6th Grade Common Core Unit #6: Equations and Inequalities

Resources: Big Ideas Chapter 7

Common Core Standards: 6.EE.5; 6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 6.RP.3a

Main Focus: Write and solve equations and inequalities.

Number	Learning Targets	Common Core Standard	Resources
1	I can write word sentences as equations.	6.EE.6	7.1
2	I can use addition and subtraction to solve equations.	6.EE.5, 6.EE.7	7.2
3	I can use multiplication and division to solve equations.	6.EE.5, 6.EE.7	7.3
4	I can identify independent and dependent variables and use them in tables, graphs and equations	6.RP.3a; 6.EE.9	7.4
5	I can write word sentences and graphs to represents inequalities.	6.EE.5, 6.EE.8	7.5
6	I can solve inequalities by adding and subtracting.	6.EE.5, 6.EE.8	7.6
7	I can solve inequalities by multiplying and dividing.	6.EE.5, 6.EE.8	7.7

My Practice:

Number	Pre-test:	Exit slip scores	Day #2 Homework	Extra Targeted Practice	Post-test:
1	_____/2				_____/2
2	_____/4				_____/6
3	_____/3				_____/5
4	_____/7				_____/11
5	_____/4				_____/6
6	_____/4				_____/6
7	_____/3				_____/6

My Final Pretest Score: _____ /27   My Final Pretest Percent _____ %

My Final Posttest Score: _____ / 42   My Final Posttest Percent: _____ %

My increase between the Pre and Post test scores = _____ !!

2015

"START THINKING & Warmups"

7.1	
7.2	
7.3	
7.4	
Extra work space	

"START THINKING & Warmups"

	DAY#1	DAY#2
7.5		
7.6		
7.7		
Extra work space		
Extra work space		

Section 7.1 Writing Equations in One Variable Student Notes

Objective: Students will translate words and problems into algebraic equations.

Key Concepts & Vocabulary:

Equations: a mathematical sentence that uses an equal sign to show that two expressions are equal

Expressions	Equations

Look for key words and phrases to know where to place the equal sign!

Clues: _____   _____   _____

EXAMPLES:

Example 1.) Writing Equations_____

Write the word sentence as an equation.

1. The sum of a number n and 7 is 15. _____

2. A number y decreased by 4 is 3._____

3. 12 times a number p equals 48._____

On Your Own:

1. 9 less than a number b equals 2

2. the product of a number g and 5 is 30

3. A number k increased by 10 is the same as 24

4. the quotient of a number q and 4 is 12

Example 2.) _____

Ten servers decorate 25 tables for a wedding. Each table is decorated as shown. Let c be the total number of white and purple candles. Which equation can be used to find c?

Words:

Variable:

Equation:

Example 3.) _____

After two rounds, 24 students are eliminated from a spelling bee. There are 96 students remaining. Write an equation you can use to find the number of students that started the spelling bee.

Words:

Variable:

Equation:

On Your Own:

5. You enter an elevator and go down 7 floors. You exit on the 10th floor. Write an equation you can use to find the floor where you entered the elevator.

6. Together you and a friend have $52. Your friend has $28. Write an equation you can use to find how much money you have.
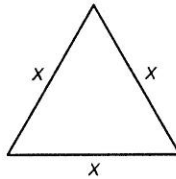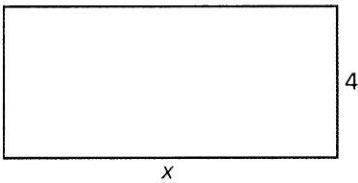
7.1 Writing Equations Homework Day 1

Write the word sentence as an equation.

1. 27 is 3 times a number y.

2. The difference of a number x and 4 is 3.

3. 8 more than a number p is 17.

4. Half of a number q is 14.

Write an equation that can be used to find the value of x.

5. Perimeter of rectangle: 32 cm

6. Perimeter of triangle: 20 in.

7. You spend $16 on 3 notebooks and x binders. Notebooks cost $2 each and binders cost $5 each. Write an equation you can use to find the number of binders you bought.

Name _____ Date _____

7.1 Writing Equations Homework Day 2

Write the word sentence as an equation.

