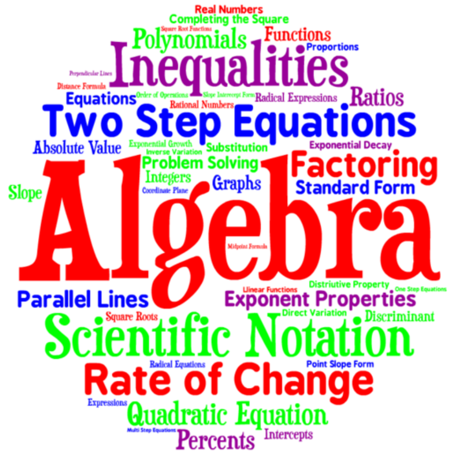
Name:_________________________________ Algebra 1 Teacher:____________________

ALGEBRA 1 SUMMER ASSIGNMENT



Summer 2017

Dear Algebra I Students and Parents:

Welcome to Algebra I! For the 2017-2018 school year, we would like to focus your attention to the prerequisite skills and concepts for Algebra I. In order to be successful for Algebra I, a student must demonstrate a proficiency in:

- Translating verbal and algebraic expressions
- The Number System
- Operations with fractions
- Order of Operations
- Distributing and combining like terms
- Solving single and multistep equations
- Finding the slope and y −intercept of a linear function
- Graphing linear functions

The attached review packet is provided for practice and is intended as a tool for assessment readiness. Students should have the packet completed when they start school in September. Teachers will review the answers during the first two or three days the class meets in September. As prerequisite skills, these topics are not re-taught in the Algebra I course. Students are encouraged to seek extra help before or after school from their teacher for any topics requiring more personal, in-depth remediation.

To ensure that all students demonstrate the basic algebra skills to be successful, an assessment on these topics will be administered within the first two weeks of school (date to be determined).

It is expected that each student will fully complete the review questions. Packets will be collected in class on the day of the assessment. If you have any questions, please do not hesitate to contact your child's teacher.

Translating Verbal and Algebraic Expressions

Write Verbal Expressions An **algebraic expression** consists of one or more numbers and variables along with one or more arithmetic operations. In algebra, **variables** are symbols used to represent unspecified numbers or values. Any letter may be used as a variable.

Write Algebraic Expressions Translating verbal expressions into algebraic expressions is an important algebraic skill.

Example: Write an algebraic expression for each verbal expression.

a. four more than a number *n*

The words *more than* imply addition.

$4 + n$

b. the difference of a number and 8

The expression *difference of* implies subtraction.

$n - 8$

Exercises

Write an algebraic expression for each verbal expression.

