

## 9<sup>th</sup> Grade Estimation and Computation

**Estimation: The student solves problems (including real-world situations) using estimation by:**

**[9] E&C-1 Judging whether the strategy will result in an answer greater or less than the exact answer (M3.4.1) (with [9] PS-2)**

1. Joey estimated that 28% of \$52 is \$13. Is Joey's answer greater or less than the exact answer? Explain your reasoning.

**Computation: The student accurately solves problems (including real-world situations) involving:**

**[9] E&C-2 Adding or subtracting rational numbers including integers with whole number exponents (M3.4.2)**

1. Simplify the expression.

$$\frac{1}{8} + \left(-\frac{1}{2}\right)^3 - \left(\frac{1}{4}\right)^2$$

a.  $\frac{-1}{2}$

b.  $\frac{-1}{16}$

c.  $\frac{1}{6}$

d.  $\frac{3}{16}$

**[9] E&C-3 Multiplying or dividing rational numbers including integers with whole number exponents (M3.4.3)**

1. Simplify the expression.  $\left(\frac{1}{3}\right)^2 \cdot \frac{3}{5}$

- a.  $\frac{1}{25}$       b.  $\frac{1}{15}$       c.  $\frac{1}{5}$       d.  $\frac{3}{14}$

**[9] E&C-4 Determining rate by using ratio and proportion (M3.4.5)**

1. Megan took a trip to Fairbanks from her hometown of Tok. It took her four hours to get there. If Fairbanks is 200 miles from Tok, how fast was Megan driving?

- a. 50 m/h  
b. 55 m/h  
c. 60 m/h  
d. 65 m/h

**[9] E&C-5 (L) Multiplying or dividing numbers in scientific notation (M3.4.3)**

1. Kayl wants to find the radio wave length of his favorite radio station. The formula to use is  $\lambda = \frac{c}{f}$ .

$\lambda$  = wave length     $c$ =speed of light     $f$  = frequency

If  $c = 3 \times 10^8$  m/sec (the speed of light) and  $f = 1.007 \times 10^8$  Hz (his radio station is 100.7 KISS), what is the wave length of his radio station?

- a.  $\lambda = 2.979$  m  
b.  $\lambda = 2.993m$   
c.  $\lambda = 2.979 \times 10^8$  m  
d.  $\lambda = 2.993 \times 10^8$  m

## 9<sup>th</sup> Grade Estimation and Computation Answer Key

**Estimation: The student solves problems (including real-world situations) using estimation by:**

**[9] E&C-1 Judging whether the strategy will result in an answer greater or less than the exact answer (M3.4.1) (with [9] PS-2)**

1. Joey estimated that 28% of \$52 is \$13. Is Joey's answer greater or less than the exact answer? Explain your reasoning.

*Less. 25%, or 1/4 of \$52 is \$13. Joey's estimate is less than 28%.*

**Computation: The student accurately solves problems (including real-world situations) involving:**

**[9] E&C-2 Adding or subtracting rational numbers including integers with whole number exponents (M3.4.2)**

1. Simplify the expression.

$$\frac{1}{8} + \left(-\frac{1}{2}\right)^3 - \left(\frac{1}{4}\right)^2$$

a.  $\frac{-1}{2}$

b.  $\frac{-1}{16}$ \*

c.  $\frac{1}{6}$

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**[9] E&C-3 Multiplying or dividing rational numbers including integers with whole number exponents (M3.4.3)**

1. Simplify the expression.  $\left(\frac{1}{3}\right)^2 \cdot \frac{3}{5}$

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1. Megan took a trip to Fairbanks from her hometown of Tok. It took her four hours to get there. If Fairbanks is 200 miles from Tok, how fast was Megan driving?

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## 9<sup>th</sup> Grade Functions and Relationships

**Describing Patterns and Functions: The student demonstrates conceptual understanding of functions, patterns, or sequences including those represented in real-world situations by:**

**[9] F&R-1 Describing or extending patterns (families of functions: linear, quadratic, absolute value), up to the  $n$ th term, represented in tables, sequences, graphs, or in problem situations (M4.4.1)**

1. Complete the tables.

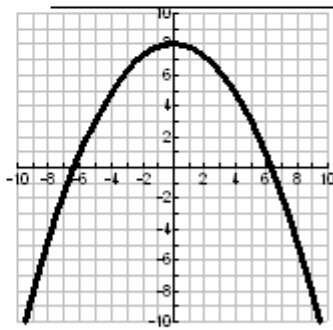
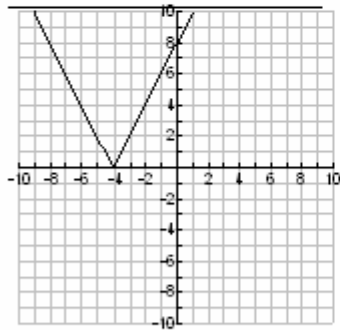
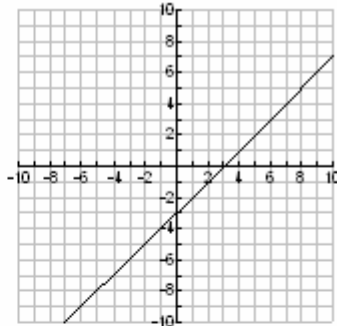
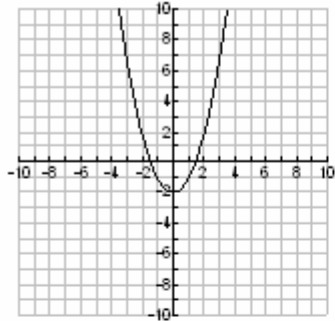
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>n</b>
<b>4</b>	<b>7</b>	<b>10</b>		

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>n</b>
<b>0</b>	<b>4</b>	<b>10</b>	<b>18</b>		

<b>-2</b>	<b>-1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>n</b>
<b>-1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>		

**[9] F&R-2 Generalizing relationships (linear, quadratic, absolute value) using a table of ordered pairs, a graph, or an equation (M4.4.4)**

1. Look at the graphs below and state if the graph is linear, quadratic, or absolute value.



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**[9] F&R-3 Describing in words how a change in one variable in a formula affects the remaining variables (e.g., how changing the radius affects the volume of a cylinder) (M4.3.2)**

1. The formula for the volume of a right cylinder is

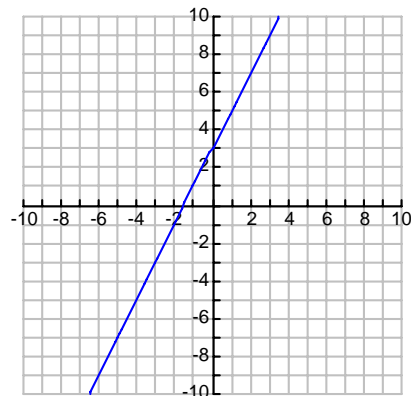
$$V = \pi r^2 h$$

if the  $r$  (radius) increases what happens to the  $V$  (volume of the cylinder)?