1. 4 is the quotient of 16 and a number n.

2. The sum of a number k and 5 is 11.

3. The difference of a number x and 2 is 7.

4. 7 times a number a is 42.

5. 6 is one-third of a number s.

6. A number t added to 13 equals 17.

7. 5 less than a number b is 16.

8. 30 is 6 multiplied by a number y.

9. **Describe the error** in writing the sentence as an equation.

$\times$ 24 is 8 multiplied by a number x.

$24x = 8$

10. You earn 4070 points in level 1 of a video game and 2710 points in level 2. After level 3, your point total is 8180. **Write an equation** you can use to find the number of points p you scored in level 3. **Do not solve**

Section 7.2 Solving Equations Using Addition or Subtraction Student Notes

Vocabulary:
1. **inverse operations** – operations that undo each other
2. **variable** – a letter that represents an unknown number
3. **solution** - a value for the variable that makes the equation true

Operation	Inverse Operation
Adding	Subtracting
Subtracting	Adding

*Goal for solving equations: Get the variable alone on one side of the equation!

Steps for solving a one-step equation:
1. Use inverse operations to get the variable alone.
2. Check your solution using the original equation.

Checking Solutions:

Tell whether the given value is a solution of the equation.

1.) $p + 10 = 38$; $p = 18$

2.) $19 - g = 7$; $g = 15$

Solving Equations:

	Check:
1.) $x - 4 = 12$	
2.) $a + 5.5 = 17.3$	Check:

3.)	Check:
$f - 27.2 = 19.3$	
4.)	Check:
$15.2 = x + 4.1$	
5.)	Check:
$1.8 + x = 13.7$	

6.) You are shopping at the mall and decide to buy the pair of shoes shown for $59.95. After you buy the shoes, you have $5.50 left. Write and solve an equation to find how much money you had before you bought the shoes.

Define the variable:_____

Equation: _____ = _____

Name _____ Date _____

Tell whether the given value is a solution of the equation.

1. $34 + x = 46;\ x = 12$

2. $y - 9 = 14;\ y = 22$

3. $6d = 54;\ d = 9$

4. $\dfrac{n}{3} = 13;\ n = 39$

Solve the equation. SHOW ALL STEPS! Check your solution.

5. $7 + k = 11.8$

6. $p - 24 = 13$

7. $b - 16 = 7$

8. $9.5 = x + 4.2$

9. In the heavyweight class of professional wrestling, the junior weight limit is 190 pounds. This is 15 pounds heavier than the light heavyweight limit. Write and solve an equation to find the weight limit of the light heavyweight class.

7.2 One Step Adding and Subtracting HW Day 2

Tell whether the given value is a solution of the equation.

Problem	Show Work	Yes/No
1. $p - 4 = 28; p = 32$		
2. $\dfrac{y}{6} = 6; y = 24$		

Solve the equation. Check your solution.

3. $x - 5 = 9$

4. $q + 8 = 25$

5. $f - 22 = 14$

6. $r - 3.2 = 1.7$

7. $8.9 = v + 7.3$

8. $\dfrac{1}{3} + n = \dfrac{2}{3}$

Describe and correct the error in solving the equation.

9.
$$\begin{aligned} 13 + m &= 56 \\ +13 \qquad\quad &+13 \\ m &= 69 \end{aligned}$$

Write the word sentence as an equation. Then solve the equation.

Word Sentence	Equation	Solution
10. 20 equals 8 more than a number y.		
11. 4 less than a number g equals 9.		

Vocabulary:
1. **inverse operations** – operations that undo each other
2. **variable** – a letter that represents an unknown number
3. **solution**- a value for the variable that makes the equation true

Operation	Inverse Operation
Multiplying	Dividing
Dividing	Multiplying

*Goal for solving equations: Get the variable alone on one side of the equation!

Steps for solving a one-step equation:
1. Use inverse operations to get the variable alone.
2. Check your solution using the original equation.

Checking Solutions:
Tell whether the given value is a solution of the equation.