1. a number decreased by 8

2. a number divided by 8

3. four times a number

4. a number divided by 6

5. a number multiplied by 37

6. the sum of 9 and a number

7. 3 less than 5 times a number

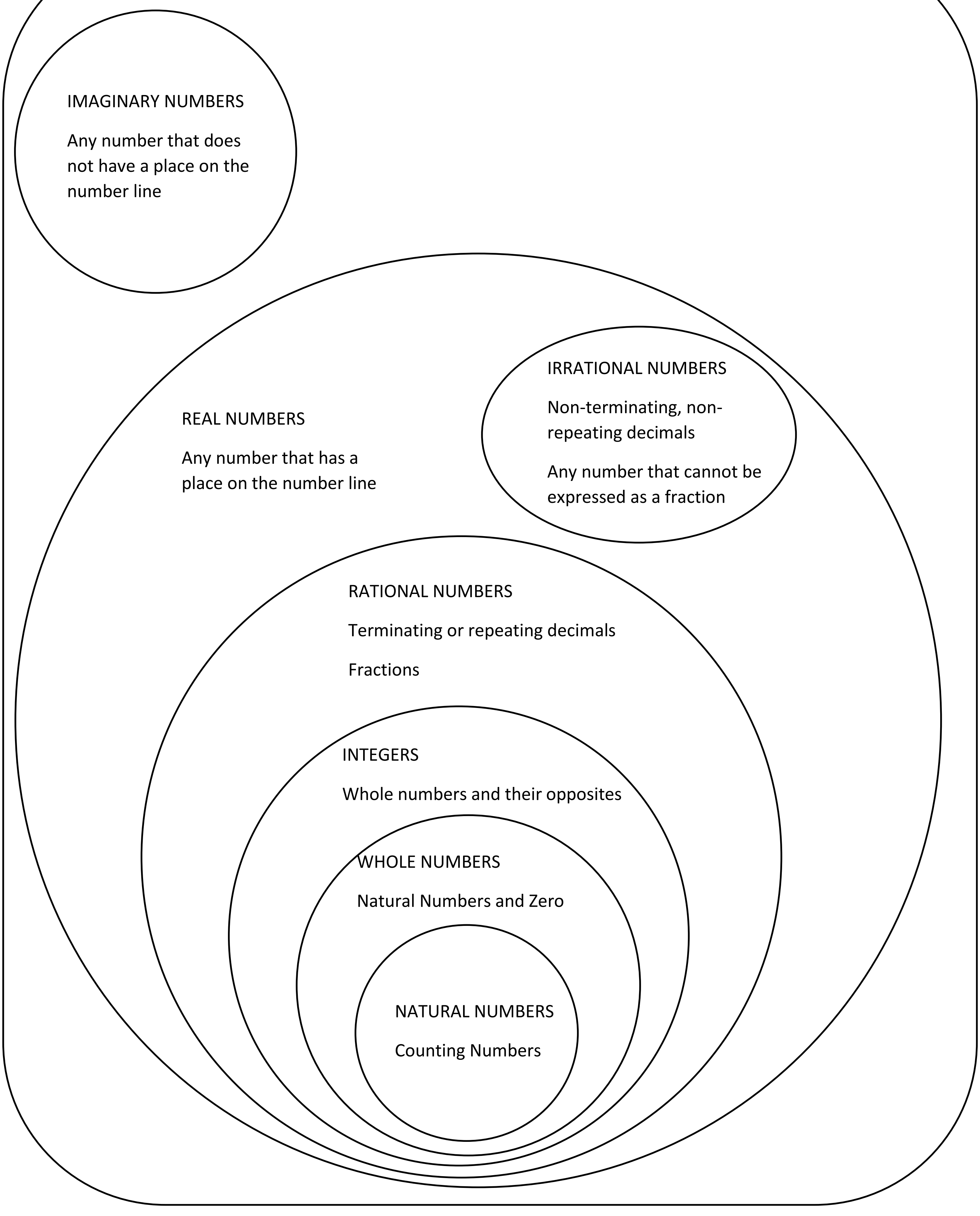
8. twice the sum of 15 and a number

9. 7 more than the product of 6 and a number

10. 15 less than k

11. the difference of 17 and 5 times a number.

The Number System



Examples: Mark each box that described the given number.

Number	Natural	Whole	Integer	Rational	Irrational	Imaginary
7	■	■	■	■		
0		■	■	■		
$2.\overline{37}$				■		
$\sqrt{2}$					■	
$\frac{2}{3}$				■		
-3			■	■		
$\sqrt{-2}$						■

Exercises:

Number	Natural	Whole	Integer	Rational	Irrational	Imaginary
1. 25						
2. -14						
3. $\frac{5}{7}$						
4. 0.32						
5. -3.76						
6. $\sqrt{8}$						
7. 23						
8. $\sqrt{100}$						
9. -1.9						
10. $0.47892..$						
11. $\sqrt{96}$						
12. $9.\overline{39}$						
13. $\sqrt{-9}$						
14. π						

Operations with Fractions

Example: Simplify each expression containing fractions.

a. $\mathbf{\frac{1}{3}+\frac{3}{4}}$

To add or subtract fractions, you must have a *common denominator*.

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

$\frac{4}{12}+\frac{9}{12}$

$\frac{13}{12}$

b. $\mathbf{\frac{-2}{7}\times\frac{1}{-4}}$

To multiply fractions, multiply the *numerator* and the *denominator*, then *simplify*.

$\frac{-2}{7}\times\frac{1}{-4}$

$\frac{-2}{-28}$

$\frac{1}{14}$

Exercises:

Simplify each expression containing fractions.

1. $-\frac{4}{3}+\frac{9}{5}$	**2.** $-\frac{4}{5}-\frac{7}{8}$
2. $\frac{-4}{3}\times\frac{3}{-5}$	**4.** $\frac{-10}{7}\times\frac{1}{6}$

Solving Single and Multistep Equations

Solving Equations: A mathematical sentence with one or more variables is called an **open sentence**. Open sentences are **solved** by finding replacements for the variables that result in true sentences. A sentence that contains an equal sign, =, is called an **equation**.

