Understand the Slope-Intercept Equation for a Line

Name: _____

Prerequisite: How can you represent and interpret proportional relationships?

Study the example problem showing how to represent and interpret a proportional relationship. Then solve problems 1–5.

Example

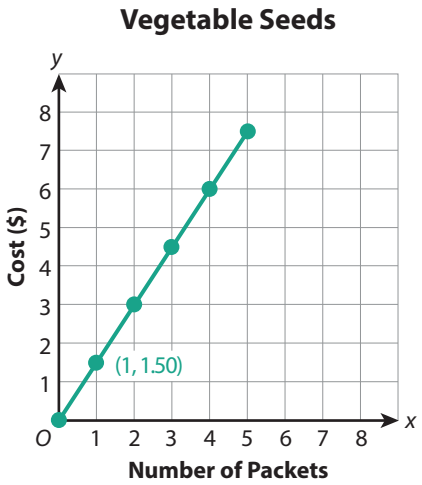
The table shows the costs for 2, 3, 4, and 5 vegetable seed packets. What is the unit rate?

Vegetable Seeds

Number of Packets	2	3	4	5
Cost ($)	3.00	4.50	6.00	7.50

Use the data to make a graph. Find the cost of 1 seed packet.

The unit rate is the cost in dollars for 1 packet. The graph shows that the unit rate is 1.50.



1 How you can use the table to find the unit rate in the example problem?

_____

_____

2 What is the constant of proportionality in the example? What is the slope of the graph? What do they represent in the context of this problem? How do the constant of proportionality and slope relate to the unit rate?

_____

_____

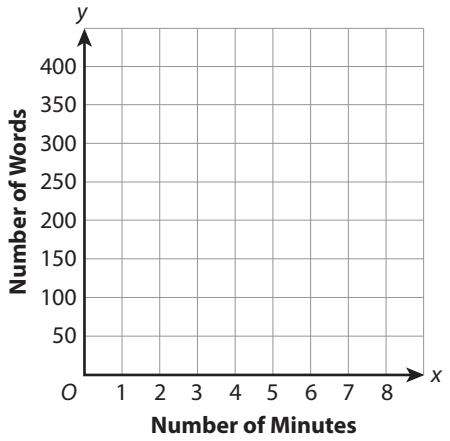
Solve.

3 The table shows how many words Julian can type if he types at a steady rate. Use the information in the table to make a graph. Find the slope of the graph and explain what it means in this situation.

Typing Rate

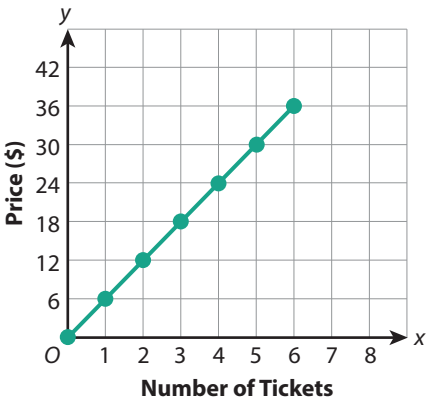
Number of Minutes	2	4	6	8
Number of Words	80	160	240	320

Typing Rate



4 The price for movie tickets at Town Theater is shown in the graph. The price of 5 movie tickets at Center Theater is $3.75 greater than the price of 5 movie tickets at Town Theater. What is the price per ticket at each theater?

Town Theater Tickets



5 A hardware store buys 300 feet of nylon rope. The store sells the rope by the inch. A customer can purchase 40 inches of the rope for $1.60. The store sells all of the rope and makes a profit of $54. How much did the store pay for the rope in dollars per inch?

Show your work.

Solution: _____

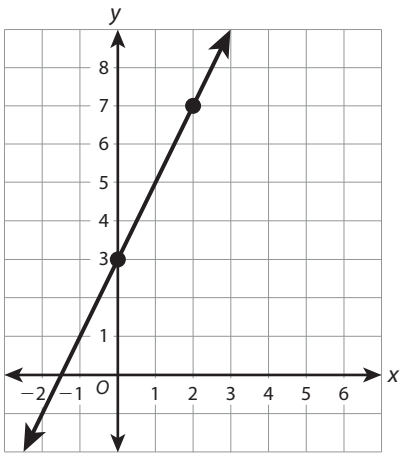
Name: _____

Writing a Linear Equation in Slope-Intercept Form

Study the example problem showing how to write an equation in slope-intercept form. Then solve problems 1–6.

Example

Write an equation for the line shown in the diagram.



Find the slope of the line.

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{2 - 0}$ Use the slope formula. Substitute 7 for y_2, 3 for y_1, 2 for x_2, and 0 for x_1.

$m = \frac{4}{2}$, or 2 Simplify. The slope is 2.

The line passes through (0, 3), so the *y*-intercept is 3. Use the slope-intercept form $y = mx + b$ to write an equation.

$y = mx + b$
$y = 2x + 3$ Substitute 2 for m and 3 for b.

An equation for the line is $y = 2x + 3$.

1 How is the equation $y = 2x$ similar to the equation $y = 2x + 3$ in the example problem? How is it different?

_____

_____

2 Graph $y = 2x$ in the diagram above. Compare the graphs. Does either graph represent a proportional relationship? Explain.

