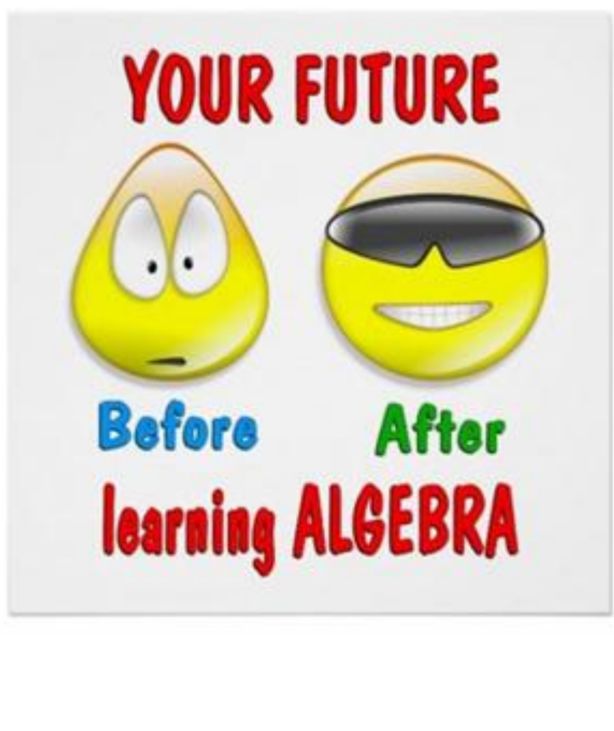
Algebra 1: Unit 1

Fundamentals of Algebra



Lesson 1 – 1: Function Notation and Evaluating Expressions

Learning Target(s):

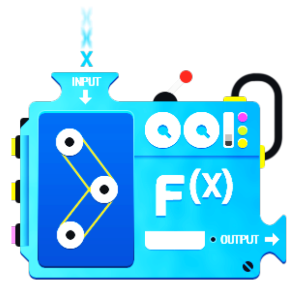
- **I can read and write functions in function notation.**
- **I can use the order of operations to evaluate expressions**

A.FGR.2.4/A.FGR.9.1

Vocabulary:
- Algebra
- Equation
- Evaluate
- Expression
- Function
- Ordered Pair
- Variable

Begin 1-1 Video 1

A ____function_____ is a special type of relationship between two sets of numbers that makes it possible for us to know what value will be produced when a specific value is plugged in. It's like a machine that you feed numbers into and get answers back out.



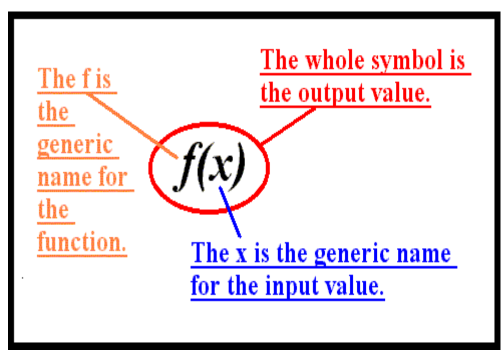
In past math courses, most equations you have dealt with have been written with x's and y's. When writing equations for functions, we often use a specific format called ___function notation_______.

We are used to writing equations where _y__ is a function of _x__.

In function notation, we write equations where __*f(x)*__ is a function of __x_.

Really, the only difference between function notation and what we are used to writing is that we use *f(x)* instead of y.

So, if we had the equation $y = 5x + 9$, in function notation, we would write this as ____$f(x) = 5x + 9$_______.



Often times, we are asked to evaluate functions at a specific point using function notation. Let's take a look at an example.

Example 1:

If $f(x) = 7x$, find *f(2)*.

You try:

1. If $f(x) = x + 9$, find $f(-4)$

2. If $g(x) = \frac{x}{3}$, find $g(27)$

Begin 1-1 Video 2

We can also write ordered pairs in function notation.

Example 2:
Write the following order pair in function notation: (9,-7).

Example 3: Translate the following statement into an ordered pair: $h(3) = 12$.

You try:
Write the following ordered pairs in function notation.

1. (0, 0)
2. (2, -3)
3. (-6,7)

Translate the following statement into an ordered pair.

4. $f(2) = -2$
5. $g(0) = 9$
6. $h(-3) = -3$

Begin 1-1 Video 3

Example 4:
$(3-5)^2 + \frac{20}{2} - 3(3)$

G.E.M.S.

G

E

M

S

You Try:

1. $(-7 + 3 \bullet 8) \div -7$

2. $(-4 + 2)^2 + -1 + 7$

Begin 1-1 Video 4

An expression containing variables, numbers, and operation symbols is called an __________algebraic expression_____________. $5x + 3y + 8$ is an example of an algebraic expression. Expressions do not have ______an equal sign______. Algebraic expressions can be evaluated for given values. To evaluate for a given value, we _____substitute____ the given number for the matching ___variable_ .

Example 5: $f(x) = 3x^2 + 1$; find $f(4)$

Example 6: $m(p - 7^2 - 10 \div 2)$; use $m = 5$ and $p = -2$

You try:

Evaluate each expression or equation for the given value.

1. $yx + y + z$; use $x = 3$, $y = 4$, and $z = 2$

2. If $k(x) = (x + 2)^2$,find $k(3)$

Lesson 1 – 2: Parts of an Expression

Learning Target(s):

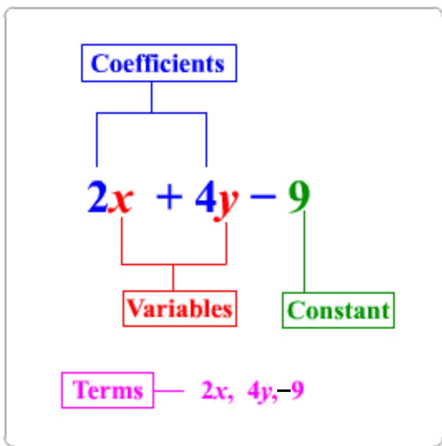
- **I can identify parts of an expression.**
- **I can translate English phrases and sentences into algebraic expressions.**

A.PAR.8.1

Vocabulary:
- Binomial Expression
- Coefficient
- Constant Term
- Expression
- Monomial Expression
- Standard Form of a Polynomial
- Term
- Trinomial

Begin 1-2 Video 1

Recall from lesson 1 that an expression containing variables, numbers, and operation symbols is called an ______algebraic expression_______. $5x + 3y + 8$ is an example of an algebraic expression. Expressions do not have ________an equal sign_________.



Each expression is made up of ___terms_____. A term can be a _positive or negative number, a ____variable______, or a _______constant_______ multiplied by a variable or variables. Each term in an algebraic expression is separated by a + sign or – sign. In $5x + 3y + 8$, the terms are: _5x__, _3y__, and 8.

______Monomial_______: An expression with one term. Ex. $4x^2$

______Binomial_______: An expression with two terms. Ex. $4x^2 + 3$

______Trinomial_______: An expression with three terms. Ex. $4x^2 + 2x + 3$

_____Polynomial____: An expression with multiple terms. Ex. $4x^2 + 3xy + 2x + 3$

A number with a fixed value is called a _______constant_________. In simple terms, it will be the number that's all by itself.

When a term is made up of a constant multiplied by a variable or variables, that constant is called a _______coefficient_________. In the term 5*x*, the coefficient is ___5___. If a variable does not appear to have a number in front of it, we say that there is an ________understood______ coefficient of ____1___.

