

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

## Algebra 2 – Honors - - Summer Assignment

Show all work in the space provided. Write All ANSWERS on the ANSWER SHEET

### Part 1 – Chapter 1 - Review

#### Order of Operations (1.1)

<b>Order of Operations</b>	<b>Step 1</b> Evaluate expressions inside grouping symbols. <b>Step 2</b> Evaluate all powers. <b>Step 3</b> Multiply and/or divide from left to right. <b>Step 4</b> Add and/or subtract from left to right.
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Evaluate each expression.

1.  $3(4 - 7) - 11$

2.  $4(12 - 4^2)$

3.  $1 + 2 - 3(4) \div 2$

4.  $12 - [20 - 2(6^2 \div 3 \times 2^2)]$

5.  $20 \div (5 - 3) + 5^2(3)$

6.  $(-2)^3 - (3)(8) + (5)(10)$

7.  $18 - \{5 - [34 - (17 - 11)]\}$

8.  $[4(5 - 3) - 2(4 - 8)] \div 16$

9.  $\frac{1}{2}[6 - 4^2]$

10.  $\frac{1}{4}[-5 + 5(-3)]$

11.  $\frac{-8(13 - 37)}{6}$

12.  $\frac{(-8)^2}{5 - 9} - (-1)^2 + 4(-9)$

Evaluate each expression if  $a = \frac{3}{4}$ ,  $b = -8$ ,  $c = -2$ ,  $d = 3$ , and  $g = \frac{1}{3}$ .

13.  $ab^2 - d$

14.  $(c + d)b$

15.  $\frac{ab}{c} + d^2$

16.  $\frac{d(b - c)}{ac}$

17.  $(b - dg)g^2$

18.  $ac^3 - b^2dg$

19.  $-b[a + (c - d)^2]$

20.  $\frac{ac^4}{d} - \frac{c}{g^2}$

21.  $9bc - \frac{1}{g}$

22.  $2ab^2 - (d^3 - c)$

**Formulas** A **formula** is a mathematical sentence that expresses the relationship between certain quantities. If you know the value of every variable in the formula except one, you can use substitution and the order of operations to find the value of the remaining variable.

**23. TEMPERATURE** The formula  $F = \frac{9}{5}C + 32$  gives the temperature in degrees Fahrenheit for a given temperature in degrees Celsius. What is the temperature in degrees Fahrenheit when the temperature is  $-40$  degrees Celsius?

**24. PHYSICS** The formula  $h = 120t - 16t^2$  gives the height  $h$  in feet of an object  $t$  seconds after it is shot upward from Earth's surface with an initial velocity of 120 feet per second. What will the height of the object be after 6 seconds?

## Properties of Real Numbers (1.2)

**Real Numbers** All real numbers can be classified as either rational or irrational. The set of rational numbers includes several subsets: natural numbers, whole numbers, and integers. **(STUDY)**

<b>R</b>	real numbers	{all rationals and irrationals}
<b>Q</b>	rational numbers	{all numbers that can be represented in the form $\frac{m}{n}$ , where $m$ and $n$ are integers and $n$ is not equal to 0}
<b>I</b>	irrational numbers	{all nonterminating, nonrepeating decimals}
<b>Z</b>	integers	{..., -3, -2, -1, 0, 1, 2, 3, ...}
<b>W</b>	whole numbers	{0, 1, 2, 3, 4, 5, 6, 7, 8, ...}
<b>N</b>	natural numbers	{1, 2, 3, 4, 5, 6, 7, 8, 9, ...}

### Properties of Real Numbers - (STUDY)

Real Number Properties		
For any real numbers $a$ , $b$ , and $c$		
Property	Addition	Multiplication
Commutative	$a + b = b + a$	$a \cdot b = b \cdot a$
Associative	$(a + b) + c = a + (b + c)$	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
Identity	$a + 0 = a = 0 + a$	$a \cdot 1 = a = 1 \cdot a$
Inverse	$a + (-a) = 0 = (-a) + a$	$a \cdot \frac{1}{a} = 1 = \frac{1}{a} \cdot a, a \neq 0.$
Closure	$a + b$ is a real number.	$a \cdot b$ is a real number.
Distributive	$a(b + c) = ab + ac$ and $(b + c)a = ba + ca$	

