


### Solve and Discuss It!

Eight year-old Alex is learning to ride a horse. The trainer says that a horse ages 5 years for every 2 human years. The horse is now 50 years old in human years. How can you determine the age of the horse, in human years, when Alex was born?



**Lesson 7-8**  
Understand the y-intercept of a Line

Go Online | PearsonRealize.com

**I can...**  
find the y-intercept of a graph and explain what it means.

**Focus on math practices**

**Use Structure** A veterinarian says that a cat ages 8 years for every 2 human years. If a cat is now 64 years old in cat years, how old is the cat in human years?

439

**Essential Question** What is the y-intercept and what does it indicate?

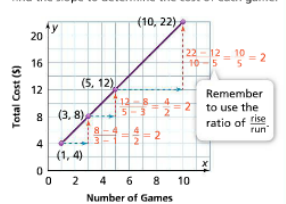
**EXAMPLE 1** Determine the y-intercept of a Relationship

Mathilde and her friend are going bowling. She can rent shoes at the bowling alley or use her mother's old bowling shoes. How can she determine how much money she will save if she brings her mother's old bowling shoes?

**Look for Relationships** What pattern can you see in the costs of different numbers of games?

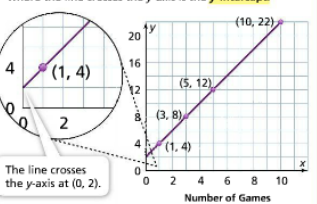
One game	\$4.00
Three games	\$8.00
Five games	\$12.00
Ten Games	\$22.00

**STEP 1** Write the number of games and the cost as ordered pairs. Graph the ordered pairs and then find the slope to determine the cost of each game.



The slope is 2. That means the cost of each game is \$2.

**STEP 2** Extend the line to show where the line crosses the y-axis. The y-coordinate of the point where the line crosses the y-axis is the **y-intercept**.



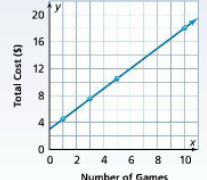
The line crosses the y-axis at (0, 2).

The y-intercept is 2. That means that the cost of shoe rental is \$2. Mathilde saves \$2 if she brings her mother's old bowling shoes.

Scan for Multimedia

**Try It!** Prices for a different bowling alley are shown in the graph. How much does this bowling alley charge for shoe rental? The line crosses the y-axis as (     ,     ). The y-intercept is     .

**Convince Me!** In these examples, why does the y-intercept represent the cost to rent bowling shoes?



440 7-8 Understand the y-intercept of a Line

Go Online | PearsonRealize.com

**EXAMPLE 2** The y-Intercept of a Proportional Relationship

A robotic assembly line manufactures a set number of parts per minute. Use a graph to verify how many parts the assembly line manufactures when it is first turned on.

**STEP 1** Predict the number of parts.

The machine has not made any parts when it is first turned on, so the answer should be 0.

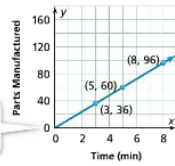
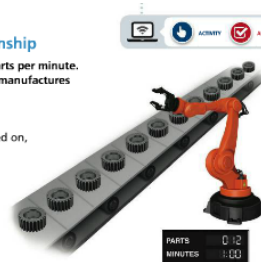
**STEP 2** Determine the number of parts manufactured at different intervals.

Parts Manufactured	12	36	60	96
Time (minutes)	1	3	5	8

**STEP 3** Plot the points. Then draw a line to connect the points.

The y-intercept is 0. That agrees with the prediction. No parts are manufactured when the robotic assembly line is first turned on.

The line passes through the origin (0, 0).



**EXAMPLE 3** Identify the y-Intercept

What is the y-intercept for each of the linear relationships shown?



The line crosses the y-axis at (0, 2). The y-intercept is 2.



The line crosses the y-axis at (0, -1). The y-intercept is -1.