Example 1: What are the names for each part of the algebraic expression

1.8x +32 + y?

Terms: _____ , _____ and _____ Coefficient: _____and____Constant:_____

You Try:

1. Identify the terms, coefficients and constants of the given expressions.

a. $14x^2 + 12x + 4$
- terms:
- coefficients:
- constants:

b. $3x - 15x^2 + 9 + 42x^3$
- terms:
- coefficients:
- constants:

Begin 1-2 Video 2

In some terms, the variables will have exponents, such as $8x^2$. This exponent determines the __degree_____ of that term.

- The degree of $8x^2$ is __2__. The degree of $8x^3$ is __3__.
- If the variable does not have an exponent, the degree is __1__. For instance, the degree of 8x is 1.
- If a term has more than one variable, the degree is equal to the ___sum of the exponents_____ of all its variables. The degree of $8x^3y^2z$ is ____.
- If a term does not contain any variable, the degree is ___. For instance, the degree of 9 is __0__. This is due to the fact that $x^0 = 1$.

Example 2: List the terms, coefficients, and degree of each term in the following expression: $4x^3y^2 + 2x^2 - 3x + 4$.

Terms: ______,_____,_____ and__
Coefficients: __, ___ and ___
Constant: ___

Degree of $4x^3y^2$ is ______
Degree of $2x^2$ is ___
Degree of $3x$ is ___
Degree of 4 is ___

In a polynomial, we typically list the terms in descending order of degree. Meaning, you will rarely see an expression written like this: $7x^2 - x^3 - 9 + 4x$. We would much prefer to see it "in order" like this: $-x^3 + 7x^2 + 4x - 9$. When a polynomial has been put in order, we call this _standard form of a polynomial.

Once the polynomial has been written in descending order, the coefficient of the term with the highest degree is referred to as the _leading coefficient.

Additionally, if asked for the degree of the entire expression it will be the degree of that first term, which is the highest degree.

Example 3: Give the leading coefficient and the degree of the following polynomials.

a. $1.8x + 32$ b. $4x^3y^2 + 2x^2 - 3x + 4$ c. $-2x^2 + 2x^4 + 3 - 4x$

You try:

1. For the following expressions, identify the degree of each term, the leading coefficient and the degree of the polynomial.

a. $14x^2 + 12x + 4$

- degree of each term:
- leading coefficient:
- degree of polynomial:

b. $3x - 15x^2 + 9 + 42x^3$

- degree of each term:
- leading coefficient:
- degree of polynomial:

Begin 1-2 Video 3

Terms in which the same variable is raised to the same power are called like terms and may be combined. $8x^2$and $10x^2$ are like terms.
When combining like terms, you simply add or subtract the coefficients as the problem instructs.

Before identifying parts of an expression, you should always simplify it by combining like terms and putting resulting terms in descending order (standard form).

Example 4: Simplify the following polynomials. Tell whether the resulting expressions are monomials, binomials, etc.

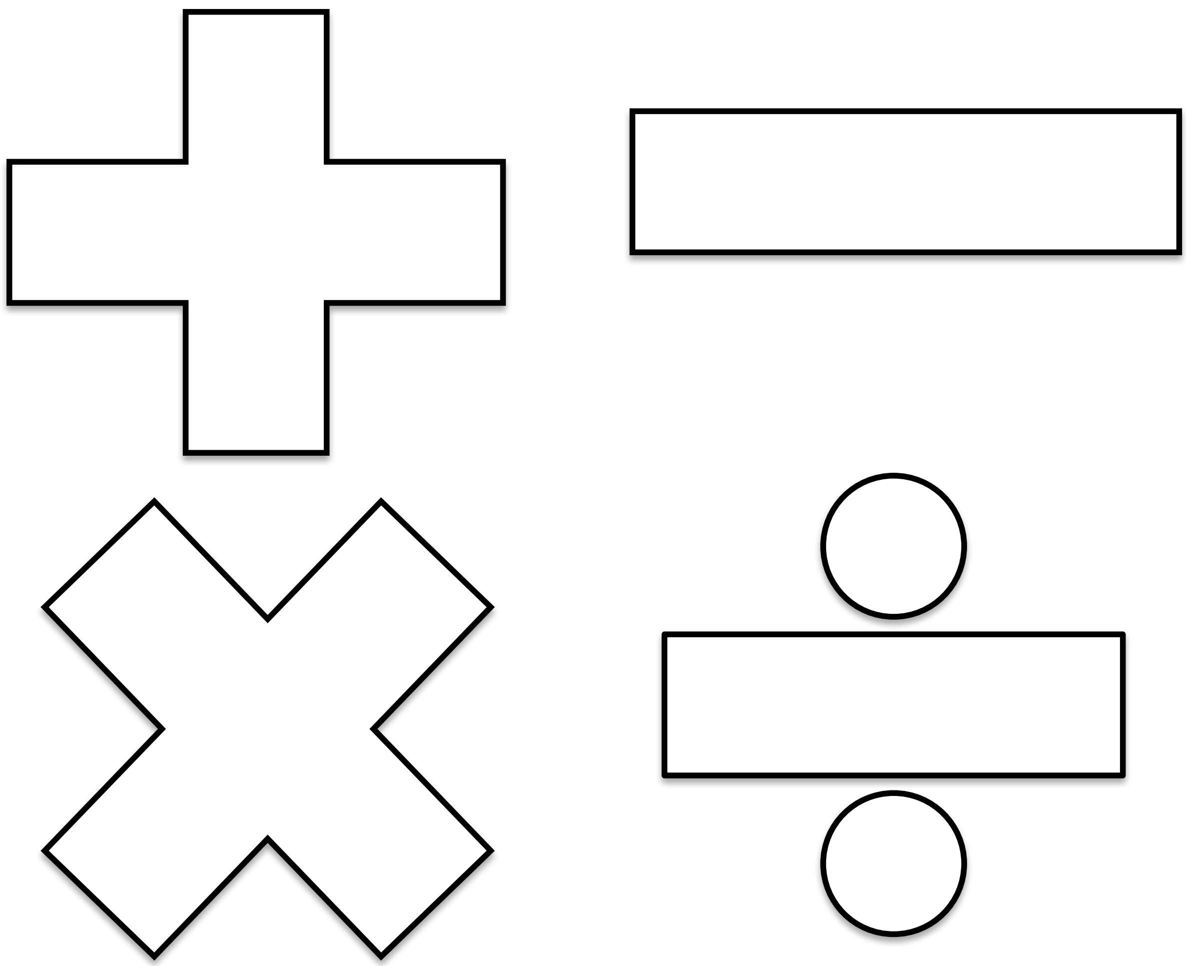
a. $8x^2 + 10x^2$ b. $5x - 8x^2 + 10x^2$

You try: Simplify the following polynomials. Be sure to combine like terms and put your answer in standard form. Tell whether the resulting expressions are monomials, binomials, etc.

1. $6x^2 + 7 - 9x + 5x + 2$ b. $4x - 4x^2 + 11x^2 - 4x$

Begin 1-2 Video 4

Before starting the video, brainstorm and record words that signify the operations below. For example, the word “add” would go in the plus sign.



Equality and Inequalities					
=	≠	>	≥	<	≤

Example 5: Six less than the product of a number and 7

Example 6: 5 more than a number is less than 2

Example 7: Twice the difference of a number and three totals twelve

You try:

1. Five times a number squared is equal to seven.

2. A number minus 3 is less than the same number added to 2.

Lesson 1 – 3: Adding and Subtracting Polynomials

Learning Target(s):

- **I can add and subtract polynomials.**

A.PAR.6.2

Begin 1-3 Video 1

Terms can only be added or subtracted when they have the same variable <u>and</u> degree!