**Simplify each expression.**

1.  $5x - 3y - 2x + 3y$

2.  $-11a - 13b + 7a - 3b$

3.  $8x - 7y - (3 - 6y)$

4.  $4c - 2c - (4c + 2c)$

5.  $3(r - 10t) - 4(7t + 2r)$

6.  $\frac{1}{5}(10a - 15b) + \frac{1}{2}(8b + 4a)$

7.  $2(4z - 2x + y) - 4(5z + x - y)$

8.  $\frac{5}{6}\left(\frac{3}{5}x + 12y\right) - \frac{1}{4}(2x - 12y)$

- 9. TRAVEL** Olivia drives her car at 60 miles per hour for  $t$  hours. Ian drives his car at 50 miles per hour for  $(t + 2)$  hours. Write a simplified expression for the sum of the distances traveled by the two cars.

- 10. NUMBER THEORY** Use the properties of real numbers to tell whether the following statement is true or false: If  $a$  and  $b \neq 0$  and  $a > b$ , it follows that  $a\left(\frac{1}{a}\right) > b\left(\frac{1}{b}\right)$ . Explain your reasoning.

## Solving Equations (1.3)

**Verbal Expressions and Algebraic Expressions** The chart suggests some ways to help you translate word expressions into algebraic expressions. Any letter can be used to represent a number that is not known.

Word Expression	Operation
and, plus, sum, increased by, more than	addition
minus, difference, decreased by, less than	subtraction
times, product, of (as in $\frac{1}{2}$ of a number)	multiplication
divided by, quotient	division

**Properties of Equality** To solve equations, we can use properties of equality.

<b>Addition and Subtraction Properties of Equality</b>	For any real numbers $a$ , $b$ , and $c$ , if $a = b$ , then $a + c = b + c$ and $a - c = b - c$ .
<b>Multiplication and Division Properties of Equality</b>	For any real numbers $a$ , $b$ , and $c$ , if $a = b$ , then $a \cdot c = b \cdot c$ and, if $c \neq 0$ , $\frac{a}{c} = \frac{b}{c}$ .

**Write an algebraic expression to represent each verbal expression.**

- 2 more than the quotient of a number and 5
- the sum of two consecutive integers
- 5 times the sum of a number and 1
- 1 less than twice the square of a number

**Write a verbal sentence to represent each equation.**

- $5 - 2x = 4$
- $3y = 4y^3$
- $3c = 2(c - 1)$
- $\frac{m}{5} = 3(2m + 1)$

**Solve each equation. Check your solution.**

9.  $14 = 8 - 6r$

10.  $9 + 4n = -59$

11.  $\frac{3}{4} - \frac{1}{2}n = \frac{5}{8}$

12.  $\frac{5}{6}c + \frac{3}{4} = \frac{11}{12}$

13.  $-1.6r + 5 = -7.8$

14.  $6x - 5 = 7 - 9x$

15.  $5(6 - 4v) = v + 21$

16.  $6y - 5 = -3(2y + 1)$

17. **GEOMETRY** The length of a rectangle is twice the width. Find the width if the perimeter is 60 centimeters. Define a variable, write an equation, and solve the problem.

18. **GOLF** Luis and three friends went golfing. Two of the friends rented clubs for \$6 each. The total cost of the rented clubs and the green fees for each person was \$76. What was the cost of the green fees for each person? Define a variable, write an equation, and solve the problem.

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## Algebra 2 – Honors - - Summer Assignment

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### Part 2 – Chapter 2 – Review

#### **Relations and Functions (2.1)**

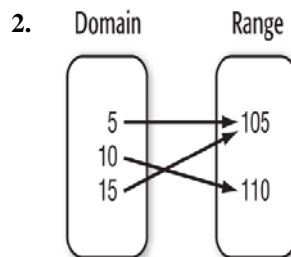
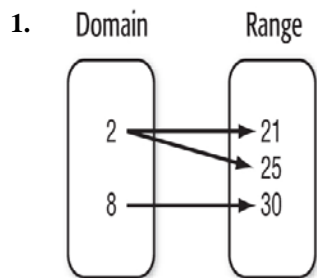
**Relations and Functions** A **relation** can be represented as a set of ordered pairs or as an equation; the relation is then the set of all ordered pairs  $(x, y)$  that make the equation true. A **function** is a relation in which each element of the domain is paired with exactly one element of the range. **(STUDY)**

<b>One-to-One Function</b>	Each element of the domain pairs to exactly one <b>unique</b> element of the range.	
<b>Onto Function</b>	Each element of the range also corresponds to an element of the domain.	
<b>Both One-to-One and Onto</b>	Each element of the domain is paired to exactly one element of the range and each element of the range.	

