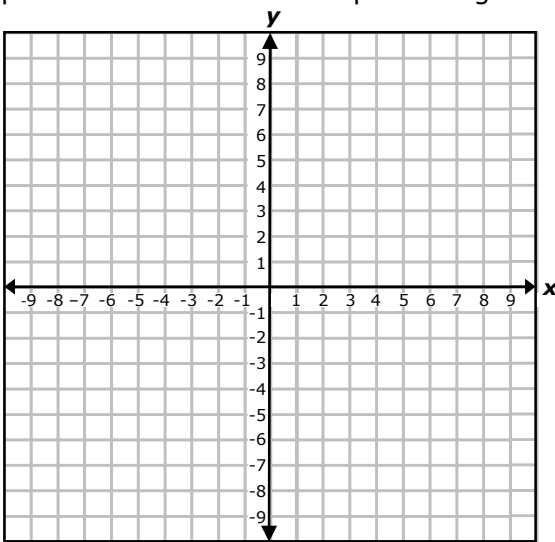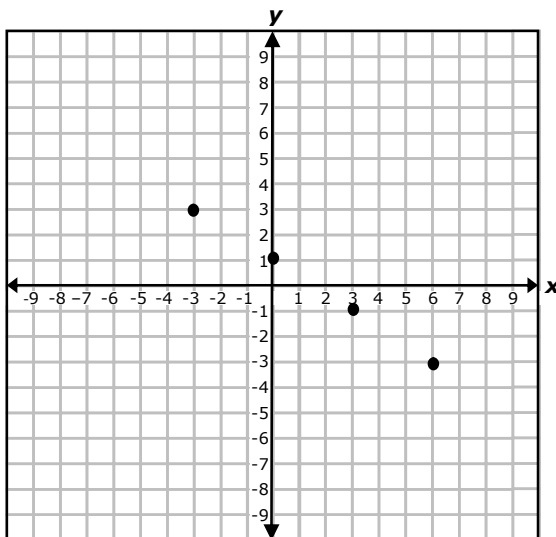
Lesson 2: 8.5C/8.5D

1. Which graph below suggests a linear relationship of bivariate data? Explain your decision.
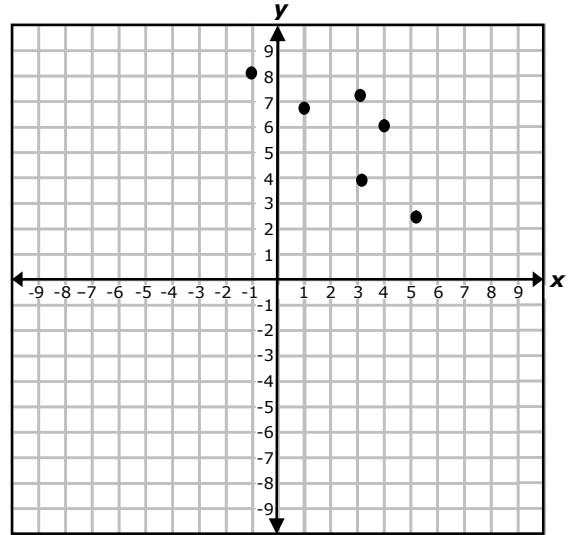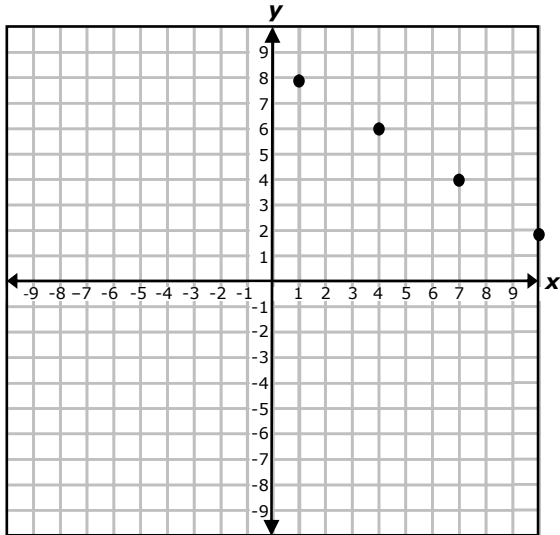
2. Draw a trend line for the following data.

3. Find the equation for the trend line you drew in #2. Use the trend line to predict the value of *y* when *x* is 20.

Lesson 3: 8.5I

1.   Look at the graph below. Determine the equation that describes the data.
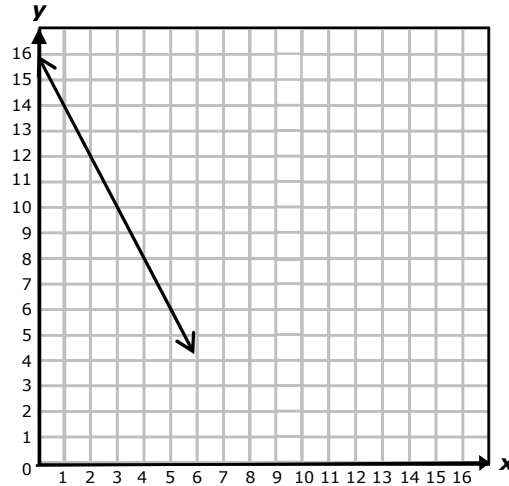
2.   Find the equation of the line that describes the table of values shown below. Show your work.