Adding polynomials is just a matter of <u>combining like terms</u>, with some <u>order of operations</u> considerations thrown in.

Example 1: Simplify $(2x + 5y) + (3x - 2y)$

You try:

1. $(-4x^2 + 4x - 5) + (8x^2 - x - 7)$

2. $(2p^2 - 3p + 7) + (7p^2 + 8p + 7)$

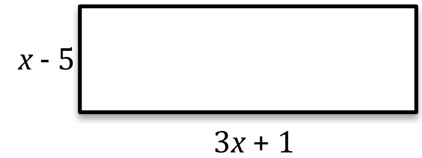
Begin 1-3 Video 2

One possible application for this skill is found in geometry.

Example 2: In a given triangle, the largest side is twice the length of the smallest side. The other side (that is not the smallest or the largest) is 2 units longer than the shortest side. Write an expression that represents the perimeter of the triangle. Let x represent the length of the smallest side.

You try:

1. Write an expression for the perimeter of the following rectangle.



Begin 1-3 Video 3

Subtracting polynomials is quite similar to adding polynomials, but you have that pesky minus sign to deal with.

The first thing I have to do is distribute that negative through the parentheses. You might find it helpful to put a "1" in front of the parentheses, to help them keep track of the minus sign:

Example 3:

Simplify $(x^3 + 3x^2 + 5x – 4) – (3x^3 – 8x^2 – 5x + 6)$

You try:

1. $(–4x^2 + 7x – 5) – (8x^2 – x – 7)$

2. $(2p^2 – 3p + 7) – (7p^2 + 8p + 7)$

Lesson 1 – 4: One- and Two-Step Equations
Learning Target: I can solve one- and two-step equations.
8.PAR.3

Vocabulary:
- Equation
- Inverse
- Solution

Begin 1-4 Video 1

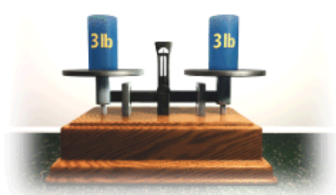
An equation is a number sentence that contains an equals symbol. It is made up of two expressions.

To solve equations, we isolate the variable. This means that we rearrange the equation so that the variable we are looking for is all by itself on one side of the equation.

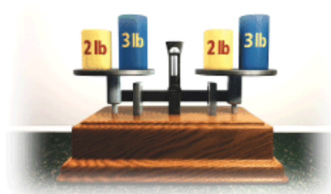
Think of equations like scales. When two sides are balanced, if you change something on one side, you have to make the same change on the other side to keep the scale balanced.

SEE APPENDIX A

HINT:
Appendix A (found at the back of your textbook) has tables that list the properties we use when isolating a variable. If at any point, I reference a property you do not remember, check the appendix for clarification.



$3 = 3$



$2 + 3 = 2 + 3$

We use inverse operations to help us isolate the variable.

(If you see) Operation	(Then you do) Inverse
Addition	Subtraction
Subtraction	Addition
Multiplication	Division
Division	Multiplication

Example 1: Solve for x:

$-3 + x = 15$

Example 2: Solve for n:

$\frac{1}{14}n = \frac{2}{7}$

You try:

1. $5a = -55$

2. $-5 = 14 - k$

Begin 1-4 Video 2

Sometimes you need to use more than one step to solve an equation. When you are trying to solve an equation,

1^{st}: Identify what operations are being done to the variable you are trying to isolate.
2^{nd}: Use the inverse of each operation to "undo" it and get the variable by itself.
Hint: Since you are working backwards to solve for the variable, you will often find that you are working through the order of operations backwards.

Example 3: Solve for x.

$$3x + 4 = 14$$

Example 4: Solve for y:

$$\frac{y+4}{3} = 9$$

You try:

1. $\frac{10+x}{2} = 7$

2. $\frac{p}{2} + 5 = -2$

Begin 1-4 Video 3

Example 5: If $f(x) = \frac{12}{x}$, find x if $f(x) = -2$.

You try: If $g(x) = x + 7$, find x if $g(x) = 23$.

Begin 1-4 Video 4

Example 5: Percy's Bikes rents bikes for $10 plus $4 per hour. Annabeth paid $30 to rent a bike. For how many hours did she rent the bike?

You try:

1. The area of a triangle is 28 in^2. The base is 8 inches. What is the height of the triangle?

Area of a Triangle: $A = \frac{1}{2}bh$

Begin 1-4 Video 5

Example 5: You want to buy a thingamajig. It costs $123.45 plus 6% sales tax. You already have $12.34 and you are earning $5.67 per week. How long will it take you to get your thingamajig?

a. How much sales tax?

b. What is the total cost?

c. Let *w* stand for weeks and write an equation.

d. Solve your equation and check your answer.

Lesson 1-5: Multi-step Equations

Learning Target(s):

- **I can solve multi-step equations.**

8.PAR.3

"Just a darn minute! — Yesterday you said that X equals **two**!"

Begin 1-5 Video 1

Solving multi-step equations:

1) Distribute
2) Combine like terms
3) Get variables on the same side of the equation.
4) Isolate the variable by using inverse operations.

Example 1: Solve for *y*

$$\frac{y+1}{2} + 7 = 19$$

Example 2: Solve for *k*

$$-(1 + 7k) - 6(-7 - k) = 36$$

You try:

1. Solve for n

14 = $1 - 2n + 5$

2. Solve for *x*.

$12 = -4(-6x - 3)$

Begin 1-5 Video 2

This section is going to hone in on problems that deal with step #3 in the process.

Example 3: Solve for *n:*
$-10(1+n)=-8n-30$

Example 4: Solve for *x*:
$-10x+6x=13+2x-9-7x$

You try:

1. Solve for *m:*
$-2(8m+10)=4-6(m+9)$

2. Solve for *n*:
$9n-2=-4n-15$

Begin 1-5 Video 3

You may recall from previous math courses that we don't always get one solution. In fact, we have three different possibilities that we may encounter when solving a linear equation. Let's take a look!

Example 5: One Solution
$-2(8+m)=-4(4+6m)$

Example 6: No Solution
$4x+27=4(x+5)$

Example 7: Infinitely Many Solutions
$3(x+7)=3x+21$

What you think.	**What you see.**	**What it means.**
Typical Result	x = 3	One solution
Well, duh…	x = x or 2 = 2	Infinitely many solutions
No it doesn't…	2 = 3	No solution

You try:

1. $5 + 3r = 3r - 5$

2. $3(9 + n) = 27 + 3n$

Begin 1-5 Video 4

Example 8: The sum of two consecutive integers is 91. What are the two integers?

Example 9: Find the two consecutive even integers whose sum is 258.

Example 10: A rectangle is 12 m longer than it is wide. Its perimeter is 68 m. Find its length and width.