- a. increases
- b. decreases
- c. stays the same

**[9] F&R-4 (L) Using a calculator as a tool when describing, extending, representing, or graphing patterns or linear equations (M4.4.2)**

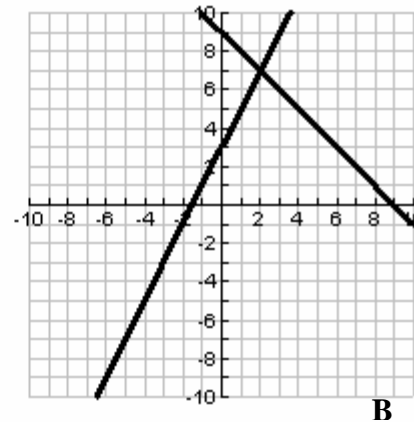
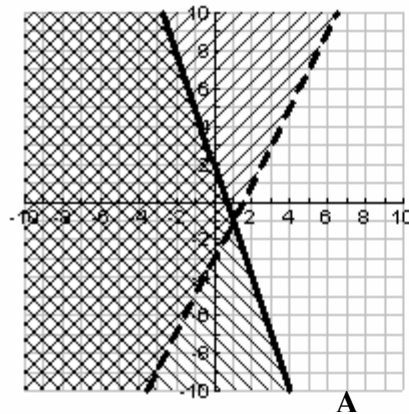
1. Use your graphing calculator to graph the following line to predict what the  $y$  value is when  $x$  is 124.



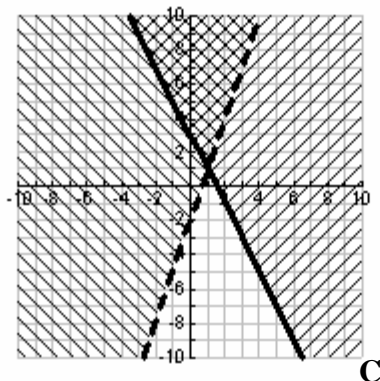
**Modeling and Solving Equations and Inequalities: The student demonstrates algebraic thinking by:**

**[9] F&R-5 Modeling (graphically or algebraically) or solving situations (including real-world applications) using systems of linear equations (M4.4.3)**

Match the following systems of equations and inequalities with their correct graphs.



1. \_\_\_\_\_  $y = 2x + 3$   
                   $y = -x + 9$
2. \_\_\_\_\_  $y > 2x - 3$   
                   $y \leq -3x + 2$
3. \_\_\_\_\_  $y \geq -2x + 3$   
                   $y > 3x - 2$



**[9] F&R-6 Solving or identifying solutions to multi-step linear equations of the form  $ax \pm b = cx \pm d$ , where  $a, b, c$  and  $d$  are rational numbers and  $a \neq 0, c \neq 0$  (M4.4.2)**

1. Katie and Tom are selling pens. Katie makes a dollar for every two pens she sells and has \$5 dollars that she made yesterday. Tom makes \$2 for every three pens he sells and he owes the teacher \$4 from yesterday. After selling pens all day they have the same amount of money. Using the equation below, how many pens did they sell?

$$\frac{1}{2}x + 5 = \frac{2}{3}x - 4$$

- a. 9
- b.  $\frac{45}{2}$
- c. 54
- d. 3

**[9] F&R-7 Solving literal equations or formulas for a variable involving one step (e.g. solve for  $t$  when  $d = rt$ ) (M4.4.2)**

1. Solve for  $b$  in the equation  $A = bh$ .

- a.  $b = \frac{h}{A}$
- b.  $b = Ah$
- c.  $b = \frac{A}{h}$
- d.  $b = A - h$

## 9<sup>th</sup> Grade Functions and Relationships Answer Key

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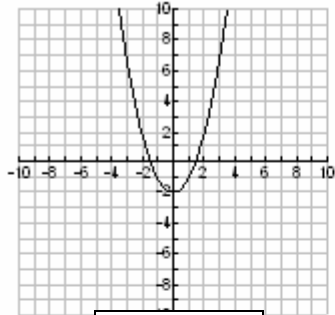
1	2	3	4	$n$
4	7	10	<b>13</b>	<b><math>3n+1</math></b>

1	2	3	4	5	$n$
0	4	10	18	<b>28</b>	<b><math>(n-1)(n+2)</math></b>

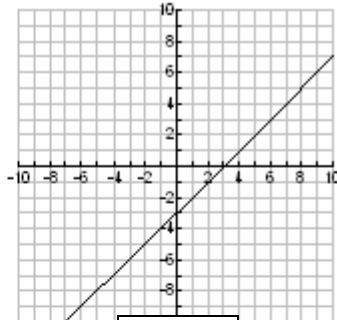
-2	-1	0	1	2	3	$n$
-1	0	1	2	3	<b>4</b>	<b><math>(n+1)</math></b>

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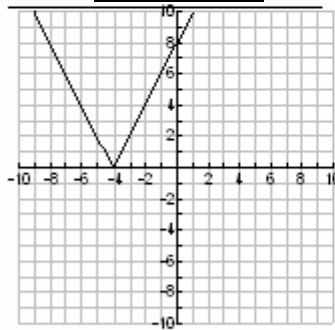
1. Look at the graphs below and state if the graph is linear, quadratic, or absolute value.