Example 1:

$$\begin{aligned}
2(x+1)+2x &= -10\\
2x+2+2x &= -10\\
4x+2 &= -10\\
\underline{\quad -2 \quad} & \underline{\;-2\quad}\\
\frac{4x}{4} &= \frac{-12}{4}\\
x &= -3
\end{aligned}$$

Example 2:

$$\begin{aligned}
7x+4 &= 5x-2(x-3)\\
7x+4 &= 5x-2x+6\\
7x+4 &= 3x+6\\
\underline{-3x \quad} & \underline{\;-3x \qquad}\\
4x+4 &= 6\\
\underline{\quad -4 \quad} & \underline{\;-4\quad}\\
\frac{4x}{4} &= \frac{2}{4}\\
x &= \frac{1}{2}
\end{aligned}$$

Special Cases

Sometimes when you solve an equation, the variables are eliminated from the entire equation and you end up with a statement that can be true or false. If the statement is true, then the solution set = $\Re$. An equation that always produces a true result is called an ***identity***. If the statement is false, then the solutions set = $\varnothing$. An equation that always produces a false result is called a ***contradiction***.

Example 1:

$$\begin{aligned}
3(2x-3) &= 6x-9\\
6x-9 &= 6x-9\\
\underline{-6x \qquad} & \underline{\;-6x \qquad}\\
9 &= 9 \quad \text{TRUE} \quad x = \text{the set of real numbers } \Re
\end{aligned}$$

Example 2:

$$\begin{aligned}
2(3x+4) &= 6x-5\\
6x+8 &= 6x-5\\
\underline{-6x \qquad} & \underline{\;-6x \qquad}\\
8 &\neq -5 \quad \text{FALSE} \quad x = \text{null set } \varnothing \text{ (the equation has no solution)}
\end{aligned}$$

<u>SOLVING EQUATIONS</u>

To solve an equation, find the value or values of a variable that make the equation true. To do this, use inverse operations to **ISOLATE THE VARIABLE**. In other words, get the variable on one side of the equal sign with a coefficient of 1. The Properties of Equality enable us to use inverse operations to isolate the variable and thus solve an equation.

STEPS FOR SOLVING EQUATIONS

1) **Simplify**, if possible. Distribute, combine like terms.
2) **Move the variable** to one side of the equal sign. (Keep coefficient positive, if possible.)
3) **Isolate the variable**. Perform inverse operations to move the constants to the other side of the equation.
4) **Divide by the coefficient** (if the coefficient $\neq 1$)

One strategy for solving an equation with fractions and/or decimals is to multiply the <u>entire</u> equation by the common denominator (to eliminate the fractions) or to multiply the <u>entire</u> equation by 10^n, where n = the greatest number of decimal places in all of the terms.

Example 1:

$\frac{1}{3}x + 0.2x = 16$ *Given*

$15\left(\frac{1}{3}x + \frac{1}{5}x\right) = 16 \cdot 15$

Sweep: Multiplication Property of Equality

$5x + 3x = 240$

$8x = 240$

*Simplify (*don't to forget to multiply each term on both sides)*

$x = 30$

Example 2:

$0.15x + 0.02x = 34$ *Given*

$100(0.15x + 0.02x) = 34$

$15x + 2x = 3400$

Sweep: Multiplication Property of Equality

$17x = 3400$

$x = 200$

*Simplify (*don't to forget to multiply each term on both sides)*

Exercises: Solve each equation.

1. $x + \frac{1}{2} = \frac{5}{2}$	2. $120 - 28a = 78$
3. $10x = 15x$	4. $\frac{1}{4} + \frac{5}{8} = k$
5. $-10p + 9p = 12$	6. $-2 = -(n - 8)$
7. $10x + 2 = 15x - 5$	8. $8(1 + 5x) + 5 = 13 + 5x$
9. $-(x - 5) + 5 = 3(3x + 10)$	10. $2(3x + 2) - 5 + 2 = 2(2x - 4)$

11. $2(6x + 6) - 5 = 7 + 16x - 4x$	12. $12(2x + 11) = 12(2x + 12)$
13. $\frac{5x}{3} - \frac{7x}{12} = \frac{13}{6}$	14. $\frac{3}{5}x - \frac{8}{15}x = \frac{1}{10}$
15. $\frac{x}{2} + \frac{x+2}{3} = 9$	16. $\frac{x+1}{4} + \frac{x+5}{2} = 5$

