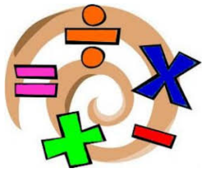
Summer Math Review 2023: 7th Pre-Algebra Entering 8th Algebra 1



Dear Students and Parents,

One of my goals is for each of you to develop a solid foundation for a successful transition to the pace and depth of Algebra 1. Important algebra-readiness skills include flexibility with integers and fractions, proportional reasoning, fluency with algebraic language, and understanding properties used for solving equations. Successful Algebra 1 students are curious problem-solvers, willing to think, to reason, and to apply different strategies. In short, successful learners are curious, resilient, and find ways to use what they know to "figure it out".

What did we learn this year? This packet has a page for each unit – from scale drawings to slope. Use the number relationships you know to help you figure things out! That's how to make the connections necessary for deep learning. Working thoughtfully will help you begin Algebra 1 feeling confident. Your Algebra 1 journey will begin with an assumption you are proficient with these skills and concepts.

I do not recommend calculators or SIRI (do you think I would?). Think about what the best strategy for the problem would be, and if it doesn't work, try again. Check to see if you have really answered the question and if your answers are reasonable. You have sharp number sense; don't forget to use it as you reason with number relationships.

I know we all are going to enjoy a well-deserved break this summer! I encourage you use this packet as an efficient way to fit a bit of reasoning and review into your summer schedule.

I am so proud of your efforts, mindset, attitude, and resilience during this year.
By showing up and playing along, you made our classroom a great place for learning.

Have a wonderful summer!

Mrs. Matthews

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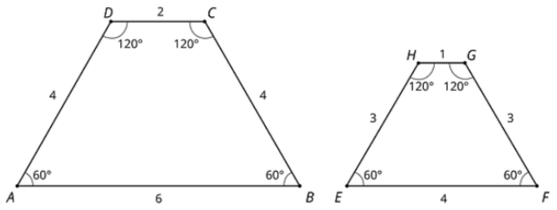
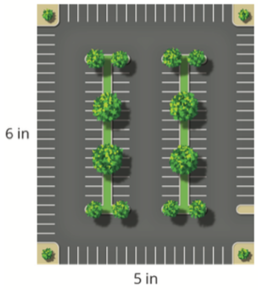
SET 1 - SCALE DRAWINGS (2 sides) 7TH Pre-Algebra Entering 8th Algebra

SKILLS:

I CAN explain what a scale factor is and can use it to create scale copies.
I CAN understand how corresponding lengths in scaled copies form equivalent ratios.
I CAN use ratio tables as a strategy when working with equivalent ratios.
I CAN describe the effects of scale factors >, <, or =1.
I CAN use reciprocals to go back and forth between an original and its scaled copy.

KEY UNDERSTANDINGS:

When I multiply each side of a figure by the same scale factor, I create a scaled copy.
Scale factors >1 create a larger copy; <1 create a smaller copy; =1 create a same-size copy.
To "undo" scaling and go back to the original, use the reciprocal of the scale factor.
Each corresponding side length of an original and its scaled copy form equivalent ratios.
Corresponding angles of an original and scaled copy are congruent.

Tell if these two polygons are scaled copies. Clearly explain your reasoning. 	A scale drawing of a rectangular parking lot is 6 in. long by 5 in. wide. The actual parking lot is 240 ft. long. What is the width of the actual parking lot? 
Rectangle A measures 8 in. by 2 in. Rectangle B is a scaled copy of Rectangle A. Select ALL the measurement pairs that could be the dimensions of Rectangle B. a.) 40 in. by 10 in. b.) 10 in. by 2.5 in. c.) 9 in. by 3 in. d.) 7 in. by 1 in. e.) 6.4 in. by 1.6 in. f.) $\frac{2}{3}$ ft. by $\frac{1}{6}$ ft.	A rectangle measures 12 by 56 inches. A scaled copy has been made using a factor of 3/4. a.) What are the dimensions of the scaled copy? b.) What is the perimeter of the original copy? Of the scaled copy? c.) If you want to scale the copy back to its original size, what scale factor should you use?