You try:

1. Find the two consecutive odd integers whose sum is 160.

2. A rectangle is 2 inches wider than it is long. Its perimeter is 30 inches. Find its length and width.

Lesson 1-6 Solving Inequalities with Number Lines

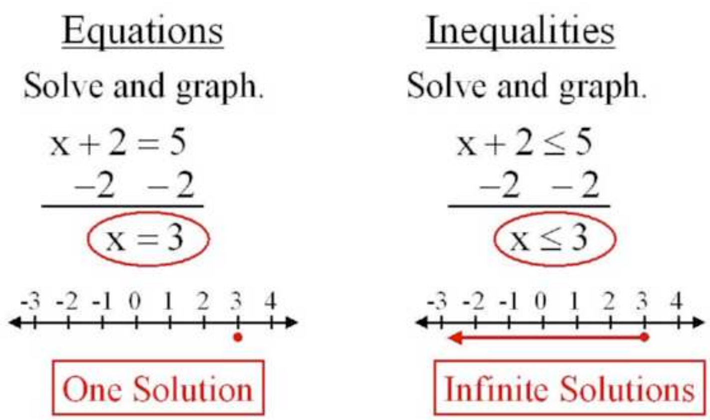
Learning Target: I can solve inequalities and represent their solution set on a number line.

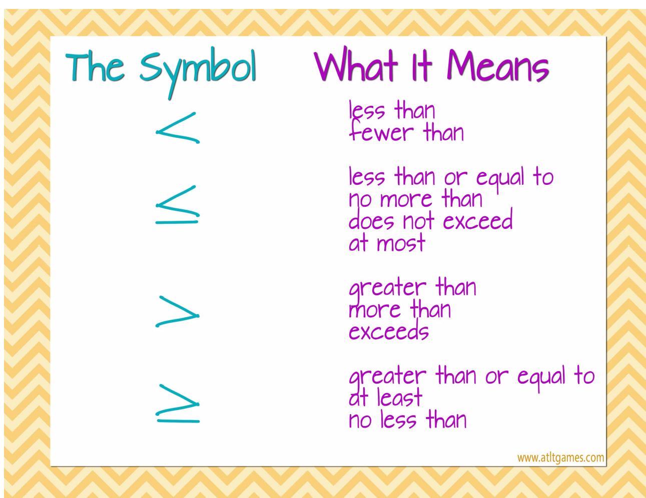
A.PAR.3.5

Vocabulary:
- Inequality

Begin 1-6 Video 1

An inequality is similar to an equation. However, instead of an equal sign, it has inequality symbols. The examples shown here do a good job of illustrating the difference between solving an equation and solving an inequality. The process is the same. The differences are all in how we interpret and display the solutions.





The Symbol	What It Means
$<$	less than fewer than
$\leq$	less than or equal to no more than does not exceed at most
$>$	greater than more than exceeds
$\geq$	greater than or equal to at least no less than

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When dealing with inequalities, you have more symbols to deal with than simply an equal sign. We touched on these in lesson 2 as well. You may find it helpful to go back and review those notes in addition to using this list.

The most important difference between an inequality and an equation is that every inequality has an infinite number of solutions. Whereas most equations we deal with at this point have only one solution.

Since inequalities have an infinite number of solutions, we typically show the solutions to an inequality on a number line The direction we shade and how we represent the starting value depends upon what kind of inequality we are dealing with.

The table below can ONLY be used if the variable is on the left hand side of the inequality.

$<$	$>$	$\leq$	$\geq$
open circle	open circle	closed circle	closed circle
shade left	shade right	shade left	shade right

Example 1: Solve and graph the following inequality. $2x + 4 < 8$

You try: Solve and graph the following inequality. $4x + 5 < -19$

Begin 1-6 Video 2

One important thing to note about solving inequalities is that when we multiply or divide by a negative number, we must switch the direction of the inequality sign.

Example 2: Solve and graph the following inequality.
$-3x - 4 \geq 11$

You try: Solve and graph the following inequality.

$$-2x - 7 > 5$$

Begin 1-6 Video 3

Example 3: Solve and graph the following inequality

$$157 > x + 3(8 + 6x)$$

You try: Solve and graph the following inequality

$$-7(m + 3) \geq 2m + 6$$

Begin 1-6 Video 4

Example 4: Esteban has a $20 gift card to the Art-Full Barn, where 4 oz tubes of paint are $4.30 each. What are the possible numbers of tubes that he could by? Write an inequality to model the situation.

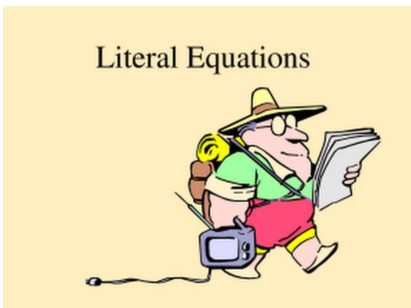
Lesson 1–7: Literal Equations

Learning Target: Given an equation in two or more variables, I can solve for a specified variable.
8.PAR.3/8.PAR.4

Vocabulary:
- Literal Equations

Begin 1-7 Video 1

__________Literal equations______are equations with ________two or more__________ variables.



Sometimes when we are given formulas, it is helpful to rearrange the formula to highlight a specific variable.

To solve a literal equation for a given variable, we use the same method as when we solve our tradition equations. We must use inverse operations.

Example 1:
The formula for the circumference of a circle is $C = 2\pi r$. Solve for *r.*

Example 2:
$12 = 2x + 3y$ (*y*)

You try:

1. $P = 2L + 2W$ (W)

2. $V = \frac{M}{D}$ (M)

Begin 1-7 Video 2

Example 3: The cost, in dollars, of a single-story home can be approximated using the formula C = klw, where l is the approximate length of the home and w is the approximate width of the home. Find the units for the coefficient k. (Assume the home is measured in feet.

Lesson 1-8 Graph on the Coordinate Plane

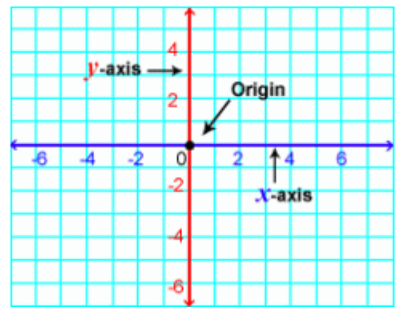
Learning Target: I can graph linear equations and inequalities on the coordinate plane.

8.PAR.4.2/8.FGR.5.4/A.FGR.2.2/A.PAR.4.1/A.PAR.4.2

Vocabulary:
- Coordinate Plane

Begin 1-8 Video 1

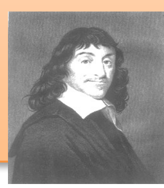
Recall from middle school that the coordinate plane is used to graph lines and plot points. It is comprised of two number lines that intersect at a point called the origin.



The horizontal (right to left) number line represents the independent variables and typically we use the variable x for these values. Thus, this is called the x-axis.

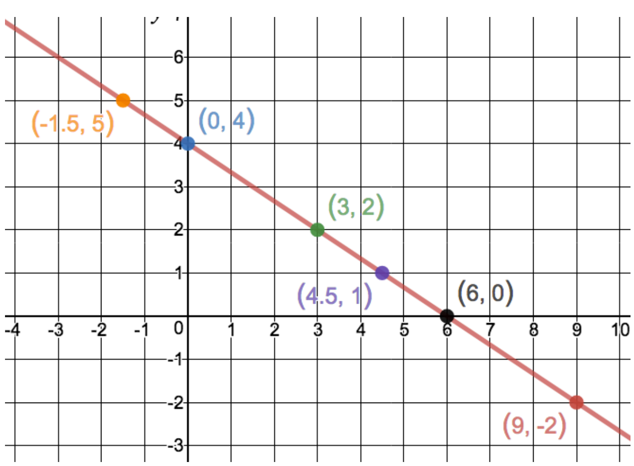
Historical Note:

You may see the coordinate plane referred to as the Cartesian Plane in some places. This is because it was first developed by a mathematician and philosopher named René Descartes in the 1630's.