1.) $4y = 56$; $y = 14$

2.) $\frac{y}{2} = 28; y = 14$

Solving Equations:

1.)	Check:
$6w = 75$	
2.)	Check:
$\frac{2}{7}x = 6$	

3.) $\frac{a}{8} = 12$	Check:
4.) $8.8 = \frac{x}{5}$	Check:
5.) $72 = 4x$	Check:

6.) You and four friends buy tickets to a football game. The total cost is $70. Write and solve and equation to find the cost of each ticket.

Define the variable:_____

Equation: _____ = _____

Name _____ Date _____

7.3 One Step Multiply/Divide Equations HW Day 1

Solve the equation. Check your solution.

1. $7k = 77$

2. $\dfrac{p}{5} = 10$

3. $3 = \dfrac{m}{12}$

4. $4a = 36$

5. $5 \bullet x = 12$

6. $4.2 = \dfrac{c}{8}$

7. You earn $5 for every friendship bracelet you sell. Write and solve an equation to find the number of bracelets you have to sell to earn $85.

8. You practice the piano for 30 minutes each day. Write and solve an equation to find the total time t you spend practicing the piano in a week.

7.3 One Step Multiply/Divide Equations HW Day 2

Solve the equation. Check your solution.

1. $\dfrac{x}{2} = 9$

2. $4 = \dfrac{t}{4}$

3. $8 \bullet d = 40$

4. $9y = 72$

5. $3 \bullet n = 63$

6. $4 = \dfrac{v}{11}$

7. $\dfrac{c}{7} = 5$

8. $210 = 7r$

Describe and correct the error in solving the equation.

9.

$4 \bullet z = 32$

$\dfrac{4 \bullet z}{4} = 4 \bullet 32$

$z = 128$

10. A teacher tells 36 students to form 4 equal groups. Write and solve a multiplication equation to find how many students s there should be in each group.

Equation	Solution

Section 7.4 Writing Equations in Two Variables Notes

KEY VOCABULARY:

A **solution** of an **equation in two variables** is an **ordered pair** that makes the equation true.

An **independent variable** is the quantity that you can **change (or choose)**.

A **dependent variable** is the value that **depends** on the independent variable

Remember Me?

An **ordered pair**
is always
written as **(x, y)**

Key Idea

The Coordinate Plane
A **coordinate plane** is formed by the intersection of a horizontal number line and a vertical number line. The number lines intersect at the **origin** and separate the coordinate plane into four regions called **quadrants**.

Quadrant II   Quadrant I

x-axis   y-axis

The origin is at (0, 0).

Quadrant III   Quadrant IV
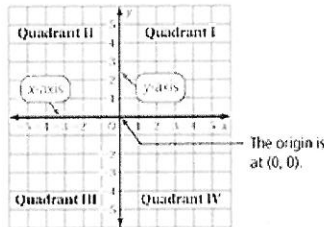
An *ordered pair* is used to locate a point in a coordinate plane.

ordered pair: (1, −2)

x-coordinate   y-coordinate

Example 1:

An athlete burns 200 calories weight lifting. The athlete then works out on an elliptical trainer and burns 10 calories for every minute. Fill in the table to find how many calories the athlete will burn after 10, 20 and 30 minutes.

What is the independent variable? _____

What is the dependent variable? _____

Minutes, m	c = 200 + 10m	Calories, c	Ordered Pair (m,c)
10			
20			
30			

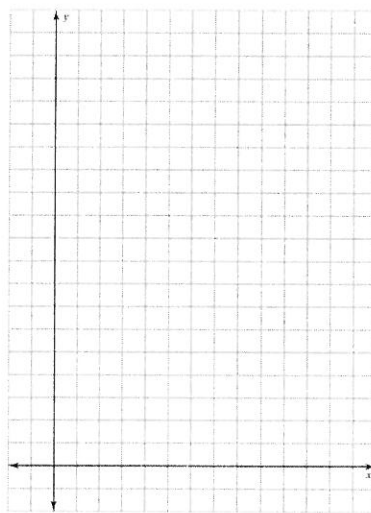Now, graph the equation by plotting the ordered pairs.
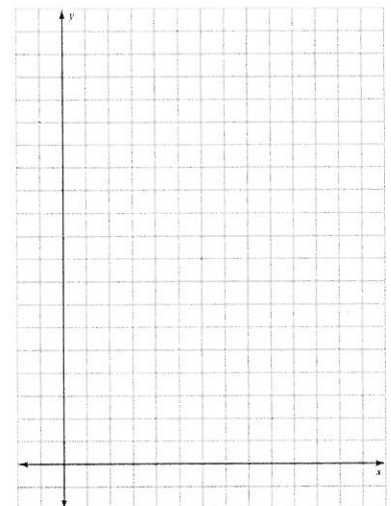
Example 2:
A train averages 40 miles per hour between two cities. Use a graph to show the relationships between the time and the distance traveled.