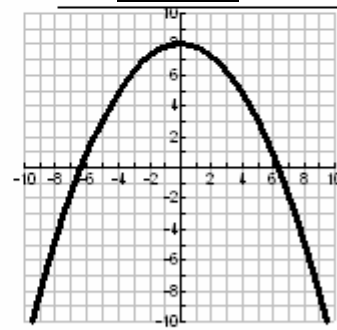
quadratic



linear



absolute value



quadratic

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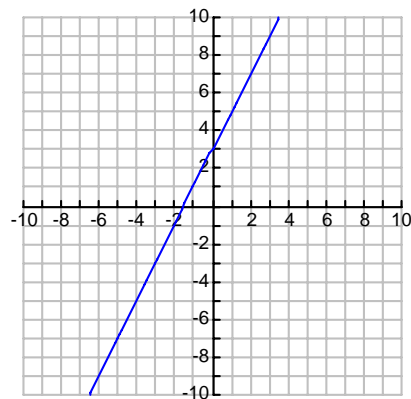
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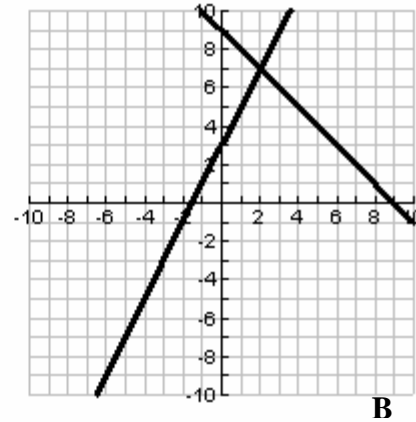
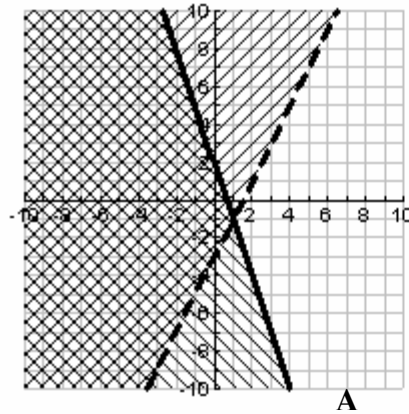


The equation of the line is  $y = 2x + 3$ . (124, 251) is a point on the line.

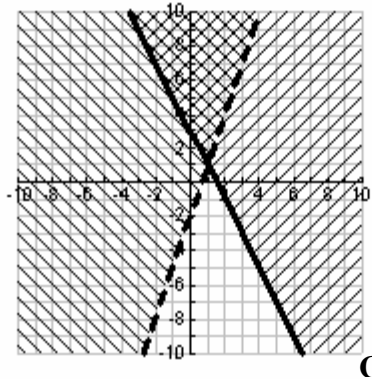
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- 2. **A**      $y > 2x - 3$   
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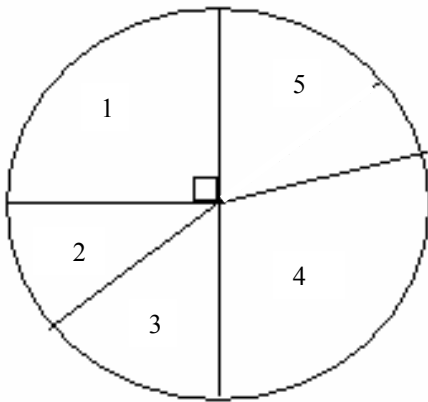
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- b.  $b = Ah$
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## 9<sup>th</sup> Grade Geometry

**Geometric Relationships: The student demonstrates an understanding of geometric relationships by:**

**[9] G-1 Identifying, analyzing, comparing, or using properties of angles (including supplementary or complementary) or circles (degrees in a circle) (M5.4.1)**

Using the diagram below, match the vocabulary words with the appropriate angle/s.

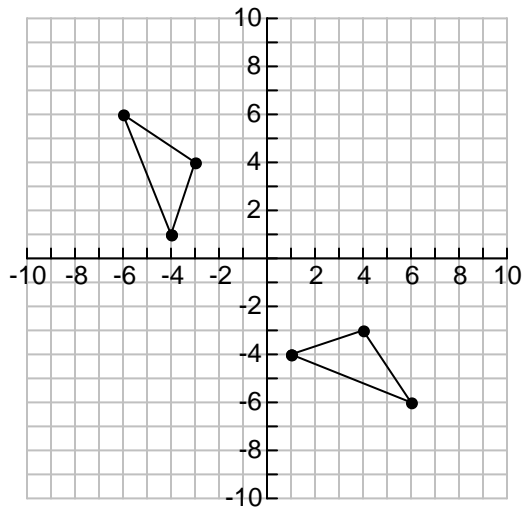


- |                     |                          |
|---------------------|--------------------------|
| ___1. supplementary | A. $\angle 4$            |
| ___2. complementary | B. $\angle 1$            |
| ___3. right angle   | C. $\angle 2 + \angle 3$ |
| ___4. obtuse angle  | D. $\angle 2$            |
| ___5. acute angle   | E. $\angle 4 + \angle 5$ |

**Transformation of Shapes: The student demonstrates conceptual understanding of similarity, congruence, symmetry, or transformations of shapes by:**