17. $\frac{m+1}{5}+\frac{m+2}{2}=4$	18. $\frac{x+7}{2}-\frac{x+3}{4}=4$

Slope

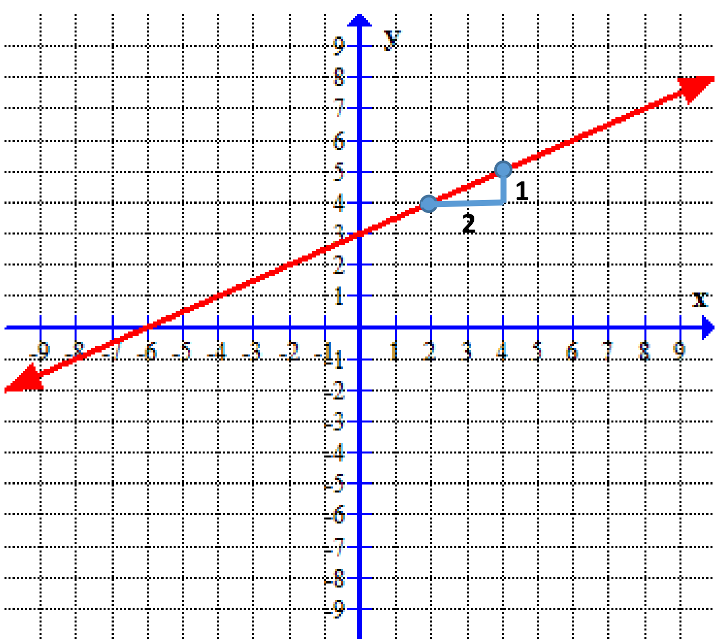
❖ The ***slope*** is the ratio of vertical **rise** to horizontal **run**.

Slope Formula		
$m = \frac{rise}{run}$	or	$m = \frac{y_2 - y_1}{x_2 - x_1}$

- The slope of a vertical line is **UNDEFINED**
- The slope of a horizontal line is **0 (zero)**

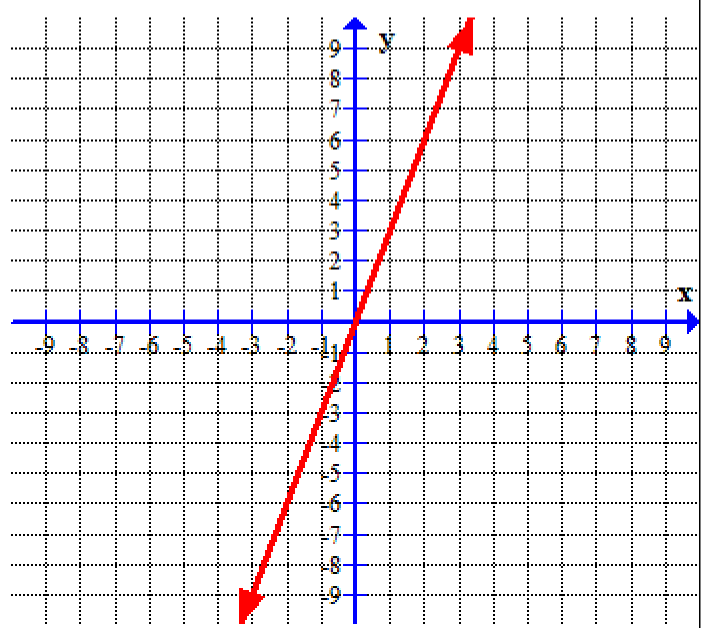
Finding slope from a graph:

1. SAMPLE:



$m = \frac{rise}{run}$ $\quad\quad$ $m = \frac{1}{2}$

2.