**Equations of Relations and Functions** Equations that represent functions are often written in **functional notation**. For example,  $y = 10 - 8x$  can be written as  $f(x) = 10 - 8x$ . This notation emphasizes the fact that the values of  $y$ , the **dependent variable**, depend on the values of  $x$ , the **independent variable**.

To evaluate a function, or find a functional value, means to substitute a given value in the domain into the equation to find the corresponding element in the range.

**State the domain and range of each relation. Then determine whether each relation is a function. If it is a function, determine if it is *one-to-one*, *onto*, *both* or *neither*.**



3.

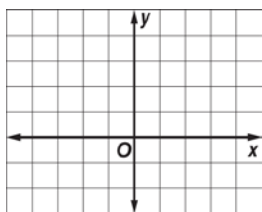
x	y
-3	0
-1	-1
0	0
2	-2
3	4

4.

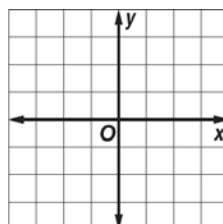
x	y
-2	-1
-2	1
-1	0
1	0
2	1

Graph each equation and determine the domain and range. Determine whether the relation is a *function*, is *one-to-one*, *onto*, *both*, or *neither*. Then state whether it is *discrete* or *continuous*.

5.  $x = -1$



6.  $y = 2x - 1$



Find each value if  $f(x) = \frac{5}{x+2}$  and  $g(x) = -2x + 3$ .

7.  $f(3)$

8.  $f(-4)$

9.  $g\left(\frac{1}{2}\right)$

10.  $f(-2)$

11.  $g(-6)$

12.  $f(m-2)$

13. **MUSIC** The ordered pairs (1, 16), (2, 16), (3, 32), (4, 32), and (5, 48) represent the cost of buying various numbers of CDs through a music club. Identify the domain and range of the relation. Is the relation discrete or continuous? Is the relation a function?

14. **COMPUTING** If a computer can do one calculation in 0.0000000015 second, then the function  $T(n) = 0.0000000015n$  gives the time required for the computer to do  $n$  calculations. How long would it take the computer to do 5 billion calculations?

## Linear Relations and Functions (2.2)

**Linear Relations and Functions** A **linear equation** has no operations other than addition, subtraction, and multiplication of a variable by a constant. The variables may not be multiplied together or appear in a denominator. A linear equation does not contain variables with exponents other than 1. The graph of a linear equation is always a line.

A **linear function** is a function with ordered pairs that satisfy a linear equation. Any linear function can be written in the form  $f(x) = mx + b$ , where  $m$  and  $b$  are real numbers.

If an equation is linear, you need only two points that satisfy the equation in order to graph the equation. One way is to find the  $x$ -intercept and the  $y$ -intercept and connect these two points with a line.

**State whether each function is a linear function. Write *yes* or *no*. Explain.**

1.  $h(x) = 23$

2.  $y = \frac{2}{3}x$

3.  $y = \frac{5}{x}$

4.  $9 - 5xy = 2$

**Write each equation in standard form. Identify  $A$ ,  $B$ , and  $C$ .**

5.  $y = 7x - 5$

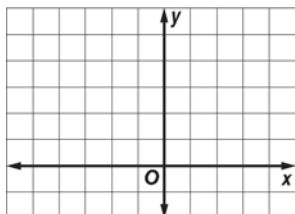
6.  $y = \frac{3}{8}x + 5$

7.  $3y - 5 = 0$

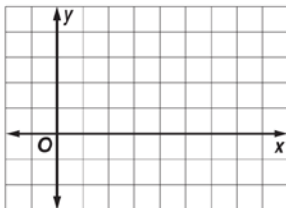
8.  $x = -\frac{2}{7}y + \frac{3}{4}$

**Find the  $x$ -intercept and the  $y$ -intercept of the graph of each equation. Then graph the equation using the intercepts.**

9.  $y = 2x + 4$

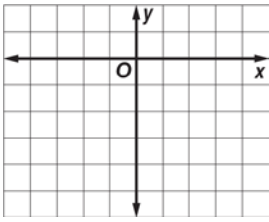


10.  $2x + 7y = 14$

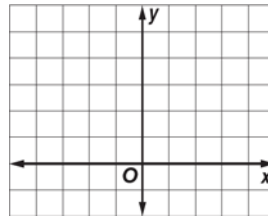




11.  $y = -2x - 4$



12.  $6x + 2y = 6$



13. **MEASURE** The equation  $y = 2.54x$  gives the length  $y$  in centimeters corresponding to a length  $x$  in inches. What is the length in centimeters of a 1-foot ruler?