**[9] G-2 Using a coordinate plane to solve problems involving congruent or similar shapes (M5.4.3)**

1. Using the diagram below, how are these two triangles related?

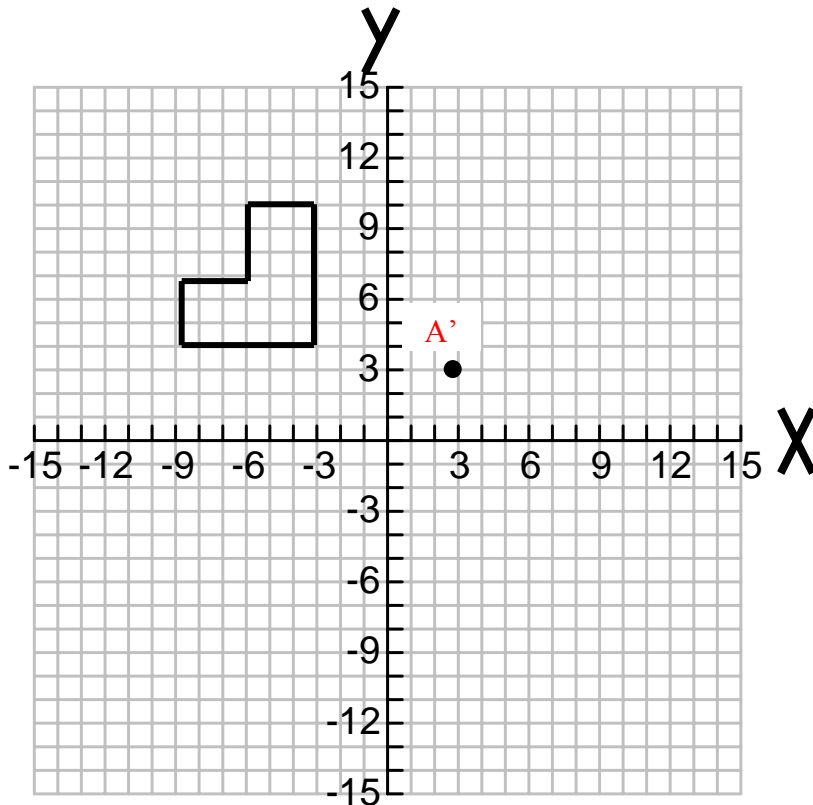


- a. similar
- b. congruent
- c. different
- d. symmetric

**[9] G-3 (L) Drawing or describing the results of applying transformations (translations, rotations, reflections, or dilations) to figures on a coordinate plane (M5.4.4)**

1. Given hexagon ABCDEF with A (-9,4), B (-9,7), C (-6,7), D (-6,10), E (-3,10), F (-3,4) and point G (3,3) in the coordinate plane below:

Using a scale factor of 2 and the dilation method, draw a larger hexagon similar to ABCDEF with one vertex at point A'. Label the dilated quadrilateral A'B'C'D'E'F'.



**Perimeter, Area, and Volume: The student solves problems (including real-world situations) by:**

**[9] G-4 Determining the volume or surface area of prisms, cylinders, cones, or pyramids (M5.3.4)**

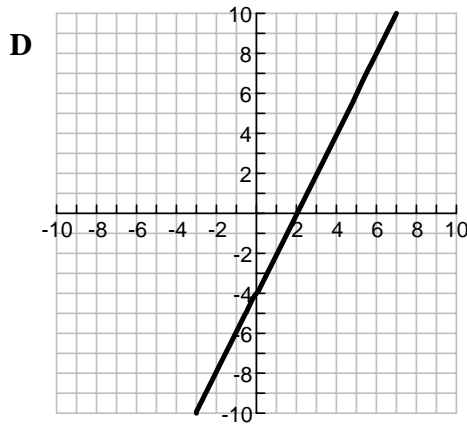
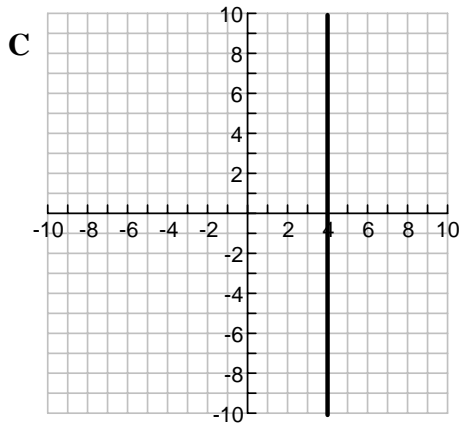
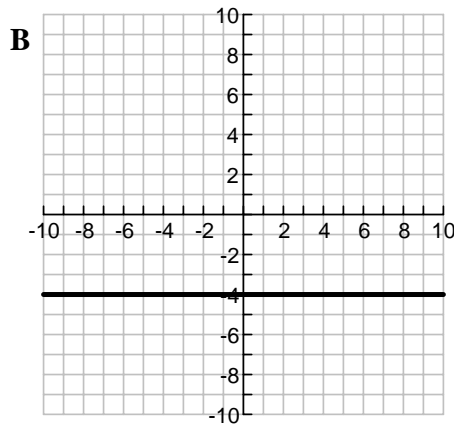
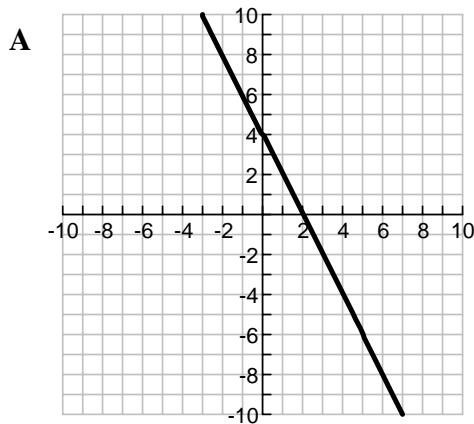
1. When Susan saw the oil tanks in Anchorage, she wondered how much oil was in one tank. If the cylinder tank is 40 ft tall and the diameter of the tank is 250 ft., what would be the volume of the tank?

- a.  $100,000\pi \text{ ft}^3$
- b.  $400,000\pi \text{ ft}^3$
- c.  $625,000\pi \text{ ft}^3$
- d.  $2,500,000\pi \text{ ft}^3$

**Position and Direction: The student demonstrates understanding of position and direction when solving problems (including real-world situations) by:**

**[9] G-5 Graphing or identifying (using equations or formulas to determine the slope of line segments on a coordinate plane) (M5.4.5)**

1. Match the following slopes to the correct graph.



\_\_\_ Positive slope

\_\_\_ Negative slope

**Construction: The student demonstrates a conceptual understanding of geometric drawings or constructions by:**

**[9] G-6 (L) Drawing, measuring, or constructing geometric models of plane figures (containing parallel and/or perpendicular lines (M5.4.6) (with [9] PS-1)**

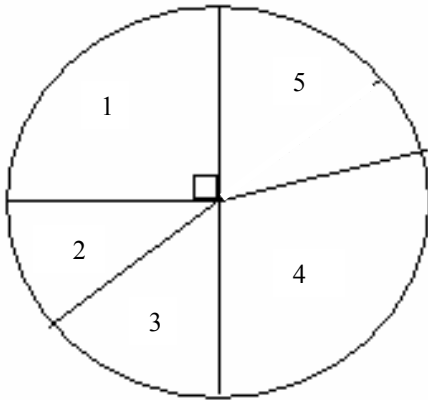
1. Construct a regular hexagon.

