

Warm-Up

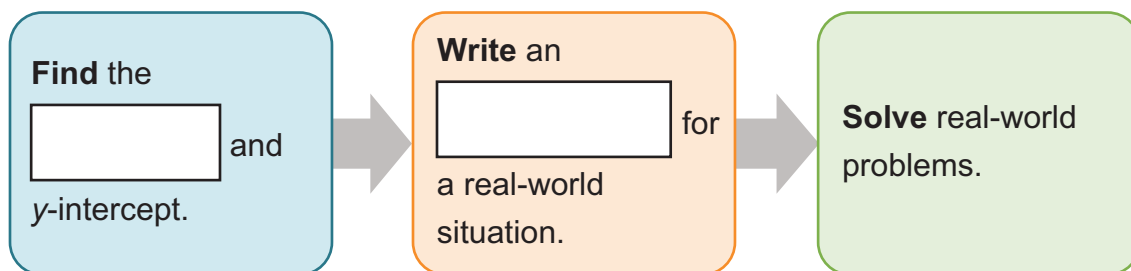
Applying Linear Functions



Lesson Question



Lesson Goals



Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

input	a value that is transformed by a process and becomes <input type="text"/>
output	the <input type="text"/> of an input that has been transformed by a process
slope	the <input type="text"/> of the change in the dependent values (outputs) to the change in the independent values (inputs) between two points on a line

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Words to Know

slope-intercept form	the form of a <input type="text"/> relation that is written as is $y = mx + b$, where m and b are real numbers, m is the <input type="text"/> and b is the y -intercept of the line
y -intercept	the y -coordinate of the point where the graph of a line <input type="text"/> the y -axis

Input and Output in the Real World

- **Input** is the number or value substituted into an expression or .
- **Output** is the number or value that results from the of a given input into an expression or function.
- **Slope** represents the of change. The rate of change in a linear relationship is constant.
- The **y -intercept** represents the value, or starting value.

Slope-Intercept Form

$$y = mx + b$$

O S I Y

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Writing a Linear Function from a Table

In the table below, x represents miles driven and y represents the cost to travel by taxi.

Miles: x input	Cost: y output
2	6.50
5	11.75
8 x_1	17 y_1
12 x_2	24 y_2

- Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{24 - 17}{12 - 8}$$

$$= \frac{7}{4}$$

$$m = \boxed{}$$

- Find the y -intercept.

$$y = mx + b$$

$$17 = 1.75(8) + b$$

$$17 = \boxed{} + b$$

$$\boxed{} = b$$

- Write the equation in **slope-intercept form**.

$$y = mx + b$$

$$y = \boxed{}$$

Interpreting a Linear Function

The cost of a taxi can be expressed by the linear function $y = 1.75x + 3$.

What does the slope represent?

$$m = \boxed{}$$

It represents the cost for each mile traveled.

What does the y -intercept represent?

$$b = \boxed{}$$

It represents the cost when you enter the taxi.

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Finding the Slope and Y-Intercept of a Line

EXAMPLE

The graph shows the membership of a student group, where x represents the number of years since the group was formed and y represents the number of members. Find the slope and y-intercept.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{80 - 38}{5 - 2}$$

$$= \frac{42}{3}$$

$$= \boxed{}$$

$$y = mx + b$$

$$38 = 14(2) + b$$

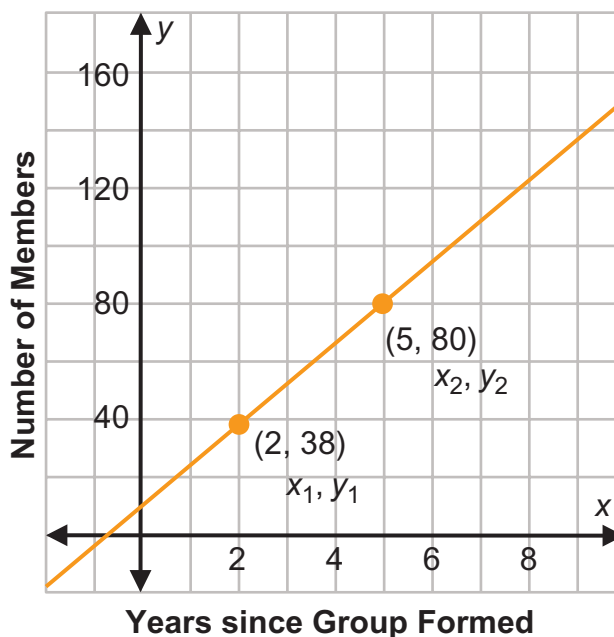
$$38 = \boxed{} + b$$

$$\boxed{} = b$$

$$y = mx + b$$

$$y = \boxed{}$$

The slope is 14, and the y-intercept is 10.



