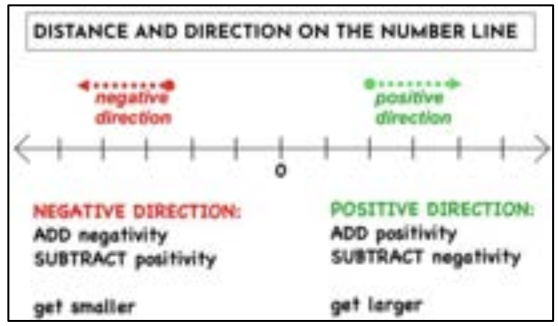
SET 1 – POSITIVE / NEGATIVE NUMBERS (2 sides) **7^{TH} Pre-Algebra Entering 8^{th} Algebra**

SKILLS:

I CAN use models of distance and direction on the number line.

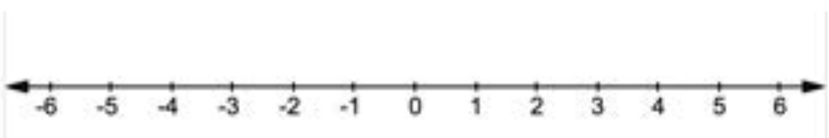
I CAN compute efficiently and solve problems with signed rational numbers.



KEY UNDERSTANDINGS:

- **A number's distance and direction from zero *(absolute value)* form the basis for operating with signed numbers. There are two ways to move in each direction from a starting point. Adding a positive and subtracting a negative move you larger. Subtracting a positive and adding a negative move you smaller.**
- **When multiplying and dividing two numbers, if signs are the same, solution is positive; if signs are different, solution is negative.**
- **We can apply these number line ideas to compute effectively not just with integers but also with positive and negative fractions and decimals.**
- **In many situations reasoning is preferable to long computation algorithms. Look for ways to use number relationships, place value, and basic facts when computing.**
- **Follow order of operations to evaluate expressions with different operations.**

Use start / move / end to show the value of the expression $-4 - (-8.5)$ on the number line.



Write the value here:

____

Find the values of these expressions.

a.) $-48 + 187$

b.) $9 + 18 + (-25) - 9$

c.) $88 + (-400) + 53$

d.) $-94 - (-79)$

e.) $-15 - 75 - 100$

f.) $-4.5 - 5.2$

g.) $-35 - 18 - 13$

h.) $0 - (-16) + 8 - 2.5$

i.) $-10 + |-5| - |5 - 10|$

Find the quotient. No long division necessary; think math facts, place value, and relationships.

a.) $-4000\ /\ 50$ b.) $-840\ /\ -1.2$ c.) $-10\ /40$

Find the product. No long multiplication; think math facts, place value, and relationships.

a.) $-25 \cdot (-30)$ b.) $-8 \cdot 4000$ c.) $-3.5 \cdot 8$

Find the sum, difference, product, or quotient. **REVIEW fraction operations as needed!** Don't guess.

$-3\frac{6}{7} \bullet 1\frac{13}{15}$ $\frac{15}{25} \cdot \frac{30}{40} \cdot \frac{10}{20}$ $6\frac{1}{9} \div 3\frac{2}{3}$

$-2\frac{1}{8} - 4\frac{2}{3}$ $\frac{3}{4} - \left(-\frac{2}{5}\right) - \frac{7}{20}$

Tell if the ***sign*** of the expression $-6\frac{1}{9} - 2\frac{11}{12}$ is *negative* or *positive*; use distance and direction on the number line to tell why.

Then give the ***CLOSEST whole-number estimate***.
Do NOT find the actual value.

Compare with >, <, or =. Use number sense and reasoning. **NO actual computation**.

a.) $\frac{1}{2} \times \frac{1}{2}$ ______ $\frac{1}{2} + \frac{1}{2}$

b.) $-8 - \frac{3}{4}$ ______ $-8 + \frac{3}{4}$

c.) $-\frac{1}{3} + \frac{3}{4}$ ______ $-\frac{3}{4} + \frac{1}{3}$

d.) $\frac{1}{4} \div 2$ ______ $\frac{1}{4} \div \frac{1}{2}$

SET 2 – EXPRESSIONS AND EQUATIONS (4 sides) 7^{TH} Pre-Algebra Entering 8^{th} Algebra

SKILLS:

- **I CAN describe situations with algebraic language.**
- **I CAN simplify and write equivalent algebraic expressions.**
- **I CAN use models to illustrate situations, properties, and solutions.**
- **I CAN apply algebraic properties with formal algebraic steps to solve equations.**
- **I CAN write and solve equations to describe situations and solve word problems.**

KEY UNDERSTANDINGS:

- **Variables represent unknowns and let us generalize relationships. Algebraic expressions are made up of terms. Coefficients tell "how many" of the variables there are and show how the variable changes; constants are fixed. Combining like terms, factoring, and distributing are ways to simplify and write equivalent expressions.**
- **A solution of an equation is the value that makes the equation true – each side of the equal sign is balanced. Bar and hanger models show this so well! When solving, use inverse operations to both sides to "undo", isolate the variable, and keep balance.**
- **We solved "regular" two-step equations, multi-step equations *(simplify expressions first before solving; choose whether to factor or distribute)*, and equations with variables on both sides *("move" variables to one side, number to the other, then solve)*.**
- **Fraction coefficient? Divide by multiplying both sides by the reciprocal.**
- **THINK to find the most efficient strategy for a particular equation. Examples: *factoring vs. distributing* and *clearing fractions (multiply each term on each side by LCD).***

Translate into an algebraic expression.	Identify the parts of this expression.
• $\frac{1}{4}$ of the sum of x and 11 • The sum of $\frac{1}{4}x$ and 11 • Two less than one-half of x • Three groups of the sum of x and 5 • Two-thirds of a number x • The product of negative 5 and x	$-x - 3y + 2z - 4$ What are the three coefficients? What is the constant term? How many terms? How many variables? Is this expression simplified?

Combine like terms to simplify:

$8x - 5 - 10x + 7$

Distribute to write an equivalent expression:

$-6(\ x\ -\ y\ +\ 2\ )$

Distribute first, then combine like terms to simplify:

$-2(\ 2x - 5\ ) - 4x - 8$

$-5\ (-3x +\ 2\ ) - 6x + 7$

Solve the equation with proper algebraic steps.
Combine like terms first.

$17 =\ 2x + 15 - 5x + 3$

Solve the equation with proper algebraic steps.
Factor or distribute? Think. Your choice.

$3(3x - 9) =\ -36$

Solve the equation with proper algebraic steps.
Try to clear fractions.

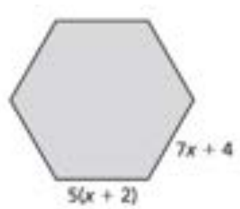
$\frac{3}{2}x + \frac{5}{6} = \frac{1}{3}$

Solve the equation with proper algebraic steps.
Distribute first, then combine like term.

$-13x - 2(x + 7) = 21$

Solve the equation with proper algebraic steps. Think-variables on both sides. Clear fractions? $\frac{7}{8} - \frac{1}{4}x = \frac{1}{2}x - \frac{1}{4}$	Solve the equation with proper algebraic steps. Variables both sides. $13.4x - 3 = -6 - 8.6x$

Write and solve an equation to find the value of x; then find side length of this regular *(all sides equal)* hexagon.



At Sonic, we order 5 burgers and a milkshake. The milkshake cost $2.50. The total bill is $26.50.
Write and solve an equation to find the cost of each burger.

My variable is _______. It stands for ____________

3.5 times a positive number is equal to the sum of the positive number and 0.5.
Write and solve an equation to find the positive number.

My variable is ________; it stands for _____________

Mixed Practice Solving Equations

$\frac{x}{5} + 8.5 = 10$	$\frac{5}{8}x + \frac{1}{2} = \frac{7}{4}$
$2(5x - 3) = 5(x - 3)$	$-2.4x + 0.5 = -1.9$
$4\left(\frac{3}{4}x - \frac{1}{2}\right) = -7$	$-2(7 + x) = -16$

SET 3 – PROPORTIONAL RELATIONSHIPS (2 sides) **7TH Pre-Algebra Entering 8th Algebra**

SKILLS:
I CAN work with proportions as a set of equivalent ratios.
I CAN describe proportions in words, ratio tables, equations, and graphs.
I CAN solve problems with proportions.

KEY UNDERSTANDINGS:
A set of equivalent ratios (*can show in a ratio table*) describes a proportional relationship.
In a proportion, each x-value (*independent*) is multiplied by the constant of proportionality to get the y-value (*dependent*). We use the letter k for the constant of proportionality.
The constant of proportionality can be interpreted as a unit rate.
It answers the question, "What do I multiply x by to get y?"
The equation $y = kx$ (*translated: y is k times x*) can be written to describe a proportion.
The graph of a proportion is a straight line through the origin.

Fill in this table to show a proportional relationship between apples and their weight.

What is the constant of proportionality?

Number of apples (x)	Weight in kg (y)
2	
5	0.60
12	
	2.4
1	

For this data set, tell if x and y are in a proportional relationship and why.

If YES, write the equation in the form $y = kx$ for the proportion.