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E 1. supplementary

A.  $\angle 4$

C 2. complementary

B.  $\angle 1$

B 3. right angle

C.  $\angle 2 + \angle 3$

A 4. obtuse angle

D.  $\angle 2$

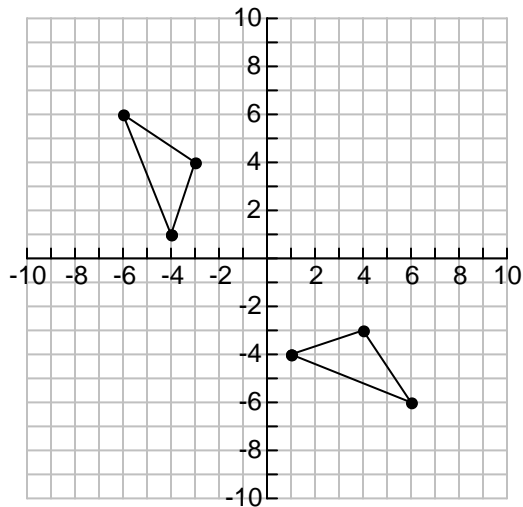
D 5. acute angle

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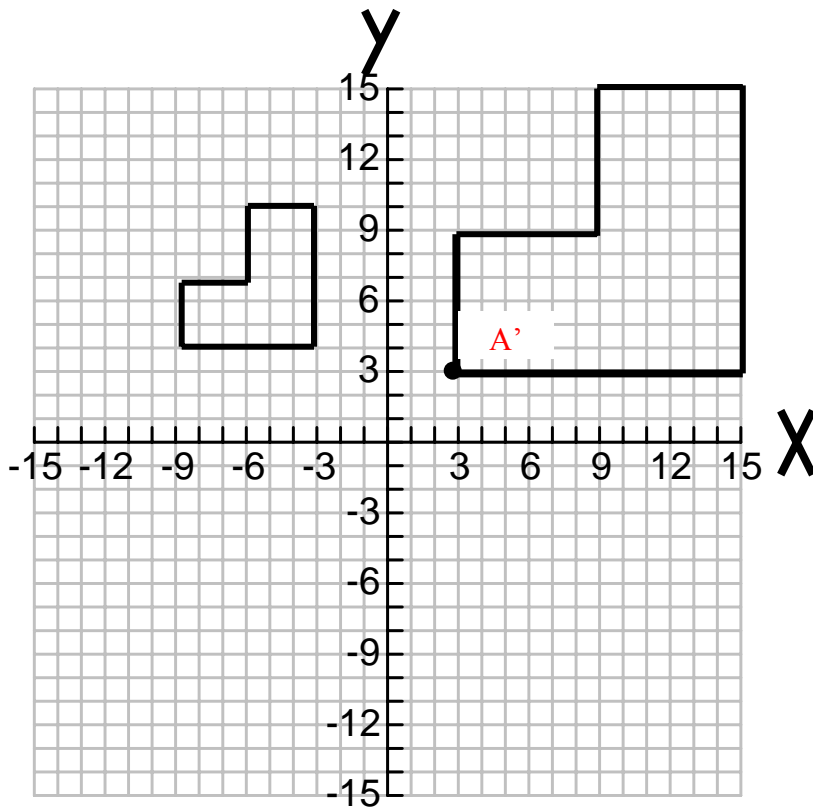


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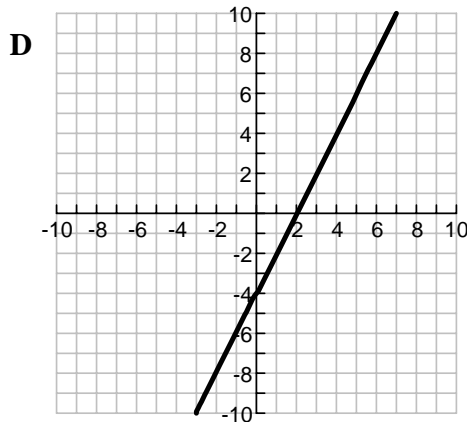
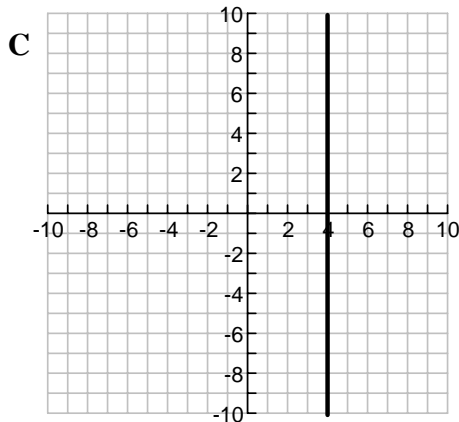
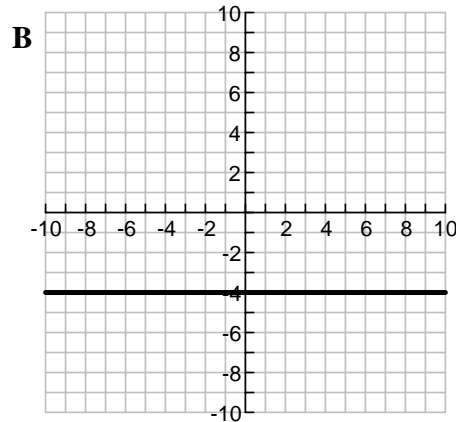
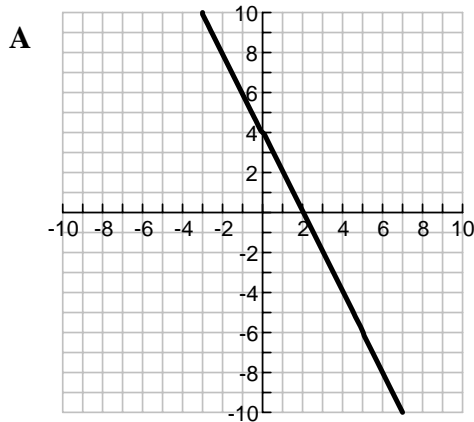
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1. Construct a regular hexagon.

**Answers will vary.**

**Possible answer: Construct a circle. Use the protractor open to the measure of radius and mark arcs around circle. Connect points to create hexagon.**

## 9<sup>th</sup> Grade Measurement

**Measurable Attributes: The student demonstrates understanding of measurable attributes by:**

**[9] MEA-1 Estimating or converting measurements between the English and metric systems in real-world applications, given a conversion factor (e.g., miles/kilometers) (M2.4.2) (with [9] N-1)**

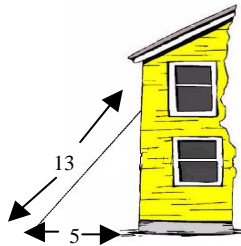
1. The speed of light is  $1.86 \times 10^5$  miles/second. Use this statement to mark the following question True or False.