Independent Variable_____ Dependent Variable_____

Fill in the table:

Time (hours), t	d =40t	Distance (miles), d	Ordered pair, (t, d)
1			
2			
4			

Identifying Solutions:
Tell whether the ordered pair is a solution of the equation.

3.) $y = 2x$; (3, 6)   4.) $y = 4x - 3$; (4, 12)

5.) You have $25 and are saving $10 each week. The equation $y = 10x + 25$ gives the amount y (in dollars) in your savings account after x weeks. How much is in your savings account after 8 weeks?

Name _____ Date _____

Tell whether the ordered pair is a solution of the equation.

1. $y = 2x$; $(0, 2)$ **2.** $y = 6x$; $(2, 12)$

3. $y = 2x + 3$; $(3, 9)$ **4.** $y = x + 4$; $(1, 3)$

Identify the independent and dependent variables.

5. The equation $p = 8.65h$ gives the amount p (in dollars) of pay a clerk receives for working h hours.

6. The equation $P = 4s$ gives the perimeter P (in inches) of a square mouse pad with a side length of s inches.

7. The equation $c = 42t + 42$ gives the total cost c (in dollars) of a grocery bill with a sales tax of t percent (in decimal form).

8. Avocados cost $3 per pound. Write and graph an equation in two variables that represents the cost of buying avocados.

Pounds, p	c = 3p	Cost, c	Ordered pair, (p, c)
1			
2			
3			

Name _____ Date _____

Tell whether the ordered pair is a solution of the equation.

Equation	Work	Yes/No
1. $y = x$; $(2, 3)$		
2. $y = 3x - 2$; $(1, 1)$		

Identify the independent and dependent variables.

3. The equation $P = 2\ell + 20$ gives the perimeter P (in inches) of a rectangular box with a length of l feet.

      Independent =   **Dependent =**

4. The equation $k = 88p$ gives the total number of keys k for p pianos.

      Independent =   **Dependent =**

5. You are hosting a party. You are providing 3 food items. Each guest brings 2 food items.

    a. Write an equation in two variables that represents the total number of food items.

    b. Identify the independent and dependent variables.

      Independent =   **Dependent =**

6. Your choir has 300 tickets to sell. You are responsible for distributing 10 tickets to each choir member to sell.

    a. Write an equation in two variables that represents the remaining number of tickets to distribute.

    b. Identify the independent and dependent variables.

      Independent =   **Dependent =**

Section 7.5 Graphing and Writing Inequalities Notes Student Notes

Vocabulary:

1. <u>inequality</u> – a mathematical sentence that compares expressions. (contains >, <, ≥, ≤)

2. <u>solution of an inequality</u> – any value that makes the inequality true

Symbol	How to Read It	Circle's Appearance
>	greater than	open (not a solution)
<	less than	open (not a solution)
≥	greater than or equal to	closed (is a solution)
≤	less than or equal to	closed (is a solution)
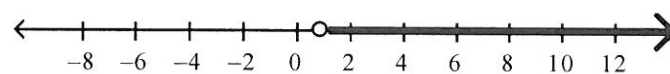
Tell whether 3 is a solution of the inequality. Explain why or why not.

1.) b + 4 < 6	2.) 9 – x ≥ 6

Graph the solutions of each inequality.

3.) x < 5	4.) c ≥ -2
←————————————→	←————————————→

Write an inequality for each graph.

5.)

6.)

Write an inequality for each statement.

7.) To qualify for the race, your time cannot be over 62 seconds.	8.) The car ride to the park will take at least 30 minutes.