_____

_____

_____

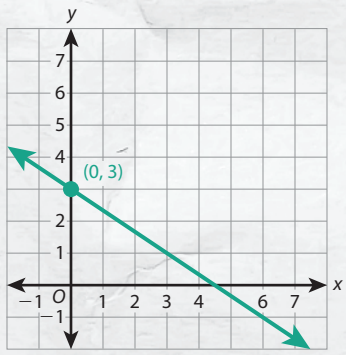
3 What value of b makes $y = 2x + b$ the same as $y = 2x$? What does that value mean?

_____

Vocabulary

slope the ratio of the vertical change (rise) to the horizontal change (run) between any two points on a line.

***y*-intercept** the *y*-coordinate of the point where a graph intersects the *y*-axis.



The y-intercept is 3.

Solve.

4 Andy uses the table below to write a linear equation.

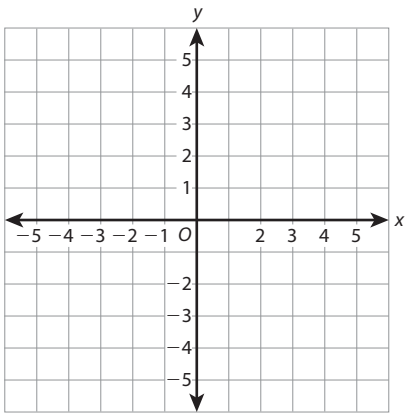
x	−1	0	1	2
y	2	4	6	8

He says he can write an equation of the form $y = mx$ for the given values. Is he correct? Explain your reasoning.

5 Look at these equations. Write each equation in slope-intercept form. Are the equations the same or different? Explain.

$y + 1 = 2x - 3$ $\quad$ $2x - 3 = y + 1$ $\quad$ $2y + 2 = 4x - 6$

6 Explain how you can write an equation for a line with slope $\frac{1}{2}$ that crosses the y-axis at the point (0, –1). Graph the line for your equation.



Name: _____

Reason and Write

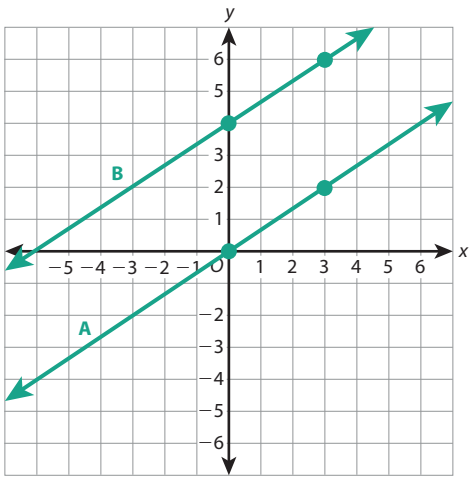
Study the example. Underline two parts that you think make it a particularly good answer and a helpful example.

Example

Draw two lines that have the same slope on the coordinate grid. Let one represent a proportional relationship and one represent a relationship that is not proportional. Label one line A and the other B.

Predict how you expect the slope-intercept equations of your lines to be similar and different. Then write the equations to check your predictions.

Show your work. Use graphs, words, and numbers to explain your answer.



I predict that the slope-intercept equations will have the same value for *m* because the lines have the same slope. The equations will have different values for *b*, because Line A crosses the *y*-axis at (0, 0) and Line B crosses the *y*-axis at (0, 3).

To write the equations, I first find the slope and *y*-intercept of each line. Line A: slope $= \frac{2-0}{3-0} = \frac{2}{3}$, *y*-intercept $= 0$; Line B: slope $= \frac{6-4}{3-0} = \frac{2}{3}$, *y*-intercept $= 4$. Equation for Line A: $y = \frac{2}{3}x$. Equation for Line B: $y = \frac{2}{3}x + 4$.

My predictions were correct. The equations have the same value for *m*, $\frac{2}{3}$, and different values for *b*, 0 and 4.

Where does the example . . .

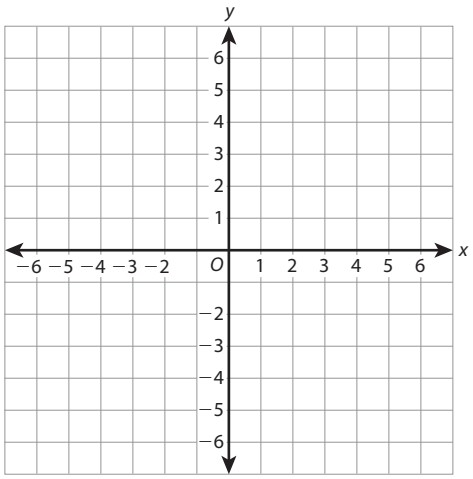
- answer each part of the problem?
- use a graph to explain.
- use words to explain?
- use numbers to explain?

Solve the problem. Use what you learned from the model.

Draw two lines that both represent proportional relationships but have different slopes. Label one line A and the other B.

Predict how you expect the slope-intercept equations of your lines to be similar and different. Then write the equations to check your predictions.

Show your work. Use graphs, words, and numbers to explain your answer.



Did you . . .

- answer each part of the problem?
- use a graph to explain.
- use words to explain?
- use numbers to explain?