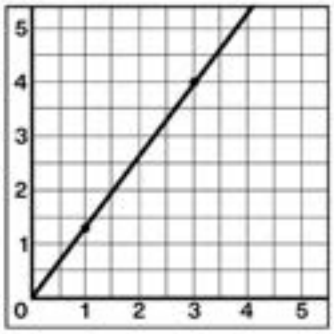
x	y
12	9
16	12
20	15

You mix ½ cup yellow paint for every ¼ cup of blue paint to get a great shade of green.
Fill in the table for this proportion.

Yellow Cups	Blue Cups	Green Cups
1/2	1/4	3/4
1		
	2	
		9

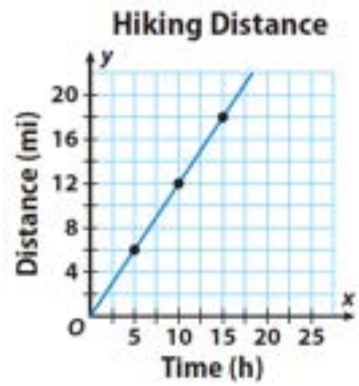
The constant of proportionality is _______. Every blue is ____________ as much as yellow.

Find the constant of proportionality from the graph.
Then write an equation for the proportion in the form $y = kx$. (hint: k is a fraction)



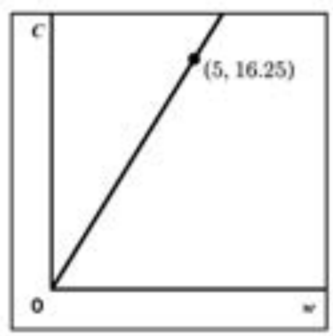
Find the constant of proportionality from the graph.
Tell what it means in this situation.

I hiked 30 minutes at this rate. How many miles did I hike?



This graph shows the cost $\boldsymbol{C}$ in dollars of $\boldsymbol{w}$ weight in pounds of strawberries.
This relationship is a proportion. Select ALL the true statements.

- 3.25 pounds of strawberries costs \$1.00.
- 1 pound of strawberries costs \$3.25.
- 4 pounds of strawberries cost \$13.
- 10 pounds of strawberries cost \$32.50
- The point (3, 10) is on the graphed line.



It costs \$5 to buy 2 pounds of gummy worms.
Fill in the ratio table models to figure out how much different pounds of candy would cost.

How much would 9 pounds cost?

How many pounds can we buy for \$17.50?

dollars					
pounds					

SET 4 – LINEAR EQUATIONS / SLOPE INTRO (3 sides) 7TH Pre-Algebra Entering 8th Algebra

SKILLS:

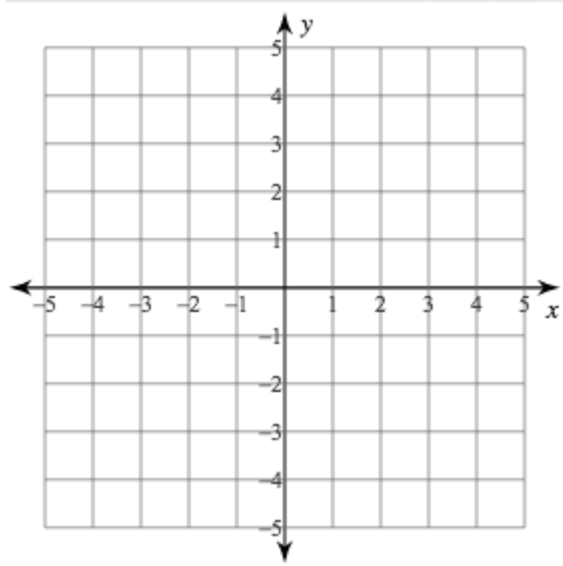
I CAN construct a table of values and graph a given linear equation in two variables.
I CAN describe slope as a ratio of vertical to horizontal change.
I CAN find the slope given a graph and given coordinates.
I CAN identify positive slope, negative slope, and slope of vertical and horizontal lines.
I CAN write equations in slope-intercept form.
I CAN interpret slope and y-intercept when solving problems.

KEY UNDERSTANDINGS:

Given a linear equation in two-variables, when I choose independent values (x) and put them into the equation, I generate dependent y-values and then graph ordered pairs on the line.
Slope is a RATIO of vertical change to horizontal change. Similar triangles *(equivalent height/base ratios, stairsteps)* can visualize slope, which is constant in a linear equation.
Given a graph, I can "count" up or down and over to find the slope.
Given a pair of coordinates, I can subtract y-values and x-values to create the $\frac{\Delta y}{\Delta x}$ slope ratio.
The slope intercept form $y = mx + b$ is useful because the coefficient is the slope, and the constant term is the y-intercept.
When solving problems, the slope is rate of change and the constant shows what is fixed.