The vertical (up and down) number line represents the dependent variables and we typically use the variable y for these values. Therefore, this line is called the y-axis. Remember that y is the same as f(x). So you may sometimes see this axis labeled as f(x).

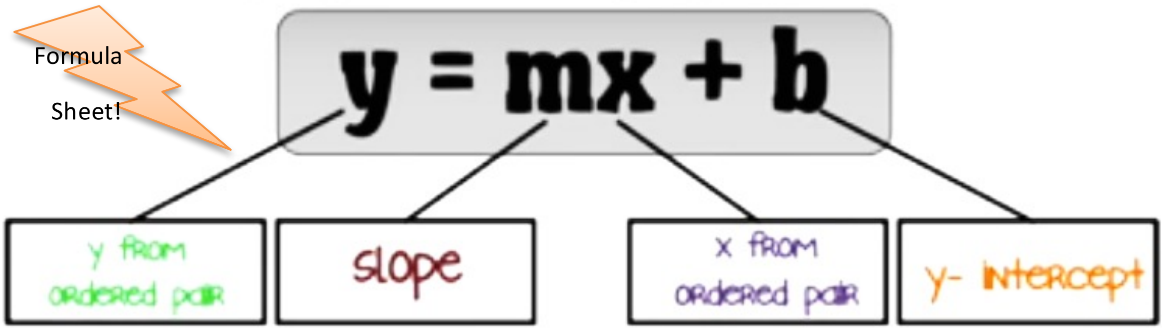
In this lesson, we will be graphing lines on the coordinate plane. When an equation with two variables is graphed on the coordinate plane, it represents all the possible solutions for that equation. Basically, that means that every moment on that line is an ordered pair that could be plugged into the equation and the two sides would remain equal.



Example 1: $2x + 3y = 12$.

Begin 1-8 Video 2

When we solve the equation of a line for y, we call the resulting form slope-intercept form. It is a useful form to have an equation in as it makes certain parameters more easily identifiable.



The two pieces of this formula that will typically have numbers plugged in are the m (slope) and the b (y-intercept). Before we can really start graphing, you need to have a solid understanding of both of these concepts.

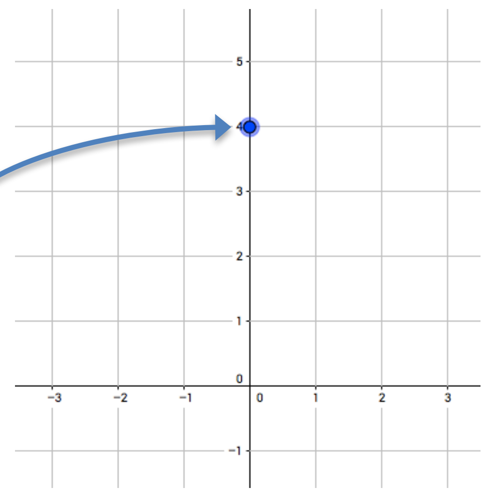
b = y-intercept = where the graph crosses (intersects) the y-axis (↕)

Example 2: $y = \frac{-2}{3}x + 4$

The y-intercept gives us an initial coordinate to plot. The x-value for a y-intercept will always be zero.

In our example, $y = \frac{-2}{3}x + 4$, the y-intercept would be 4.

So we put a point at (0,4).

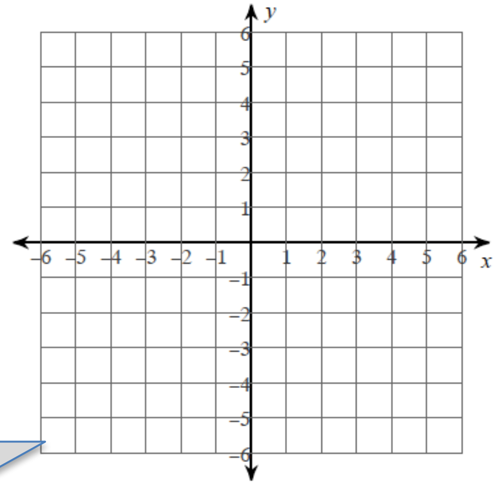


When asked for a y-intercept, always give it as an ordered pair of the form $(0,b)$.

You try: Identify the y-intercept of each equation and plot the y-intercepts on the coordinate plane given.

1. $y = \frac{3}{4}x + 3$ y-intercept:________

2. $y = \frac{1}{3}x - 5$ y-intercept:________



Begin 1-8 Video 3

$$m = \text{slope} = \frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in y}}{\text{Change in x}} = \frac{\updownarrow}{\leftrightarrow}$$

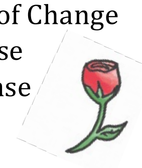
The slope tells us how the graph changes and is located with the x variable. Slope can be interpreted as the difference in rise (y-value) divided by the difference in run (x-value).

Hint* When graphing, you will want this value to be in fraction form.

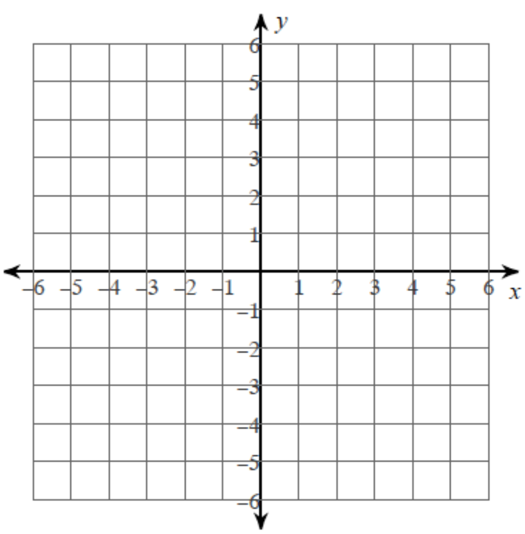
Formula Sheet!

"A rose by any other name…"
Slope goes by many names in mathematics. A few that you may see in this course are:

- Rate of Change
- Average Rate of Change
- Rate of Increase
- Rate of Decrease
- Steepness
- Cost per unit
- $m = \frac{y_2 - y_1}{x_2 - x_1}$
- speed



Example 3: $y = \frac{-2}{3}x + 4$



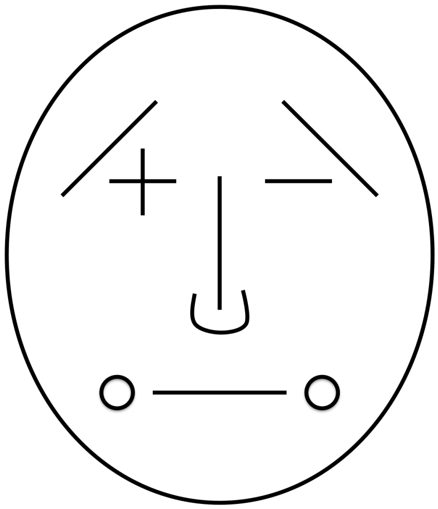
The numerator (top number) of the slope tells us how much we are supposed to go up or down.

- If the number is positive, we go _up___.
- If it is negative, we go __down______.

The denominator (bottom number) tells us whether to go left or right.

- If the bottom number is positive, we move to the __right_____.
- If the bottom number is negative, we move to the _left_____.

Last Step: Connect the dots! Note that at the end of the line we put arrows. These arrows indicate that the line goes on forever and ever and ever and ever!