Select ALL the scales that are equivalent to 1 inch to 1 foot.

a.) 1 to 12

b.) 1/12 to 1

c.) 100 to 0.12

d.) 7 to 84

e.) 9 to 108

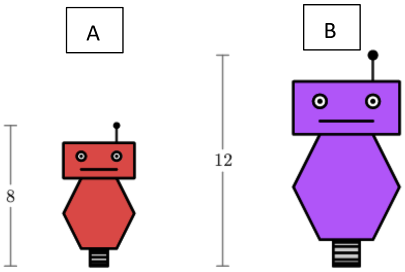
f.) 36 to 3

A scale drawing of a truck has a scale of ¾ inch to 5 feet. The length of the truck on the **drawing** is 10 ½ inches. Use the scale to find the **actual** length of the truck. *(ratio table is helpful)*

Find the scale factors. Simplify if possible.

a. From A to B

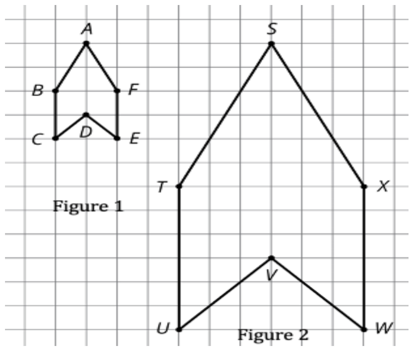
b. From B to A



Each grid square on the figure is one unit.

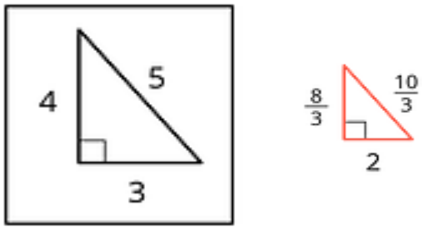
a. What is the scale factor from Figure 1 to 2?

b. Segment CD measures 2.24 cm. What measure is the corresponding segment in Figure 2?

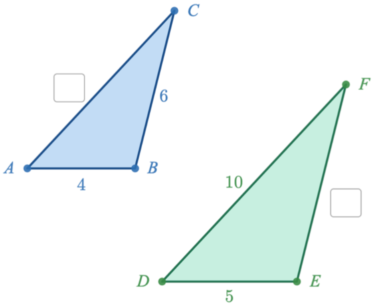


Is the smaller triangle a scaled copy of the larger triangle? ____________

If it is a scaled copy, write the scale factor.



Triangles ABC and DEF are similar triangles (scaled copies). Find the missing side lengths. Support your reasoning.

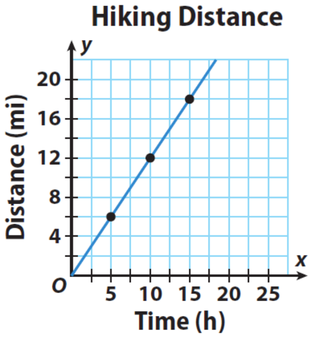


SET 2 – PROPORTIONAL RELATIONSHIPS (2 sides) 7TH Pre-Algebra Entering 8th Algebra

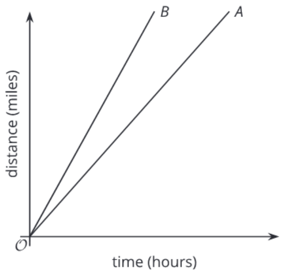
SKILLS:
I CAN understand proportions as a set of equivalent ratios.
I CAN describe proportions in words, ratio tables, equations, and graphs.
I CAN solve problems with proportions.

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.
The equation $y = kx$ (y is k times x) can be written to describe a proportion.
The graph of a proportion is a straight line through the origin.

Find the constant of proportionality from this graph and tell specifically *what it means* in this situation



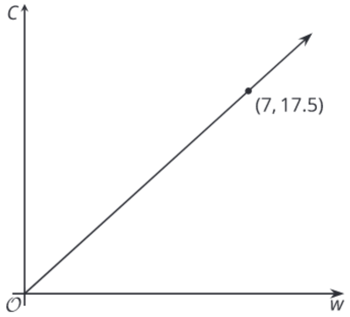
The two lines represent the distance, over time, two cars are traveling. Which car is traveling more ***slowly***? Explain how you know.



This graph shows the cost C in dollars of w pounds of peanuts, a proportional relationship.

Select ALL the true statements.