If 1 mile = 1.6 kilometers, then the speed of light is  $2.98 \times 10^5$  kilometers/second. \_\_\_\_\_

**Measurement Technique: The student uses measurement techniques by:**

**[9] MEA-2 Applying indirect methods, such as the Pythagorean theorem, to find missing dimensions in real-world applications (M2.4.4)**

1. A window washer leans a 13-foot ladder against a house. The bottom of the ladder is 5 feet from the house. Look at the diagram. How high is the second-floor window off the ground?



- a. 12 feet
- b. 8 feet
- c. 18 feet
- d.  $\sqrt{194}$

## 9<sup>th</sup> Grade Measurement Answer Key

**Measurable Attributes: The student demonstrates understanding of measurable attributes by:**

**[9] MEA-1 Estimating or converting measurements between the English and metric systems in real-world applications, given a conversion factor (e.g., miles/kilometers) (M2.4.2) (with [9] N-1)**

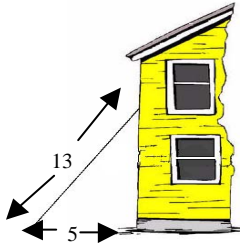
1. The speed of light is  $1.86 \times 10^5$  miles/second. Use this statement to mark the following question True or False.

If 1 mile = 1.6 kilometers, then the speed of light is  $2.98 \times 10^5$  kilometers/second. **True**

**Measurement Technique: The student uses measurement techniques by:**

**[9] MEA-2 Applying indirect methods, such as the Pythagorean theorem, to find missing dimensions in real-world applications (M2.4.4)**

1. A window washer leans a 13-foot ladder against a house. The bottom of the ladder is 5 feet from the house. Look at the diagram. How high is the second-floor window off the ground?



- a. 12 feet \*
- b. 8 feet
- c. 18 feet
- d.  $\sqrt{194}$

## 9<sup>th</sup> Grade Numeration

**Understanding of Numbers: The student demonstrates understanding of real numbers by:**

### **[9] N-1 Converting between a rational number in scientific notation and standard form (M1.4.4 & M 3.4.4)**

The speed of light  $1.86 \times 10^5$  miles/second.

Use the statement above to mark the following question True or False.

1. The speed of light is 18600000 miles/second in standard form. \_\_\_\_\_

### **[9] N-2 Equating different equivalent representations of the same exponential expression (e.g., $2^3 \cdot 2^5 = 2^8$ ) (M1.4.4 & M3.4.4)**

1. Using the properties of exponents, state if the equations are true or false.

$$x^2 + x^3 = x^5$$

$$x^3 \cdot x^5 = x^8$$

$$(x^4)^3 = x^7$$

$$\frac{x^7}{x^3} = x^4$$

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

**Understanding Meaning of Operations: The student demonstrates conceptual understanding of mathematical operations by:**

**[9] N-3 Using models, explanations, number lines, real-life situations, describing or illustrating the effects of arithmetic operations on real numbers (M1.4.3)**

1. Match the following questions with the correct letter of the answers on the left.

- |                                    |                |
|------------------------------------|----------------|
| ___ 1. $\sqrt{3} + \sqrt{3}$       | a. 0           |
| ___ 2. $\sqrt{3}(\sqrt{3})$        | b. 1           |
| ___ 3. $\frac{\sqrt{3}}{\sqrt{3}}$ | c. $\sqrt{3}$  |
| ___ 4. $\sqrt{3} - \sqrt{3}$       | d. $\sqrt{6}$  |
|                                    | e. 3           |
|                                    | f. $2\sqrt{3}$ |

**[9] N-4 Using models, explanations, number lines, real-life situations, describing or illustrating the use of inverse operations (squaring/square root) (M1.4.3 & 1.4.5)**

1. Solve for  $x$ .  $x^2 = 25$

- a. 5
- b. 17.5
- c. -5
- d.  $\pm 5$

**Number Theory: The student demonstrates conceptual understanding of number theory by:**

**[9] N-5 Applying the rules for order of operations to real numbers and variables (M1.3.5)**

1. Simplify the expression.  $3a(15 + 6 - 3^2) + 7a\left(\frac{8}{4}\right)$

a.  $59a$

b.  $50a$

c.  $\frac{47a}{2}$

d.  $\frac{39a}{4}$

**[9] N-6 (L) Using distributive property with variables (M1.4.5)**

1. Simplify the expression.

$-5x\left(\frac{1}{5} - y\right) = \underline{\hspace{2cm}}$

a.  $-5x - y$

b.  $-x - 5xy$

c.  $-x + 5xy$

d.  $-5x + y$

## 9<sup>th</sup> Grade Numeration Answer Key

**Understanding of Numbers: The student demonstrates understanding of real numbers by:**

### [9] N-1 Converting between a rational number in scientific notation and standard form (M1.4.4 & M 3.4.4)

The speed of light  $1.86 \times 10^5$  miles/second.

Use the statement above to mark the following question True or False.

1. The speed of light is 18600000 miles/second in standard form. **False**

### [9] N-2 Equating different equivalent representations of the same exponential expression (e.g., $2^3 \cdot 2^5 = 2^8$ ) (M1.4.4 & M3.4.4)

1. Using the properties of exponents, state if the equations are true or false.

$$x^2 + x^3 = x^5$$

$$x^3 \cdot x^5 = x^8$$

$$(x^4)^3 = x^7$$

$$\frac{x^7}{x^3} = x^4$$

a. False

b. True

c. False

d. True

**Understanding Meaning of Operations: The student demonstrates conceptual understanding of mathematical operations by:**

**[9] N-3 Using models, explanations, number lines, real-life situations, describing or illustrating the effects of arithmetic operations on real numbers (M1.4.3)**

1. Match the following questions with the correct letter of the answers on the left.

<u><i>f</i></u>	1. $\sqrt{3} + \sqrt{3}$	a. 0
<u><i>e</i></u>	2. $\sqrt{3}(\sqrt{3})$	b. 1
<u><i>b</i></u>		c. $\sqrt{3}$
<u><i>a</i></u>	3. $\frac{\sqrt{3}}{\sqrt{3}}$	d. $\sqrt{6}$
	4. $\sqrt{3} - \sqrt{3}$	e. 3
		f. $2\sqrt{3}$