Section 7.5 Graphing and Writing Inequalities Homework   Day 1

Graph the Solution.

1.) $x > -4$
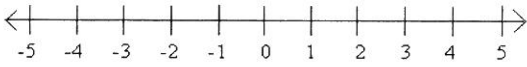
2.) $m \leq 1$
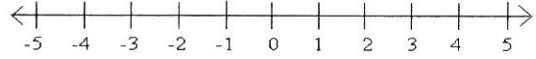
Write an inequality from the graph.

3.)

4.)
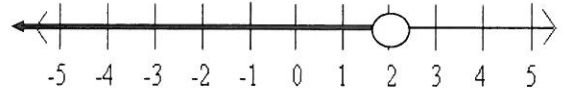
Write an inequality for each statement.

5.) the cost, c, for the field trip is at most $7

6.) To see a movie, you must be at least 17 years old

7.) the mall is less than 10 miles away from school

8.) the Bears' ticket is at least $250

Circle which numbers are solutions of the inequality.

9.) $x \leq -2$:   -3 , -2 , -1 , 0

10.) $x > 3$:   -3 , 3 , 4 , 5

7.5 Graphing & Writing Inequalities HW Day 2

Write the word sentence as an inequality.

1. 2 is more than a number v.

2. A number h is at most 15.

3. A number p is less than $\frac{1}{2}$.

4. 12 is fewer than a number n.

Tell whether the given value is a solution of the inequality.

5. $y \leq 11; \ y = 8$

6. $q + 1 \geq 7; \ q = 3$

Graph the inequality on a number line.

7. $w \leq 5$

8. $r < 0$

9. $3 \geq a$

10. $s > 6$
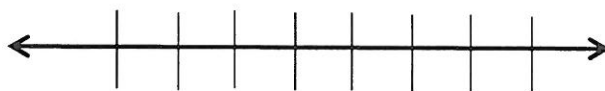
11. A lifeboat can carry up to 24 people. Write an inequality to represent this situation.

12. A USB flash drive costs \$16. You have \$50.

   a. Write an inequality to represent the number of USB flash drives you can buy.

   b. Can you buy 4 USB flash drives? Explain.

Section 7.6 Solving One-Step Inequalities with Adding & Subtracting Notes
Student notes

Objective: Students will write and solve one-step inequalities using addition or subtraction.

Steps for solving one-step inequalities:
1. Solve for the variable the same way you solve an equation (get the variable alone on one side of the inequality).
2. Rewrite your solution so that the variable is on the left side of the inequality.

Examples:
Solve each inequality. Then, graph your solution.

1.)　　　$x + 4.2 < 13.6$	2.)　　　$w - 82 \geq 129$
3.)　　　$\frac{1}{3} + h > \frac{5}{6}$	4.)　　　$5.4 < x + 1.2$

5.) The school record for the most points scored in a football season is 85. Larry has 42 points so far this season. How many more points does he need to break the record?
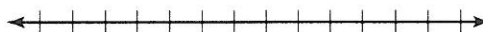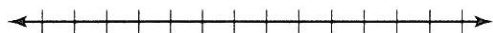
7.6 One Step Inequalities Add/Subtract HW Day 1
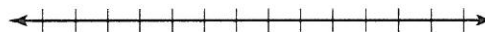
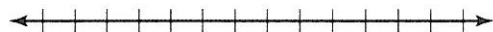**Solve the inequality. Graph the solution.**

1. $x + 6 \leq 15$

2. $y - 3 > 2$

3. $z + 1.5 \geq 2$

4. $p - \dfrac{1}{5} < \dfrac{7}{10}$

Write the word sentence as an inequality. Then solve the inequality.

5. 6 more than a number is at most 10.

Inequality:

Solve:

6. Four less than a number is more than 3.

Inequality:

Solve:

Describe and correct the error in solving the inequality.