The line crosses the y-axis at (0, 0). The y-intercept is 0.

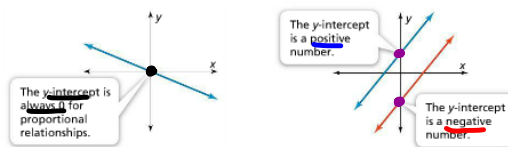
**Try It!**

What is the y-intercept of each graph? Explain.



**KEY CONCEPT**

The y-intercept is the y-coordinate of the point on a graph where the line crosses the y-axis. When the line crosses through the origin, the y-intercept is 0. When the line crosses above the origin, the y-intercept is positive. When the line crosses below the origin, the y-intercept is negative.



slope

$$y = mx + b$$

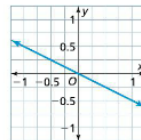
y-intercept

**Do You Understand?**

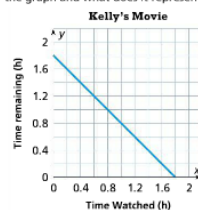
- Parental Question** What is the y-intercept and what does it indicate?
- Look for Relationships** Chelsea graphs a proportional relationship. Bradyn graphs a line that passes through the origin. What do you know about the y-intercept of each student's graph? Explain your answer.
- Generalize** When the y-intercept is positive, where does the line cross the y-axis on the graph? When it is negative?

**Do You Know How?**

- What is the y-intercept shown in the graph?



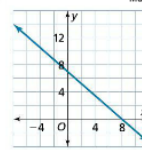
- The graph shows the relationship between the remaining time of a movie and the amount of time since Kelly hit "play." What is the y-intercept of the graph and what does it represent?



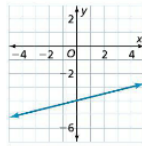
Name: \_\_\_\_\_

**Practice & Problem Solving**

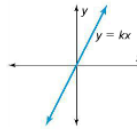
6. **Leveled Practice** Find the y-intercept of the line.  
 The y-intercept is the point where the graph crosses the -axis.  
 The line crosses the y-axis at the point (, ).  
 The y-intercept is .



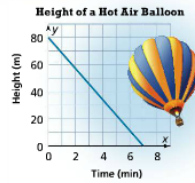
7. Find the y-intercept of the graph.



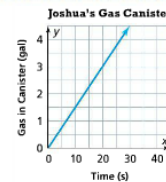
8. Find the y-intercept of the graph.



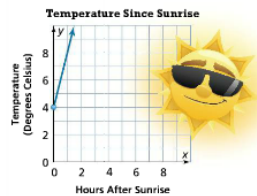
9. The graph represents the height  $y$ , in meters, of a hot air balloon  $x$  minutes after beginning to descend. How high was the balloon when it began its descent?



10. **Model with Math** The graph represents the amount of gasoline in a canister after Joshua begins to fill it at a gas station pump. What is the y-intercept of the graph and what does it represent?



11. The line models the temperature on a certain winter day since sunrise.  
 a. What is the y-intercept of the line?  
 b. What does the y-intercept represent?

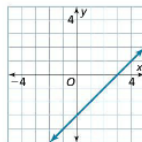


12. **Higher Order Thinking** Your friend incorrectly makes this graph as an example of a line with a y-intercept of 3.  
 a. Explain your friend's possible error.  
 b. Draw a line on the graph that does represent a y-intercept of 3.

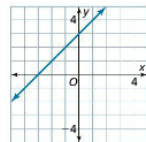
*our friend mixed up the x- and y-intercepts.*

**Assessment Practice**

13. What is the y-intercept of each graph?



y-intercept:



y-intercept:

14. Which statements describe the graph of a proportional relationship? Select all that apply.

- The y-intercept is always at the point (0, 1).
- The line always crosses the y-axis at (0, 0).
- The y-intercept is 0.
- The y-intercept is 1.
- The line does not cross the y-axis.