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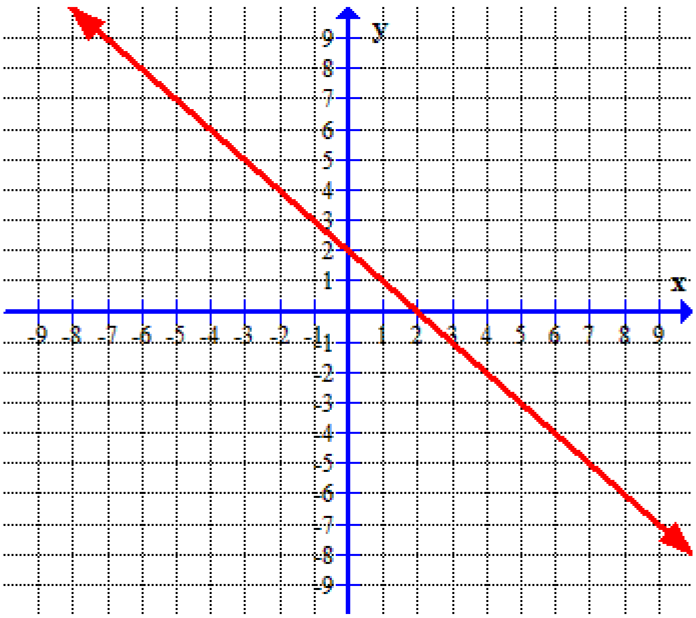

y
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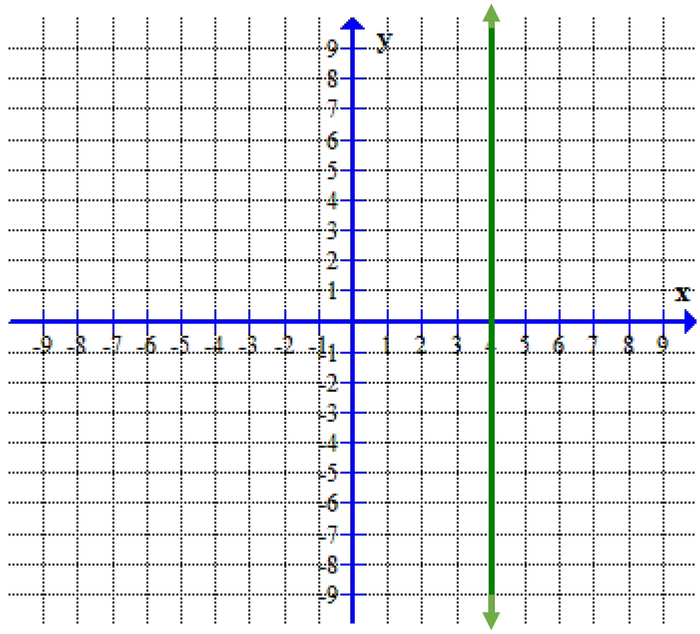
-9 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9

4.



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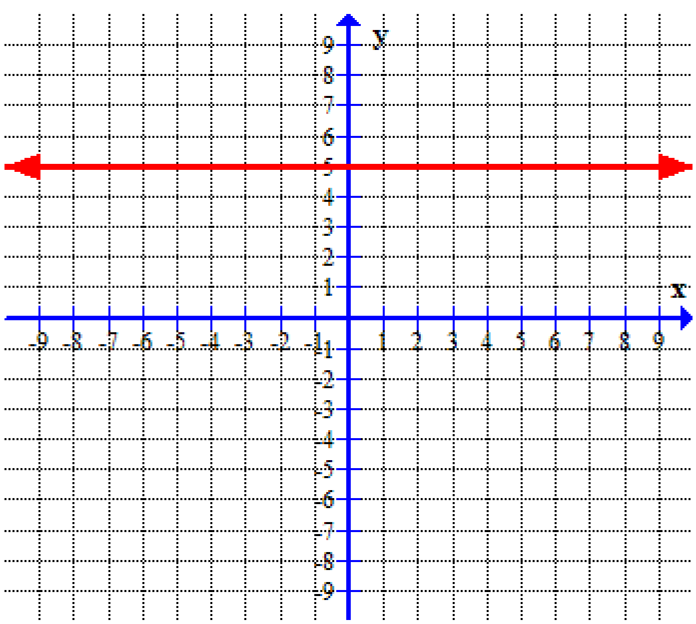
5.