7.

$$x + 5 \geq 11$$
$$\underline{-5 \quad +5}$$
$$x \geq 16$$

Describe Error:

Correct the Error:

8. The school auditorium can hold at most 480 people. There were 185 advance tickets sold for the school play. Write and solve an inequality to represent the number of people who can attend the play if all the people who bought advance tickets attend the play.
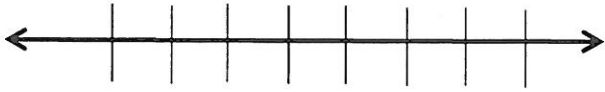
Inequality:

Solve:

Name _____ Date _____

Solve the inequality. Graph the solution.

1. $n - 9 \geq 2$

2. $v + 10 \leq 14$
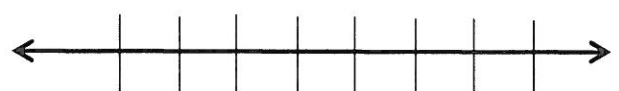

3. $p + \dfrac{1}{4} < \dfrac{5}{4}$

4. $20 < k + 15$

5. $\dfrac{4}{5} \leq m - \dfrac{1}{5}$

6. $4.4 > 2.4 + b$

7. You can spend at most $10 at the mall. You want to buy a book that costs $6.75 and a cold drink. Write and solve an inequality to represent the amount of money you can spend on your cold drink.

Inequality:

Solve:

Section 7.7 Solving Inequalities with Multiplication & Division Notes Student Notes

Objective: Students will write and solve one-step inequalities using multiplication or division.

Steps for solving one-step inequalities:
1. Solve for the variable the same way you solve an equation (get the variable alone on one side of the inequality).
2. Rewrite your solution so that the variable is on the left side of the inequality.

Examples:
Solve each inequality. Then, graph your solution.

1.) $\quad 4x \leq 64$ ←――――――――――→	2.) $\quad \frac{g}{6} > 22$ ←――――――――――→
3.) $\quad \frac{3}{5}h \leq 6$ ←――――――――――→	4.) $\quad 30 \geq \frac{x}{8}$ ←――――――――――→

5.) A thrill ride at an amusement park holds a maximum of 12 people per ride. Write and solve an inequality to find the least number of rides needed for 15,000 people.

Name _____ Date _____

Write the word sentence as an inequality. You do not need to solve.

1. Eight times a number n is less than 72. _____

2. A number t divided by 32 is at most 4.25. _____

3. 225 is less than 12 times a number w. _____

Solve the inequality. Graph the solution.

4. $12q \geq 36$

5. $\dfrac{t}{4} > 6$

6. Each table in a banquet room seats 8 people. The room can seat no more than 360 people. Write and solve an inequality to represent the number of tables in the banquet room.

7. Describe and correct the error in solving the inequality.

$$\times \quad \begin{array}{l} \dfrac{x}{6} \leq 30 \\[2mm] \dfrac{x}{6} \cdot 6 \leq \dfrac{30}{6} \\[2mm] x \leq 5 \end{array}$$

Write the word sentence as an inequality. Then the inequality.

8. A number q divided by 14 is greater than 4.

Inequality:

Solve:

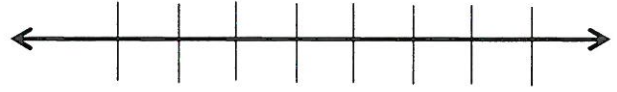9. The product of 21 and a number u is at most 126.

Inequality:

Solve:

7.7 One Step Inequalities Multiply/Divide HW Day 2

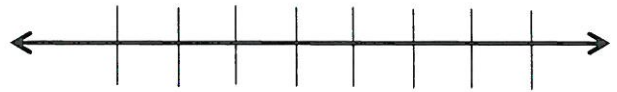**Solve the inequality. Graph the solution.**

1. $\dfrac{b}{3} > 6$

2. $2w < 16$

3. $7p \leq 70$

4. $n \div 3 \geq 12$

5. $200 < 10x$

6. $21 \geq \dfrac{g}{4}$

7. $h \div 4 \leq 0$

8. $5v \geq 125$

9. A wheelbarrow can carry up to 300 pounds of weight. A bag of soil weighs 20 pounds. Write and solve an inequality to represent the number of bags of soil the wheelbarrow can carry.