MR. SLOPE GUY

A line that has a positive slope looks like it is going uphille when viewed from left to right.

A line that has a negative slope looks like it is going downhill when viewed from left to right.

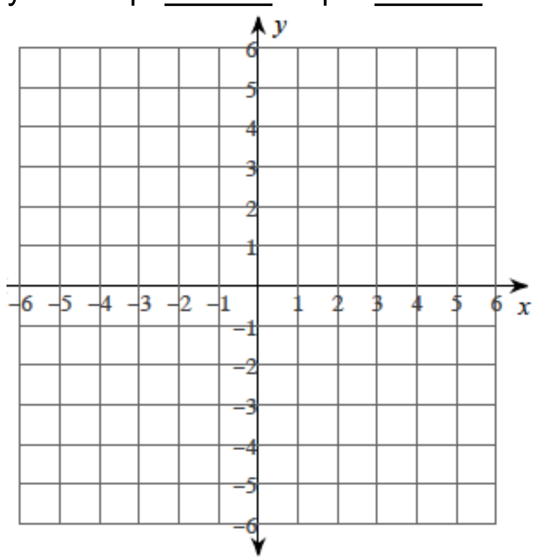
A line with a slope of zero makes a horizontal line.

A vertical line is said to have an undefined slope.

You try: Identify the y-intercept and the slope of each equation. Plot at least 2 points for each on the coordinate plane provided and connect the dots!

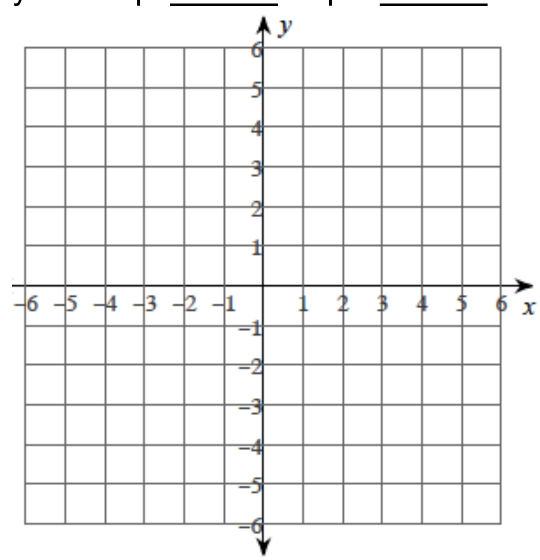
1. $y = \frac{-1}{5}x + 2$

y-intercept:_______ slope: _______



2. $y = \frac{1}{5}x - 2$

y-intercept:_______ slope: _______

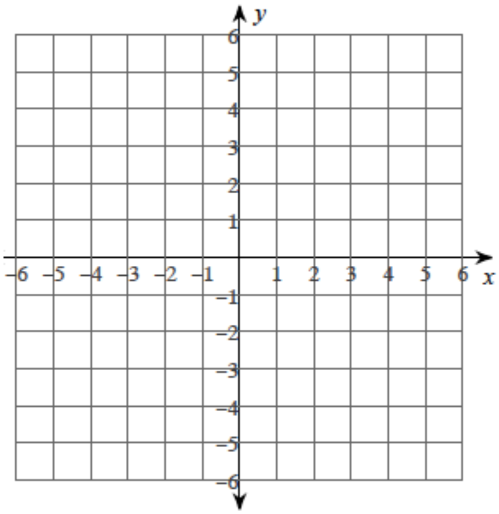


Begin 1-8 Video 4

Sometimes, you may be given an equation that is not in slope-intercept form.

Example 4:

$3x + 4y = 8$



b =

m =

<u>Steps for graphing a line from Slope-intercept form:</u>

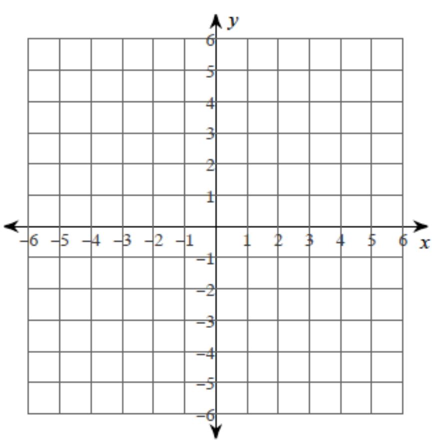
1. If the equation is not in slope-intercept form (y on a side by itself), solve for y_ so that it is in slope-intercept form. (Revisit lesson 7 for examples of this.)
2. Pull out your *m* and *b*.
   a. ***m*** is always ***m***arried to x…they are always touching.
   b. ***b*** is always ***b***y itself.
3. Graph.
   a. Begin with __b__
   - this is your y-intercept.
   - It will be the ordered pair (0, *b*)

   b. From your intercept, use your rise over run (__*m*__) to find a second point.
   - You can find additional points using your slope if you'd like.

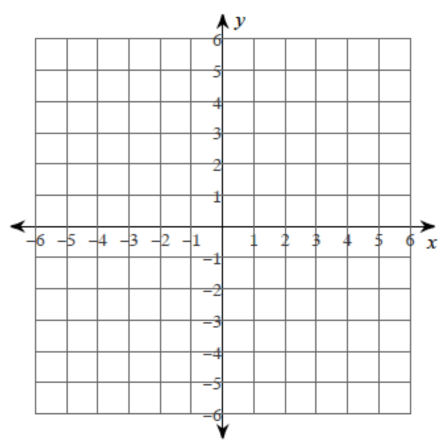
   c. Draw a _____line______ that connects these two points.

You try: Graph the given equations on the coordinate plane provided.

1. $x + 5y = 10$



2. $3x - 4y = -4$

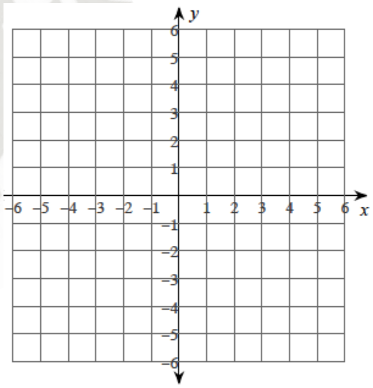


Begin 1-8 Video 5

Of course, there are always special cases. Little snowflake equations that don't look like the others.

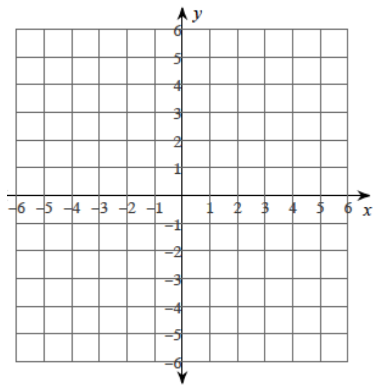
What if there is no m or b?

Example 5: Graph $y = x$



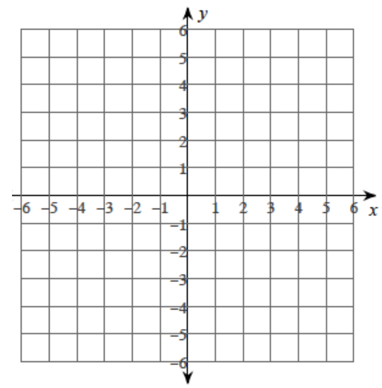
What if there is no x??