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-9 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9

Using the Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Find the slope:

Example: $(3, -5)$ and $(-10, 6)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-(-5)}{-10-3} = \frac{11}{-13}$$

1. $(0, 1)$ and $(2, 3)$

2. $(11, 18)$ and $(11, -19)$

3.

x	y
-2	-8
-1	-4
0	0
1	4

Slope Intercept Form

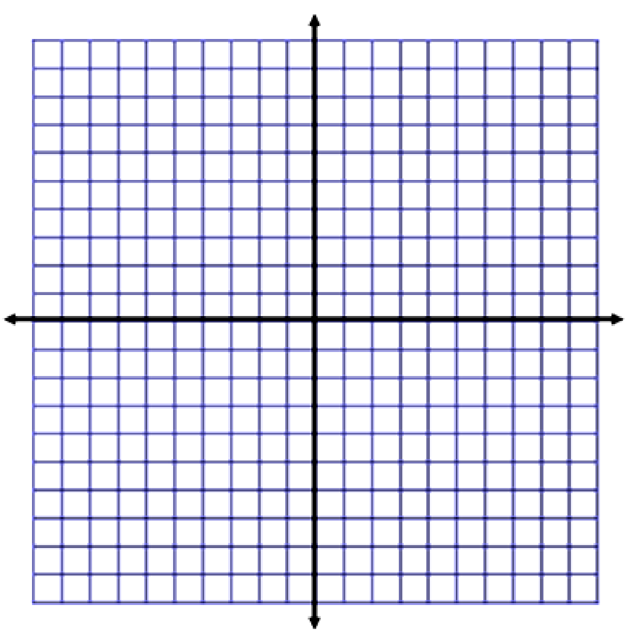
The slope intercept form for a line with a slope of m and a y-intercept of b is: $\boldsymbol{y = mx + b}$

Put each equation into slope intercept form. Identify the slope and y-intercept, then graph the line.

1. $-3x + y = 9$

$m =$__________

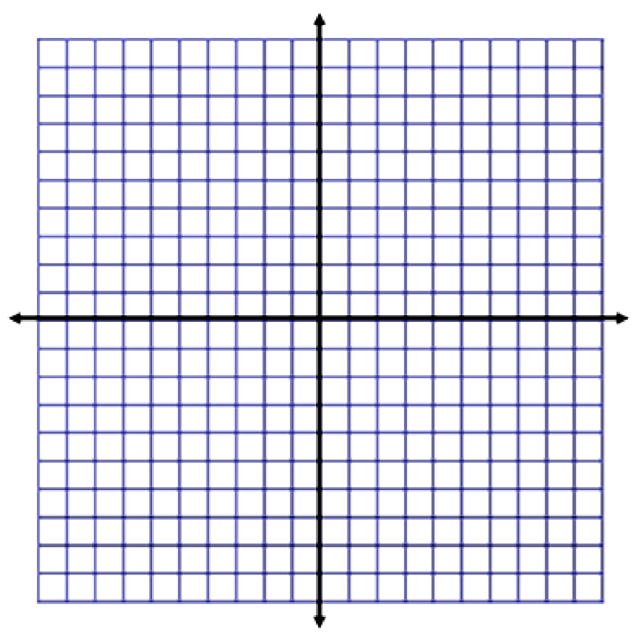
$y - int =$__________



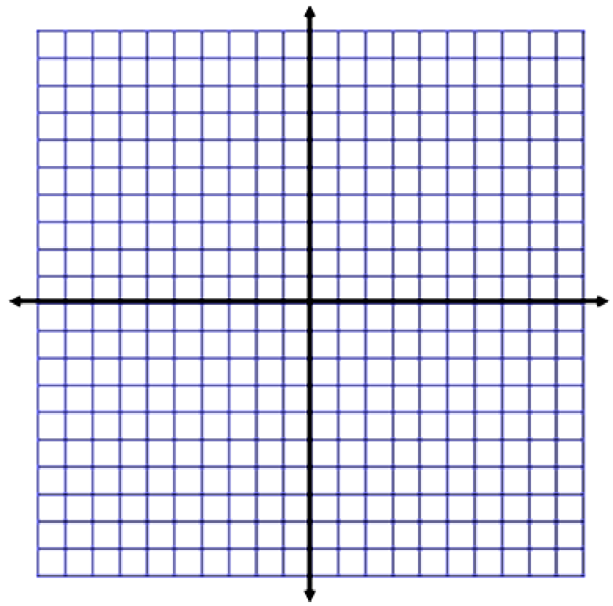
2. $y = \frac{2}{3}x - 5$

$m =$__________

$y - int =$__________



3. $3y = -2x + 15$



$m =$___________

$y - int =$___________