14. **LONG DISTANCE** For Meg's long-distance calling plan, the monthly cost  $C$  in dollars is given by the linear function  $C(t) = 6 + 0.05t$ , where  $t$  is the number of minutes talked.

a. What is the total cost of talking 8 hours? of talking 20 hours?

b. What is the effective cost per minute (the total cost divided by the number of minutes talked) of talking 8 hours? of talking 20 hours?

## Rate of Change and Slope (2.3)

**Rate of Change** Rate of change is a ratio that compares how much one quantity changes, on average, relative to the change in another quantity.

### Slope

#### Slope $m$ of a Line

For points  $(x_1, y_1)$  and  $(x_2, y_2)$ , where  $x_1 \neq x_2$ ,  $m = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$

Find the slope of the line that passes through each pair of points. Express as a fraction in simplest form.

1.  $(3, -8), (-5, 2)$

2.  $(-10, -3), (7, 2)$

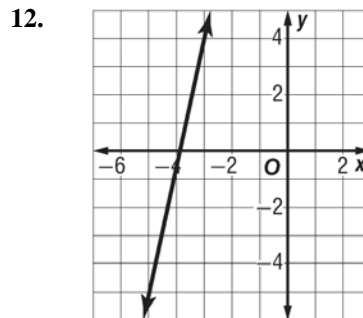
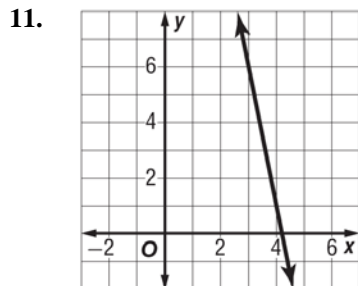
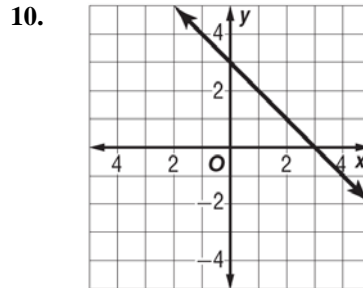
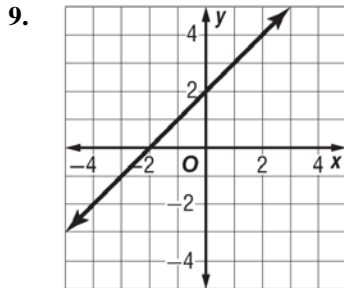
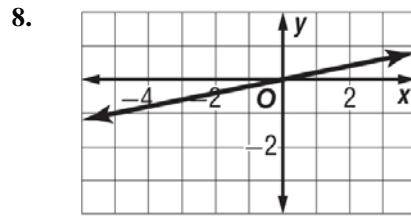
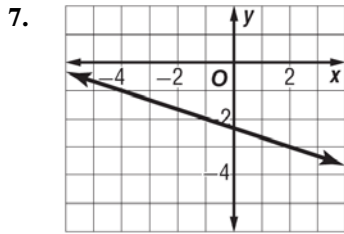
3.  $(-7, -6), (3, -6)$

4.  $(8, 2), (8, -1)$

5.  $(4, 3), (7, -2)$

6.  $(-6, -3), (-8, 4)$

Determine the rate of change of each graph.



**13. DEPRECIATION** A machine that originally cost \$15,600 has a value of \$7500 at the end of 3 years. The same machine has a value of \$2800 at the end of 8 years.

- Find the average rate of change in value (depreciation) of the machine between its purchase and the end of 3 years.
- Find the average rate of change in value of the machine between the end of 3 years and the end of 8 years.
- Interpret the sign of your answers.