Example 6: Graph $y = 3$



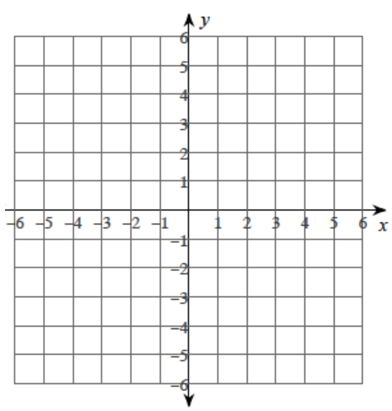
What if there is no y???

Example 7: Graph $x = -2$

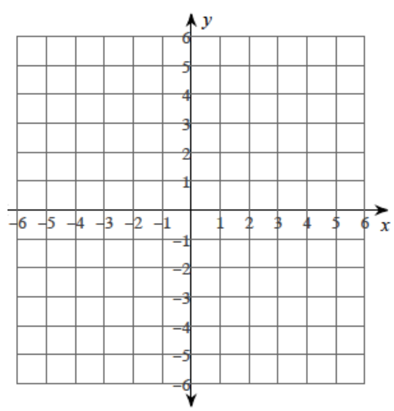


You try:

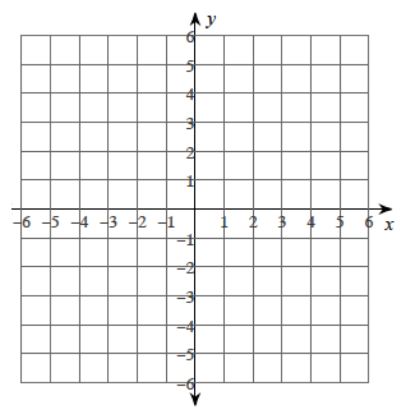
1. Graph $y = x - 2$



2. Graph $y = -4$



3. Graph $x = 3$



Begin 1-8 Video 6

Example 8:

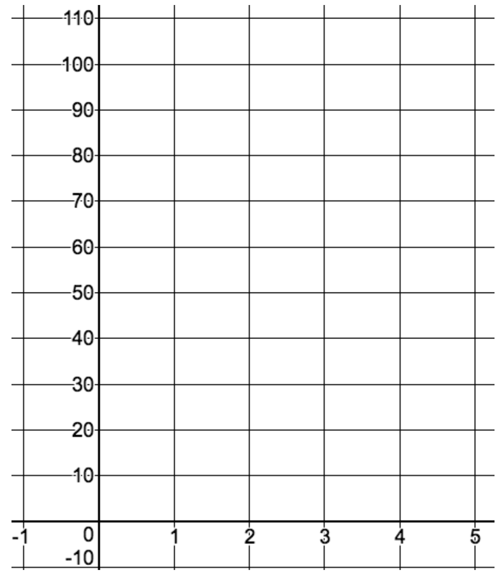
Trinity is working at Jaemor Farms to earn some extra money over the summer. She started the summer with $52 in her savings account and plans to add $20 per week.

a) Write an equation to represent the relationship between time and Trinity's account balance.

b) Graph the line that represents your equation.

c) In the context of this problem, what does the y-intercept represent?

d) In the context of this problem, what does the slope represent?



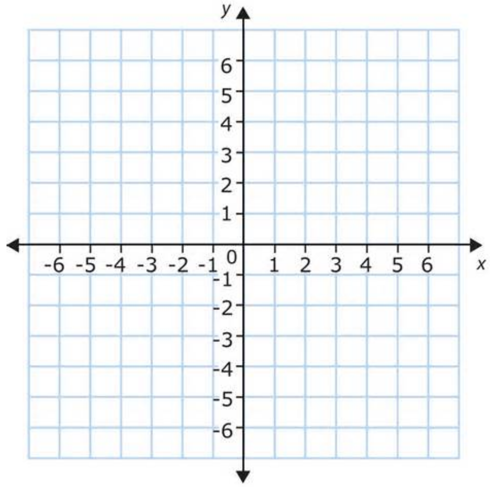
Begin 1-8 Video 7

The steps for graphing inequalities on the coordinate plane are essentially the same as graphing equations. The difference? Rather than a single line of ordered pairs that make the equation true, an inequality has a whole region of ordered pairs. To display this, we incorporate shading, just as we did when solving inequalities with a single variable.

What kind of line to draw and where to shade…

<	≤	>	≥
dashed	solid	dashed	solid
shade below	shade below	shade above	shade above

Example 9: Graph the following inequality on the coordinate plane.
$y \geq 2x - 1$

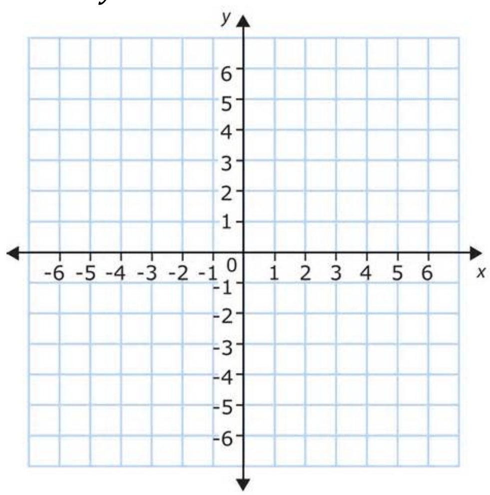


What kind of line did we draw?______________
Why?________________

Where did we shade?_________________
Why?________________

Give two possible solutions:_______________
Give two ordered pairs that are **not** possible solutions:__________________

Example 10: Graph the following inequality on the coordinate plane.
$3x + 2y < 8$



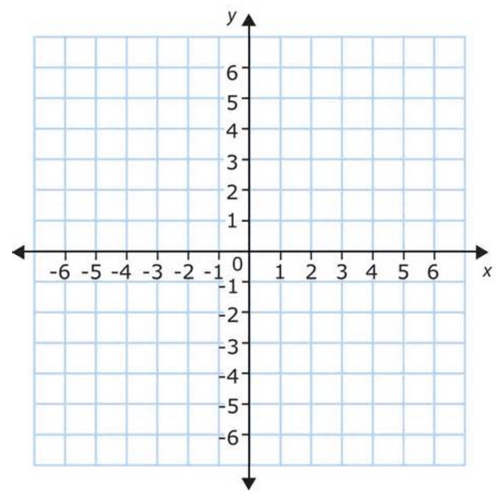
What kind of line did we draw?______________
Why?________________

Where did we shade?_________________
Why?________________

Give two possible solutions:_______________
Give two ordered pairs that are **not** possible solutions:__________________

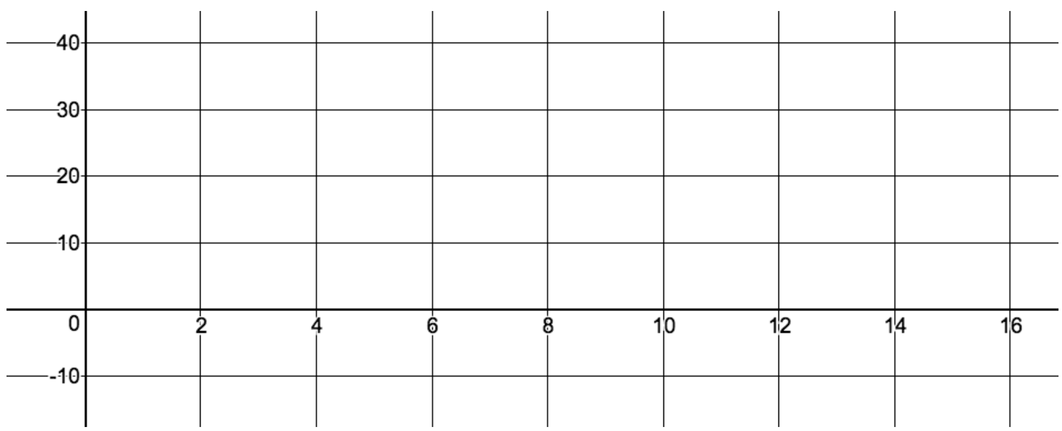
You try:
1. Graph the following inequality on the coordinate plane.

$$y < -3x + 1$$



Begin 1-8 Video 8

Example 11: Sami works two jobs to help pay for her college tuition. At Zaxby's she earns \$8 an hour (y). She also babysits and earns \$16 an hour (x). She must earn at least \$240 per week to make her necessary payments. Write and graph an inequality to model this situation.