**[9] N-4 Using models, explanations, number lines, real-life situations, describing or illustrating the use of inverse operations (squaring/square root) (M1.4.3 & 1.4.5)**

1. Solve for  $x$ .  $x^2 = 25$

- a. 5
- b. 17.5
- c. -5
- d.  $\pm 5^*$*

**Number Theory: The student demonstrates conceptual understanding of number theory by:**

**[9] N-5 Applying the rules for order of operations to real numbers and variables (M1.3.5)**

1. Simplify the expression.  $3a(15 + 6 - 3^2) + 7a\left(\frac{8}{4}\right)$

a.  $59a$

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**[9] N-6 (L) Using distributive property with variables (M1.4.5)**

1. Simplify the expression.

$-5x\left(\frac{1}{5} - y\right) = \underline{\hspace{2cm}}$

a.  $-5x - y$

b.  $-x - 5xy$

**c.  $-x + 5xy^*$**

d.  $-5x + y$

## 9<sup>th</sup> Grade Process Skills

**Process Skills: The student demonstrates the ability to problem-solve by:**

**[9] PS-1 Selecting, modifying, and applying a variety of problem-solving strategies (e.g., charts, graphing, inductive and deductive reasoning, Venn diagrams) and verifying the results (M7.4.2) (with [9] G-6 [L])**

1. Construct a regular hexagon.

**[9] PS-2 Evaluating, interpreting, and justifying solutions to problems by using an alternative strategy (M7.4.3) (with [9] E&C-1)**

1. Joey estimated that 28% of \$52 is \$13. Is Joey's answer greater or less than the exact answer? Explain your reasoning.

**[9] PS-2 Evaluating, interpreting, and justifying solutions to problems by using an alternative strategy (M7.4.3) (with [9] E&C-1) and**

**Communication: The student communicates his or her mathematical thinking by:**

**[9] PS-3 Representing mathematical problems numerically, graphically, and/or symbolically, translating among these alternative representations; or using appropriate vocabulary, symbols, or technology to explain, justify, and defend strategies and solutions (M8.4.1, M8.4.2, & M8.4.3) and**

**Reasoning: The student demonstrates an ability to use logic and reason by:**

**[9] PS-4 Following and evaluating an argument, judging its validity using inductive or deductive reasoning and logic; or making and testing conjectures (M9.4.1 & M9.4.2) (with [9] S&P-6)**

1. Out of which bag would George most likely pick two white marbles? \_\_\_\_\_

BAG 1	BAG 2
5 white marbles	3 white marbles
4 black marbles	2 black marbles

2. Explain how you chose which bag would give George the best probability to pick two whites.

**Reasoning: The student demonstrates an ability to use logic and reason by:**

**[9] PS-4 Following and evaluating an argument, judging its validity using inductive or deductive reasoning and logic; or making and testing conjectures (M9.4.1 & M9.4.2) (with [9] S&P –7 [L])**

*Going to the Fair: Is it a Fair Game?*

1. Make up a game that is fair that could be used at a carnival, then find the probability of winning.

**Connections: The student understands and applies mathematical skills and processes across the content strands by:**

**[9] PS-5 Using real-world contexts such as science, humanities, peers, community, careers, and national issues (M10.4.1 & M10.4.2) (with [9] S&P-1 [L] and [9] S&P-4)**

*Comparing wages from 2000-2005 for two or more careers*

1. Research to find career wages from 2000-2005.
2. Organize your information and graph each career.
3. Draw a line that best fits the data for each career.
4. Make a prediction of what the wages of the careers chosen would be in 2010.

## 9<sup>th</sup> Grade Process Skills Answer Key

**Process Skills: The student demonstrates the ability to problem-solve by:**

**[9] PS-1 Selecting, modifying, and applying a variety of problem-solving strategies (e.g., charts, graphing, inductive and deductive reasoning, Venn diagrams) and verifying the results (M7.4.2) (with [9] G-6 [L])**

1. Construct a regular hexagon.

**Answers will vary.**

**Possible answer: Construct a circle. Use the protractor open to the measure of radius and mark arcs around circle. Connect points to create hexagon.**

**[9] PS-2 Evaluating, interpreting, and justifying solutions to problems by using an alternative strategy (M7.4.3) (with [9] E&C-1)**

1. Joey estimated that 28% of \$52 is \$13. Is Joey's answer greater or less than the exact answer? Explain your reasoning.

*Less. 25%, or 1/4 of \$52 is \$13. Joey's estimate is less than 28%.*

[9] PS-2 Evaluating, interpreting, and justifying solutions to problems by using an alternative strategy (M7.4.3) (with [9] E&C-1) and

**Communication: The student communicates his or her mathematical thinking by:**

[9] PS-3 Representing mathematical problems numerically, graphically, and/or symbolically, translating among these alternative representations; or using appropriate vocabulary, symbols, or technology to explain, justify, and defend strategies and solutions (M8.4.1, M8.4.2, & M8.4.3) and

**Reasoning: The student demonstrates an ability to use logic and reason by:**

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1. Out of which bag would George most likely pick two white marbles? **Bag 2**

BAG 1	BAG 2
5 white marbles	3 white marbles
4 black marbles	2 black marbles

2. Explain how you chose which bag would give George the best probability to pick two whites.

$$\text{Bag one } \frac{5}{9} \bullet \frac{4}{8} = \frac{5}{18}$$

$$\text{Bag two } \frac{3}{5} \bullet \frac{2}{4} = \frac{3}{10}$$

**Reasoning: The student demonstrates an ability to use logic and reason by:**

**[9] PS-4 Following and evaluating an argument, judging its validity using inductive or deductive reasoning and logic; or making and testing conjectures (M9.4.1 & M9.4.2) (with [9] S&P –7 [L])**

*Going to the Fair: Is it a Fair Game?*

1. Make up a game that is fair that could be used at a carnival, then find the probability of winning.

*Students should show the probability of winning times the cost of the game.*

**Connections: The student understands and applies mathematical skills and processes across the content strands by:**

**[9] PS-5 Using real-world contexts such as science, humanities, peers, community, careers, and national issues (M10.4.1 & M10.4.2) (with [9] S&P-1 [L] and [9] S&P-4)**

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1. Research to find career wages from 2000-2005.
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3. Draw a line that best fits the data for each career.
4. Make a prediction of what the wages of the careers chosen would be in 2010.