Follow our guidelines to choose three values for x.
Generate a table of values for the equation $\boldsymbol{y = \frac{2}{3}x - 2}$.
Then graph the equation.

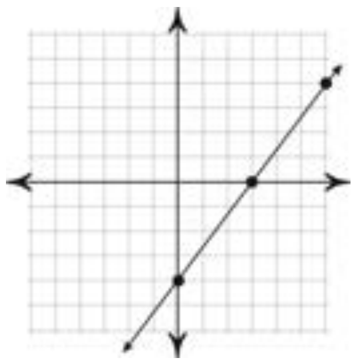
$\boldsymbol{x}$	$\boldsymbol{\frac{2}{3}x - 2}$	$\boldsymbol{y}$	$\boldsymbol{(x, y)}$

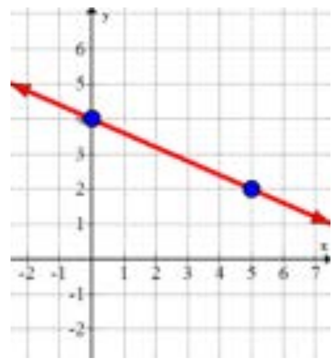


You and a friend are in-line skating at a park with lots of hills.
You start from an elevation of 720 feet and go up to 750 feet; it takes you 30 minutes.
Your friend skates starting from an elevation of 600 feet to 690 feet and it takes him one hour.

Who skates at a faster rate?
Find the slopes for you and your friend (vertical/horizontal change) to compare your rates of change.

Use the graphs to find the slope of these lines.

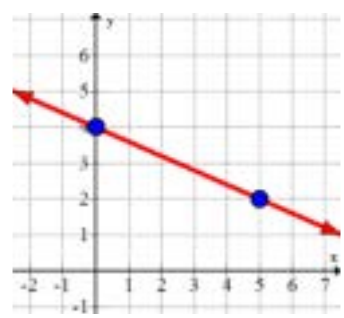




Find the slope of the line passing through these points. Show $\frac{\Delta y}{\Delta x}$ ratio.

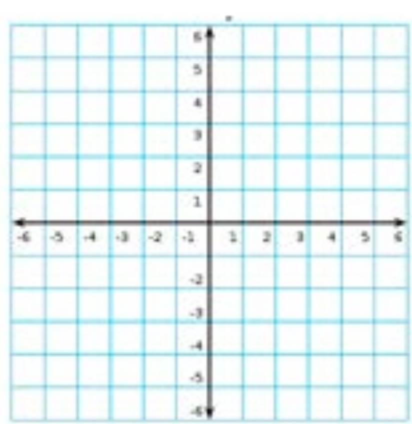
$(-2, 3)\quad (-4, -1)$

Write the equation of this line in slope-intercept form.



Graph both the equations $\boldsymbol{y = 2x - 3}$ and $\boldsymbol{y = 2x}$ on the same coordinate plane.

Then compare and contrast these equations by listing at least five observations – similarities and differences.

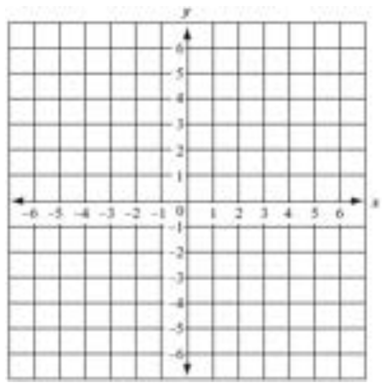


Graph the line given the slope and y-intercept. How? Graph the y-intercept; then "use" slope to find the next point.

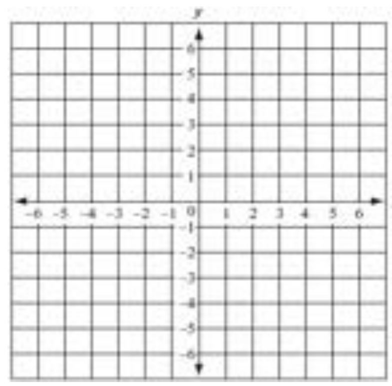
$y = -2x + 3$

slope: ______

y-intercept: ______



Graph the line passing through $(-3, -4)$ with a slope of 3/4. How? Graph the point, then "use" slope to find the next point.



To paint a house, a painting company first charges a flat fixed fee of $500 for supplies PLUS a rate of $50 for each hour of labor needed to do the job.

Fill in the table to show the total costs for different number of hours worked. Then graph.

Is this a proportional relationship? __________. Tell why or why not.

Hours, x, independent	Total Cost y, dependent
0	500
5	750
10	
15	
20	
25