What are two possible combinations Sami could work?

Unit 1: EOC Practice Items

The following items are excerpts from Georgia Milestones Algebra I EOC Study/Resource Guide for Students and Parents.

1. **A rectangle has a length of 12 meters and a width of 400 centimeters. What is the perimeter, in cm, of the rectangle?**

   A. 824
   B. 1,600
   C. 2,000
   D. 3,200

2. **Jill swam 200 meters in 2 minutes 42 seconds. If each lap is 50 meters long, which time is her estimated time, in seconds, per lap?**

   A. 32
   B. 40
   C. 48
   D. 60

3. **In which expression is the coefficient of the *n* term –1?**

   A. $3n^2 + 4n - 1$
   B. $-n^2 + 5n + 4$
   C. $-2n^2 - n + 5$
   D. $4n^2 + n - 5$

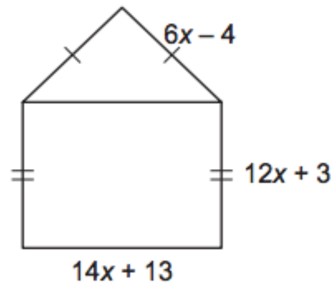
4. **The expression s^2 is used to calculate the area of a square, where *s* is the side length of the square. What does the expression $(8x)^2$ represent?**

   A. the area of a square with a side length of 8
   B. the area of a square with a side length of 16
   C. the area of a square with a side length of $4x$
   D. the area of a square with a side length of $8x$

5. **Which expression has the same value as the expression $(8x^2 + 2x - 6) - (5x^2 - 3x + 2)$?**

   A. $3x^2 - x - 4$
   B. $3x^2 + 5x - 8$
   C. $13x^2 - x - 8$
   D. $13x^2 - 5x - 4$

6. **A model of a house is shown.**



What is the perimeter, in units, of the model?

A. $32x + 12$
B. $46x + 25$
C. $50x + 11$
D. $64x + 24$

7. **This equation can be used to find *h*, the number of hours it will take Flo and Bryan to mow their lawn.**

$$\frac{h}{3} + \frac{h}{6} = 1$$

How many hours will it take them to mow their lawn?

A. 6
B. 3
C. 2
D. 1

8. **A ferry boat carries passengers back and forth between two communities on the Peachville River.**

- **It takes 30 minutes longer for the ferry to make the trip upstream than downstream.**
- **The ferry's average speed in still water is 15 miles per hour.**
- **The river's current is usually 5 miles per hour.**

This equation can be used to determine how many miles apart the two communities are.

$$\frac{m}{15 - 5} = \frac{m}{15 + 5} + 0.5$$

What is *m*, the distance between the two communities?

A. 0.5 mile
B. 5 miles
C. 10 miles
D. 15 miles

9. **For what values of x is the inequality $\frac{2}{3} + \frac{x}{3} > 1$ true?**

A. $x < 1$
B. $x > 1$
C. $x < 5$
D. $x > 5$

10. **Look at the steps used when solving $3(x - 2) = 3$ for x.**

$3(x - 2) = 3$	Write the original equation.
$3x - 6 = 3$	Use the Distributive Property.
$3x - 6 + 6 = 3 + 6$	Step 1
$3x = 9$	Step 2
$\frac{3x}{3} = \frac{9}{3}$	Step 3
$x = 3$	Step 4

Which step is the result of combining like terms?

A. Step 1
B. Step 2
C. Step 3
D. Step 4

11. **Which function is modeled in this table?**

x	$f(x)$
1	8
2	11
3	14
4	17

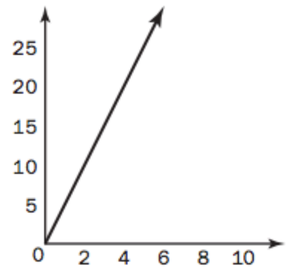
A. $f(x) = x + 7$
B. $f(x) = x + 9$
C. $f(x) = 2x + 5$
D. $f(x) = 3x + 5$

12. **If $f(12) = 4(12) - 20$, which function gives $f(x)$?**

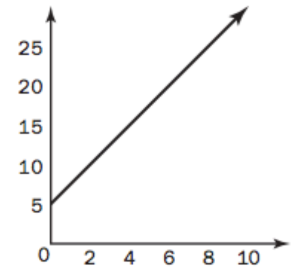
A. $f(x) = 4x$
B. $f(x) = 12x$
C. $f(x) = 4x - 20$
D. $f(x) = 12x - 20$

13. To rent a canoe, the cost is \$3 for the oars and life preserver, plus \$5 an hour for the canoe. Which graph models the cost of renting a canoe?

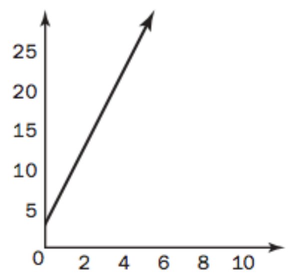
A.



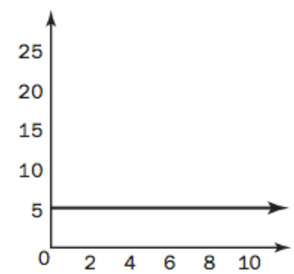
B.



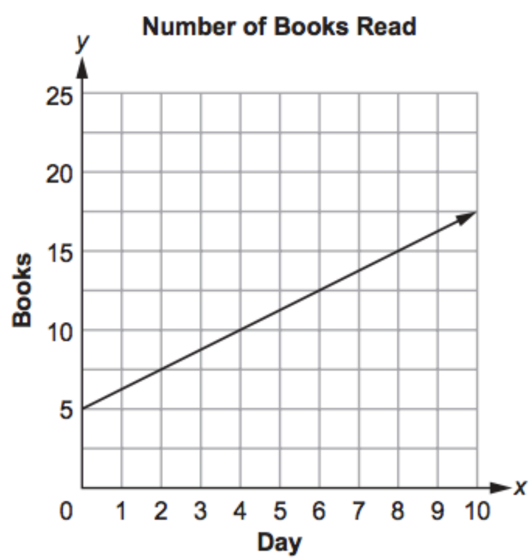
C.



D.



14. Juan and Patti decided to see who could read more books in a month. They began to keep track after Patti had already read 5 books that month. This graph shows the number of books Patti read for the next 10 days and the rate at which she will read for the rest of the month.



If Juan does not read any books before day 4 and he starts reading at the same rate as Patti for the rest of the month, how many books will he have read by day 12?

A. 5
B. 10
C. 15
D. 20