Inequality:

Solve:

265

Name _____ Units _____ Date _____

Math 6th: Algebra: Equations and Inequalities STUDY GUIDE

<u>Directions</u>: Carefully read and follow the directions for each section. Remember to <u>SHOW YOUR WORK</u> and write your answers on the lines provided. Don't forget the correct units!

Write an equation for each word sentence.   Do not solve!

1.) 36 is the product of 5 and p.

2.) y decreased by 21 is 2.

1.) _____

2.) _____

Solve each equation.

3.) $\frac{x}{11}$ = 11   4.) b – 2.5 = 4.6

3.) _____

4.) _____

5.)   1.1 + x = 23.8   6.) 2.3m = 13.8

5.) _____

6.) _____

7.) Explain how you would check #6 to make sure that the answer is correct.

8.) You have watched a movie for 56 minutes. The movie is a total of 111 minutes long. Write and solve an equation to find the number of minutes *m* that remain.

Equation: _____

Answer: _____

Tell whether the ordered pair is a solution of the equation.

9.) y = 5x - 2; (4, 16)   10.) y = 15x; (2, 30)
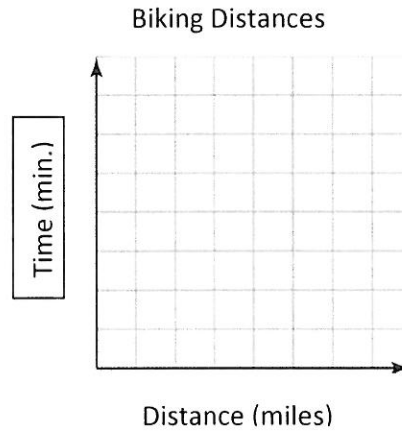
Show your math:

9.) Yes or No   10.) Yes or No

11a.) Fill in the table and graph the relationship between time and distance if you bike one mile in five minutes.

Distance	Time	Ordered Pair
1 mile		
3 miles		
5 miles		

Biking Distances

Time (min.)

Distance (miles)

11b.) What is the independent variable? Explain your reasoning.

12.) You rent a snowboard for $10 an hour and you have to pay an additional $4 for a protective gear.

The equation that represents the total cost of going snowboarding is c = 10h + 4

a.) Fill in the table and graph your equation. **Label axes and give a title**.

Time	Evaluate the Equation (show your work)	Cost	Ordered Pair
1 hr.			
2 hrs.			
3 hrs.			
4 hrs.			
5 hrs.			
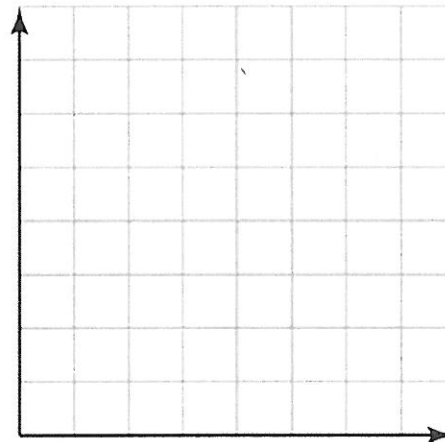
b.) How much will it cost to go snowboarding for 4 hours?

12c.) _____

Write the word sentence as an inequality.

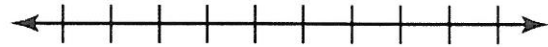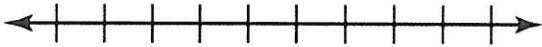13.) A number n is at at most 21.

14.) x is smaller than 11.

13.) _____

14.) _____

Graph the inequality on a number line.

15.) x > 15

16.) m ≤ 2

Solve each inequality.

17.) x – 44 ≤ 2

18.) $2 > \frac{y}{8}$

17.) _____

18.) _____

19.) h + 19 < 111

20.) 9x ≥ 63

19.) _____

20.) _____

Tell whether the given value is a solution of the inequality.

21.) x + 9 < 16; x = 20

22.) b – 4 < 13; y = 11

Show your math:

21.) Yes or No

22.) Yes or No

23.) Is the student correct? Explain your reasoning.

$$x + 3 < 22.2$$
$$-3 \quad -3$$
$$x < 19.2$$

Circle One: Correct   Wrong

Explanation: _____

_____

_____