x	2	3	5	7
y	4	7	13	19

Lesson 4: 8.5G

1.   Explain what to look for in a graph to determine if the graph represents a function.

2.   Explain what to look for in a mapping that describes a function.

3.   Look at the domain and range represented below. Create a mapping that is a function.

x

0
1
2
3
5

y

8
9
10
11
13
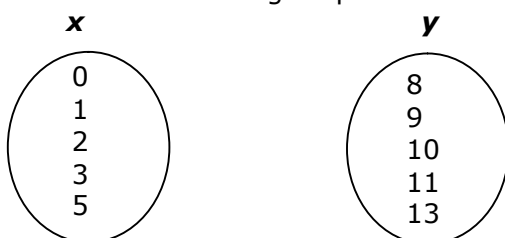
4. Look at the domain and range represented below. Create a mapping that is NOT a function.

x

0
1
2
3
5

y

7
8
9
10
12
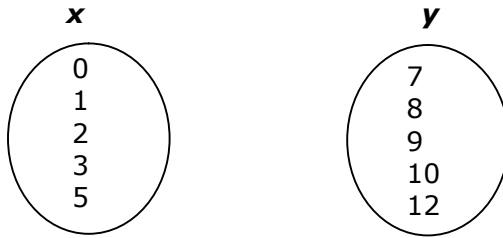
Lesson 5:   8.6C/8.7C/8.7D

1. Draw a model that geometrically represents the Pythagorean Theorem.

2. State the Pythagorean Theorem as an equation._____ + _____ = _____

3. What is a set of Pythagorean triples?

4. Find the missing side in the following right triangles. Use your calculator and round to the nearest tenth of an unit when necessary. Show your work.

9   ?

12

30

?

12
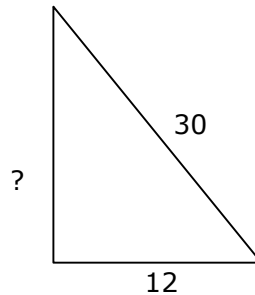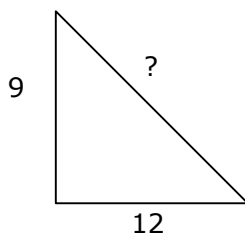
5. Decide if the following lengths could be the side lengths of a right triangle. Show work to support your answer.
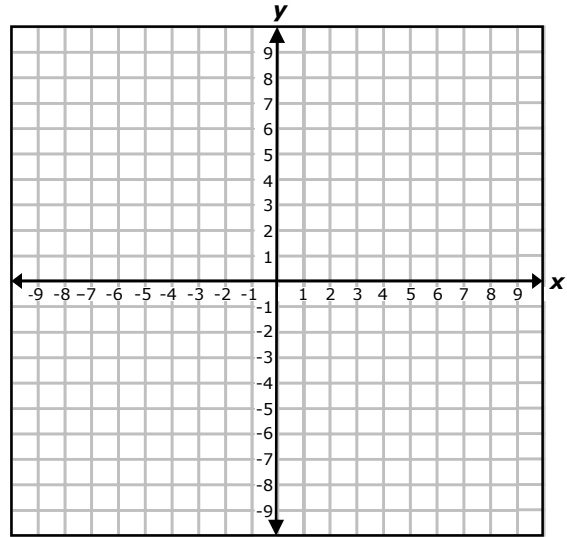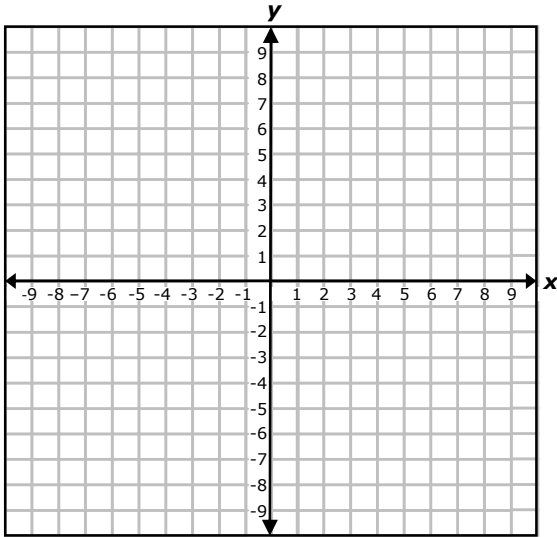
_____ $\sqrt{5}, \sqrt{13}$, and $\sqrt{18}$

_____ 13, 12, and 5

_____ 24, 30, and 40

6. Find the distance between (2, 5) and (6, 8).   Find the distance between (−1, 5) and (6, −8).

Lesson 6: 8.7A

1. What is a sphere?

2. Draw a sphere and label the center, radius, great circle, and circumference

3. What is the volume of a sphere with a radius of 8 inches (to the nearest cubic inch)? Show your work.

4. What is the radius of a sphere with a volume of 4500π cubic inches? Show your work.

Lesson 7: 8.7B

1. Find the total surface area of a rectangular prism with dimensions 4, 5, and 12 units.

2. A triangular prism has base edges of 3, 4, and 5 units. What is the lateral area and total surface area of the prism? (What kind of triangle is the base?)

Lesson 8: 8.11B

1. How do you find the mean of a set of data?

2. What is the mean absolute deviation of a set of data?

3. List the steps in finding the MAD for a data set.

4. What is the MAD of the data set below? Round to nearest tenth of a unit.

$$12, 15, 16, 18, 15, 20, 13, 18$$

5. What does a small MAD indicate for the data set?