## 9<sup>th</sup> Grade Statistics and Probability

**Data Display: The student demonstrates an ability to classify and organize data by:**

**[9] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers, community, or careers) using information from tables or graphs that display two sets of data [or with technology L] (M6.4.1) and**

**Analysis and Central Tendency: The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating, making predictions, or, describing trends; or drawing, formulating, or justifying conclusions) by:**

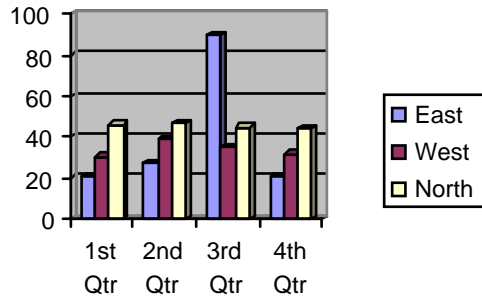
**[9] S&P-4 Identifying and/or showing the meaning of a best fit line (M6.4.2) (with [9] PS-5)**

*Comparing wages from 2000-2005 for two or more careers*

1. Research to find career wages from 2000-2005.
2. Organize your information and graph each career.
3. Draw a line that best fits the data for each career.
4. Make a prediction of what the wages of the careers chosen would be in 2010.

**[9] S&P-2 Using information from a variety of displays or analyzing the validity of statistical conclusions found in the media (M6.4.1)**

Perfect Attendance Awards



1. The frequency graph above shows the number of perfect attendance awards received by students in three high schools, East, West, and North, during one school year. For each of the following statements, circle true if the statement is an accurate interpretation of the information presented on the graph or false if the information is not an accurate interpretation of the information presented on the graph.

- |  |      |       |
|--|------|-------|
| a. East High school had the most perfect attendance awards given that year.                    | True | False |
| b. There were more awards given out during the third quarter than any other quarter that year. | True | False |
| c. West High School received the fewest perfect attendance awards overall that year.           | True | False |
| d. The perfect attendance at North High School was the most variant of all three schools.      | True | False |
| e. Perfect attendance awards were fairly consistent in each of the 3 schools.                  | True | False |
| f. A total of over 80 perfect attendance awards were given from all 3 schools each quarter.    | True | False |

**[9] S&P-3 Using range and measures of central tendency to determine the best representation of the data for a practical situation (M6.4.3)**

David recorded the lowest temperature of each of the first 15 days of the month of November. Temperatures in Fahrenheit degrees: {0, 2, 5, 16, 17, 18, 18, 19, 19, 20, 21, 21, 23, 23, 23}

1. Which measure (mean, median, mode, or range) gives the most typical low temperature for a day in November?

- a. mean
- b. median
- c. mode
- d. range

**Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:**

**[9] S&P-5 Determining or comparing the experimental and/or theoretical probability of independent or dependent events (M6.4.5)**

1. Tara has a bag with 3 white marbles, 2 black marbles, and 5 gray marbles. She takes out two marbles without looking. What is the probability that the marbles are both white?

- a.  $\frac{1}{15}$
- b.  $\frac{9}{100}$
- c.  $\frac{3}{5}$
- d.  $\frac{2}{9}$

**[9] S&P-6 Making predictions about the probability of independent or dependent events and using the information to solve problems (M6.4.5) (with [9] PS-4, [9] PS-3, and [9] PS-2)**

1. Out of which bag would George most likely pick two white marbles?

\_\_\_\_\_

BAG 1	BAG 2
5 white marbles	3 white marbles
4 black marbles	2 black marbles

2. Explain how you chose which bag would give George the best probability to pick two whites.

**[9] S&P 7 (L) Designing, conducting, analyzing, and communicating the results of a probability experiment (M6.4.6) (with [9] PS-4)**

*Going to the Fair. Is it a Fair Game?*

1. Make up a game that is fair and that could be used at a carnival, then find the probability of winning.

## 9<sup>th</sup> Grade Statistics and Probability Answer Key

**Data Display: The student demonstrates an ability to classify and organize data by:**

**[9] S&P-1 [Designing, collecting L], organizing, displaying, or explaining the classification of data in real-world problems (e.g., science or humanities, peers, community, or careers) using information from tables or graphs that display two sets of data [or with technology L] (M6.4.1) and**

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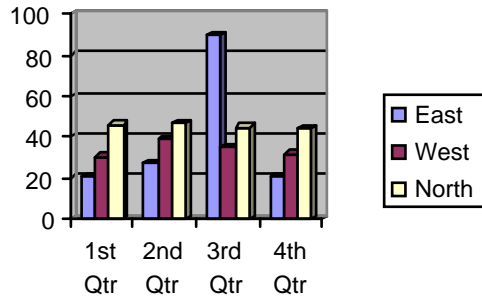
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- |  |              |               |
|--|--------------|---------------|
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| b. There were more awards given out during the third quarter than any other quarter that year. | <b>True*</b> | False         |
| c. West High School received the fewest perfect attendance awards overall that year.           | <b>True*</b> | False         |
| d. The perfect attendance at North High School was the most variant of all three schools.      | True         | <b>False*</b> |
| e. Perfect attendance awards were fairly consistent in each of the 3 schools.                  | True         | <b>False*</b> |
| f. A total of over 80 perfect attendance awards were given from all 3 schools each quarter.    | <b>True*</b> | False         |

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David recorded the lowest temperature of each of the first 15 days of the month of November. Temperatures in Fahrenheit degrees: {0, 2, 5, 16, 17, 18, 18, 19, 19, 20, 21, 21, 23, 23, 23}

1. Which measure (mean, median, mode, or range) gives the most typical low temperature for a day in November?

a. mean

**b. median\***

c. mode

d. range

<b>Probability: The student demonstrates a conceptual understanding of probability and counting techniques by:</b>
--

**[9] S&P-5 Determining or comparing the experimental and/or theoretical probability of independent or dependent events (M6.4.5)**

1. Tara has a bag with 3 white marbles, 2 black marbles, and 5 gray marbles. She takes out two marbles without looking. What is the probability that the marbles are both white?

a.  $\frac{1}{15}$  \*

b.  $\frac{9}{100}$

c.  $\frac{3}{5}$

d.  $\frac{2}{9}$

**[9] S&P-6 Making predictions about the probability of independent or dependent events and using the information to solve problems (M6.4.5) (with [9] PS-4, [9] PS-3, and [9] PS-2)**

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