Chapter 1 – ANSWERS

Order of Operations

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_
- 6. \_\_\_\_\_
- 7. \_\_\_\_\_
- 8. \_\_\_\_\_
- 9. \_\_\_\_\_
- 10. \_\_\_\_\_
- 11. \_\_\_\_\_
- 12. \_\_\_\_\_
- 13. \_\_\_\_\_
- 14. \_\_\_\_\_
- 15. \_\_\_\_\_
- 16. \_\_\_\_\_
- 17. \_\_\_\_\_
- 18. \_\_\_\_\_
- 19. \_\_\_\_\_
- 20. \_\_\_\_\_

- 21. \_\_\_\_\_
- 22. \_\_\_\_\_
- 23. \_\_\_\_\_
- 24. \_\_\_\_\_

- 5. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- 6. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

Properties of Real Numbers

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_
- 6. \_\_\_\_\_
- 7. \_\_\_\_\_
- 8. \_\_\_\_\_
- 9. \_\_\_\_\_
- 10. \_\_\_\_\_

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- 14. \_\_\_\_\_
- 15. \_\_\_\_\_
- 16. \_\_\_\_\_
- 17. \_\_\_\_\_
- 18. \_\_\_\_\_

Solving Equations

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

Chapter 2 – ANSWERS

Relations and Functions

1. D: \_\_\_\_\_

R: \_\_\_\_\_

Y or N \_\_\_\_\_

2. D: \_\_\_\_\_

R: \_\_\_\_\_

Y or N \_\_\_\_\_

3. D: \_\_\_\_\_

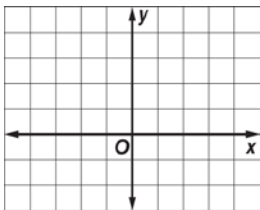
R: \_\_\_\_\_

Y or N \_\_\_\_\_

4. D: \_\_\_\_\_

R: \_\_\_\_\_

Y or N \_\_\_\_\_



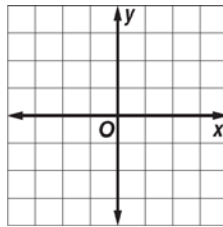
5.

D: \_\_\_\_\_

R: \_\_\_\_\_

Function? \_\_\_\_\_

Type: \_\_\_\_\_



6.

D: \_\_\_\_\_

R: \_\_\_\_\_

Function? \_\_\_\_\_

Type: \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_

12. \_\_\_\_\_

13. \_\_\_\_\_

14. \_\_\_\_\_

Linear Relations/Functions (2.2)

1. Y or N \_\_\_\_\_

\_\_\_\_\_

2. Y or N \_\_\_\_\_

\_\_\_\_\_

3. Y or N \_\_\_\_\_

\_\_\_\_\_

4. Y or N \_\_\_\_\_

\_\_\_\_\_

5. \_\_\_\_\_

A = \_\_\_\_\_ B = \_\_\_\_\_ C = \_\_\_\_\_

6. \_\_\_\_\_

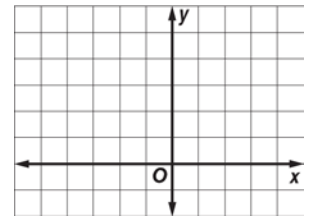
A = \_\_\_\_\_ B = \_\_\_\_\_ C = \_\_\_\_\_

7. \_\_\_\_\_

A = \_\_\_\_\_ B = \_\_\_\_\_ C = \_\_\_\_\_

8. \_\_\_\_\_

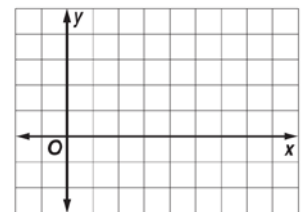
A = \_\_\_\_\_ B = \_\_\_\_\_ C = \_\_\_\_\_



9.

x – int \_\_\_\_\_

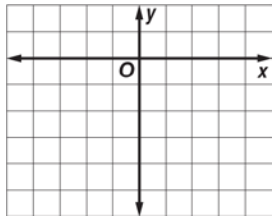
y – int \_\_\_\_\_



10.

x – int \_\_\_\_\_

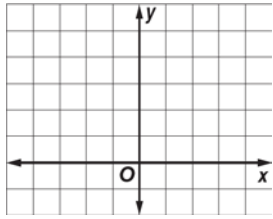
y – int \_\_\_\_\_



11.

x - int \_\_\_\_\_

y - int \_\_\_\_\_



12.

x - int \_\_\_\_\_

y - int \_\_\_\_\_

13. \_\_\_\_\_

14a. \_\_\_\_\_

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

**Rate of Change (2.3)**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_

13a. \_\_\_\_\_

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

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

\_\_\_\_\_

\_\_\_\_\_