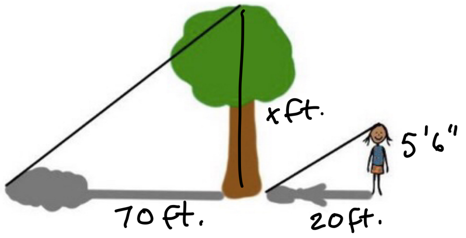
- 17.5 pounds of peanuts costs $7.00.
- The point (4, 10) is on the graph of the proportion.
- 1 pound of peanuts costs $2.50.
- 15 pounds of peanuts cost $25.50.
- 2.5 pounds of peanuts cost $1.00
- C is the dependent variable



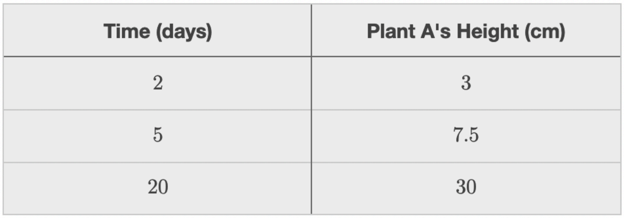
For this data set, tell if x and y are in a proportional relationship and why.
If YES, write the equation in the form $y = kx$ for the proportion.

x	y
12	9
16	12
20	15

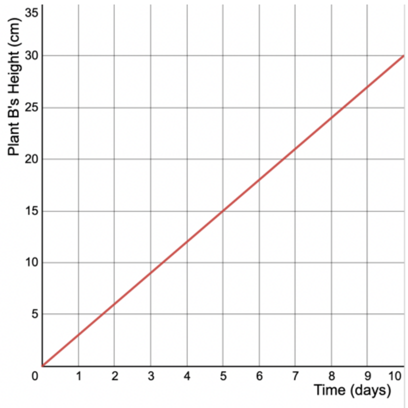
These shadows make similar triangles. Apply proportional reasoning to find the height of the tree.
Note: 5 ft. 6 in. is not the number 5.6, is it?



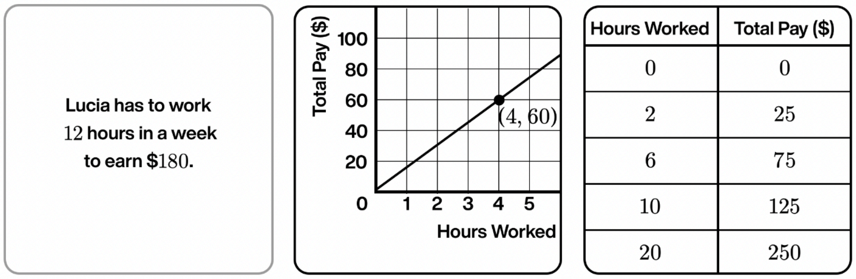
Two seeds were planted, and their heights were measured each day.
Plant A's data was recorded in a table. Plant B's data was graphed.
Which plant grew at a faster rate? Support your reasoning.



Time (days)	Plant A's Height (cm)
2	3
5	7.5
20	30



Here are three cards. Two of them represent the same relationship and one is different.
Which one represents a different relationship than the others?



Lucia has to work
12 hours in a week
to earn $180.

Hours Worked	Total Pay ($)
0	0
2	25
6	75
10	125
20	250

SET 3 – POSITIVE / NEGATIVE NUMBERS (3 sides) **7TH Pre-Algebra Entering 8th Algebra**

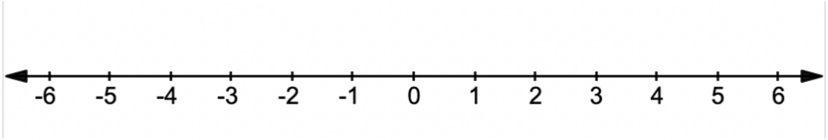
SKILLS:

- **I CAN understand models of distance and direction on the number line.**
- **I CAN compute efficiently with signed rational numbers.**
- **I CAN 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.**
- **Order of operations is followed 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.) $-720\ /-6$ 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.