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Interpreting a Linear Function

The membership of a student group is expressed by the equation $y = 14x + 10$, where x represents the number of years since the group was formed and y represents the number of members.

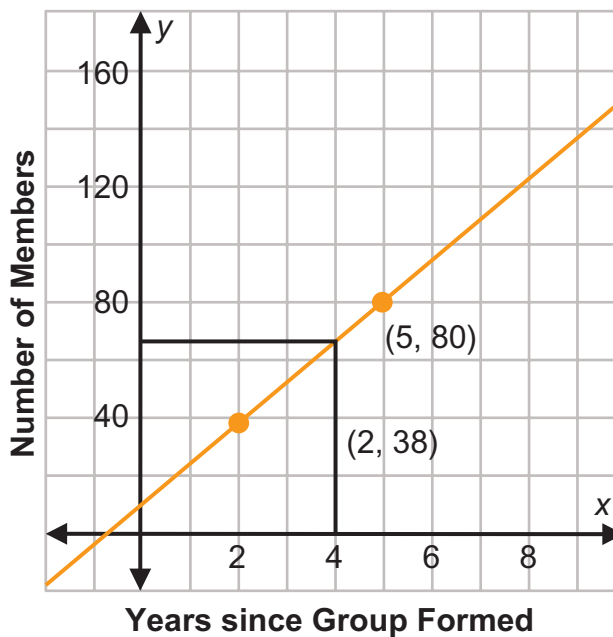
- The y -intercept (when $x = 0$) shows that the initial membership was .
- How many members did the group have after 4 years?

$$y = 14x + 10$$

$$y = 14(4) + 10$$

$$y = \text{} + 10$$

$$y = \text{$$



After 4 years, the group had 66 members.

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Input and Output in Real-World Relationships

EXAMPLE

Justin bought a share of stock in a cell phone company. Four weeks after his purchase, the price for the share was \$78.61. Fourteen weeks after his purchase, the price was \$71.71.

What is the input?

$x = \#$ of since the stock purchase.

What is the output?

$y =$ the of the stock

List the ordered pairs based on the information in the problem.

(4, 78.61) (,)

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Finding the Slope in the Real World

The relationship between the weeks Justin has owned a stock, x , and its price, y , is linear. Find the slope between the two points: (4, 78.61) and (14, 71.71). Use the formula to calculate slope:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Find the **slope**.

$$\begin{aligned} m &= \frac{71.71 - 78.61}{14 - 4} \\ &= \frac{-6.9}{10} = \text{\texttt{[]}} \end{aligned}$$

What does the **slope** represent?

The slope represents the in the stock price each week. It decreases \$0.69 each week.

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Finding the Y-Intercept in the Real World

The relationship between the weeks Justin has owned a stock, x , and its price, y , is linear. Use the slope, $m = -0.69$, and one of the points to find the y -intercept.

$$(4, 78.61) \text{ and } (14, 71.71)$$

Find the y -intercept.

$$y = mx + b$$

$$78.61 = -0.69(4) + b$$

$$78.61 = \boxed{} + b$$

$$\boxed{} = b$$

What does the y -intercept represent?

The y -intercept represents the $\boxed{}$ price of the stock.

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Solving a Linear Function

The price of the cell phone stock is expressed by the linear equation $y = -0.69x + 81.37$, where x represents the number of weeks Justin has owned the stock and y represents the price of the stock. If this relationship continues, what would be the price of the stock after 10 weeks?

$$y = -0.69x + \boxed{}$$

$$y = -0.69(10) + 81.37$$

$$y = \boxed{} + 81.37$$

$$y = \boxed{}$$

The price of the stock after 10 weeks will be \$74.47.

Summary

Applying Linear Functions



Lesson Question

How can you represent a real-world situation with a linear function?



Answer

Use this space to write any questions or thoughts about this lesson.