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

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

Tell if the sign of the expression $\boldsymbol{-6\frac{1}{9} - 2\frac{11}{12}}$ is *negative* or *positive*; 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.) $-\frac{1}{3} + \frac{3}{4}$ ______ $-\frac{3}{4} + \frac{1}{3}$

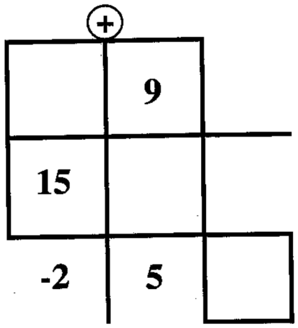
d.) $\frac{1}{4} \div 2$ ______ $\frac{1}{4} \div \frac{1}{2}$

e.) $-4.8 - (-12)$ ____ $-4.8 + 12$

“If a and b are *positive* integers, then $a - b$ MUST ALWAYS be a positive integer.”

Is this correct? Support your answer with a number example.

Integer Two-Way
ADD across to the right and down.
(think subtraction when finding missing addends..)



Follow order of operations to find the value of these expressions.

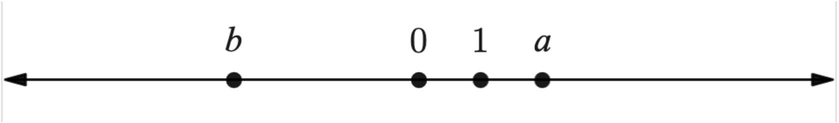
$5 \cdot (-2) - (1-6)^2$

$-1 + 3^2 - 6 \cdot 5$

Select all the expressions with a ***positive*** value based on the positions of a and b.

(Select all that apply.)

☐ $-b$ ☐ $a+b$ ☐ $a-b$ ☐ $a \cdot b$ ☐ $-\frac{b}{a}$



Fill in the missing values in this table.

Value		Expression					
a	b	$-a$	ab	$-ab$	$a-b$	$b-a$	$-a+b$
$\frac{1}{2}$	-6						

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SET 4 – EXPRESSIONS AND EQUATIONS (3 sides) 7TH Pre-Algebra Entering 8th Algebra

SKILLS:

- **I CAN "translate" to 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 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)*, and equations with variables on both sides *("move" variables to one side, number to the other, then solve)*.**
- **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.

- $\frac{1}{4}$ 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

Identify the parts of this expression.

$$\boldsymbol{-a - 3b + 2c - 4}$$

What are the three coefficients?

What is the constant term:

How many terms are there?

How many variables are there?

Is this expression simplified?

Combine like terms to simplify:

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

$8x - 5 - 10x + 7$

Distribute to write an equivalent expression:

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

$-\frac{1}{4}\,(-3x + \frac{1}{2})$

Distribute first, then combine like terms to simplify:

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

$4(0.2x - 0.3) - (2x - 1)$

Solve the equation with proper algebraic steps.

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

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

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

Solve the equation with proper algebraic steps.
Can you clear fractions?

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

Solve the equation with proper algebraic steps.

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

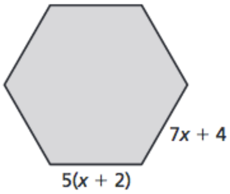
Solve the equation with proper algebraic steps. Can you clear fractions?

$$\frac{7}{8} - \frac{1}{4}x = \frac{1}{2}x - \frac{1}{4}$$

Solve the equation with proper algebraic steps.

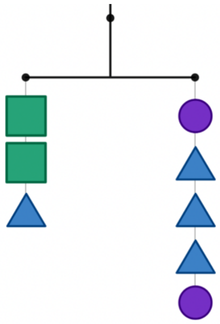
$$13.4x - 3 = 2(-3 - 4.3x)$$

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



In this balanced hanger, the square is 12 grams, and the circle is 9 grams.

Find the weight of the triangle.



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

My variable is ________. It stands for ______________

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SET 5 – LINEAR EQUATIONS / SLOPE INTRO (2 sides) 7TH Pre-Algebra Entering 8th Algebra

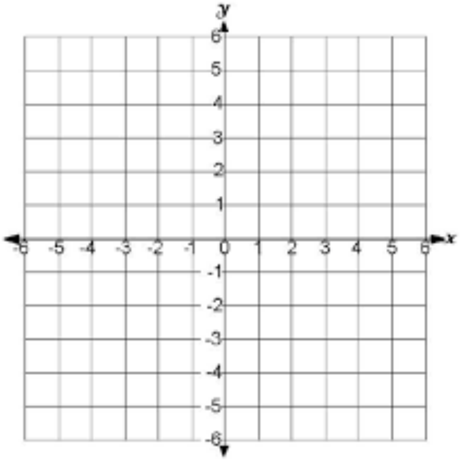
SKILLS:
I CAN construct a table of values and graph a given linear equation in two variables.
I CAN describe slope as a ratio of vertical to horizontal change.
I CAN find the slope given a graph and given coordinates.
I CAN identify positive slope, negative slope, and slope of vertical and horizontal 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 can generate 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)* are a great way to visualize slope. Slope 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.

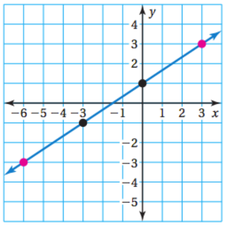
Make a table of values following our guidelines. How? The x-variable is independent, so you get to choose x. Guidelines: choose 3 values for x: a positive, zero, and a negative. Input your x-value into the equation to generate (output) the y-value. Once you have your (x, y) ordered pairs, graph them!

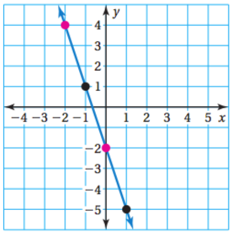
$$\boxed{y = -\frac{1}{3}x + 4}$$

x	$-\frac{1}{3}x + 4$	y	(x, y)



Find the slope of each line from the graph.

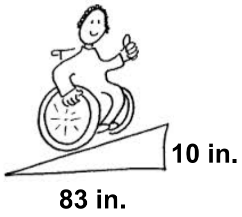




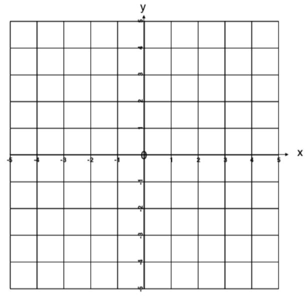
Find the slope of the line that goes through these points. Write the $\frac{\Delta y}{\Delta x}$ ratio to support your answer.

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

Engineers use the word "grade" to describe the steepness of a road; it is written as a percent. Which is steeper, this wheelchair ramp or a road with an 8% grade? *Support your answer using slope*.

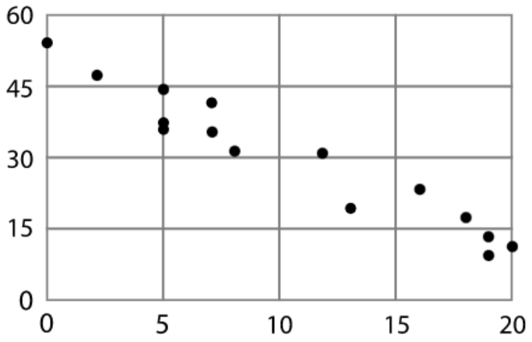


Sketch *(just sketch, no equation)* a line with a positive slope and a negative y-intercept. Through which 3 quadrants does it pass?



Which of these statements is true about the relationship of the data in this scatter plot?

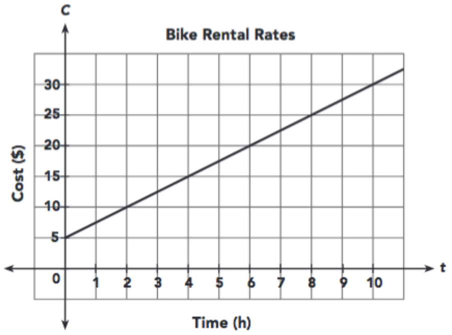
- As x increases, y tends to increase.
- As x increases, y tends to decrease.
- As x increases, y tends to stay the same.



To rent a bike, Ralphie pays a flat rate plus an hourly fee. The graph shows the dollars ***C***, paid for the number of hours, ***h,*** the bike is used.

a.) Find the y-intercept from the graph.
Tell what it means in this situation.

b.) Find the slope from the graph.
Tell what it means in this situation.

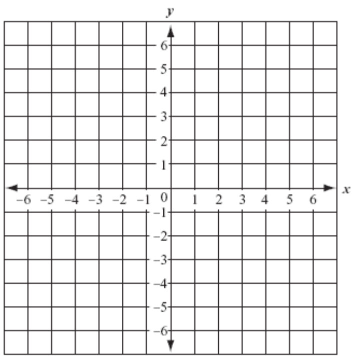


Graph the line given the slope and y-intercept. How? Graph the y-intercept; then "use" slope to find the next point.

$\boldsymbol{y = -2x + 3}$

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.