Name _____

5-10A Compare Functions with Different Representations

Objective To compare two linear functions that are represented in different ways

Two hot-air balloons are descending. When Hunter starts timing their descents, the green-striped balloon is at 3000 feet, descending at a rate of 480 feet per minute. Hunter recorded the solid orange balloon's heights in the table. Compare the descents.

Height of Solid Orange Balloon	
Time (min)	Height (feet)
1	2380
3	1540
5	700

▶ To compare the descents, you can use tables, equations, graphs, or verbal descriptions to represent the descents. Since each descent is a function, represent both descents in the same way so you compare the two functions.

Representation 1 Use equations.

Green-Striped Balloon:

- Write an equation in slope-intercept form using the given information.

$y = -480x + 3000$ ← Use $y = mx + b$.

Solid Orange Balloon:

- Write an equation in slope-intercept form by finding the slope and using it to write an equation.

Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1540 - 2380}{3 - 1}$$

$$= \frac{-840}{-2} = -420$$

Use the point-slope form to write an equation.

$$y - y_1 = m(x - x_1)$$

$$y - 2380 = -420(x - 1)$$

Rewrite the equation in slope-intercept form.

$$y - 2380 = -420x + 420$$

$$y - 2380 + 2380 = -475x + 420 + 2380$$

$$y = -420x + 2800$$

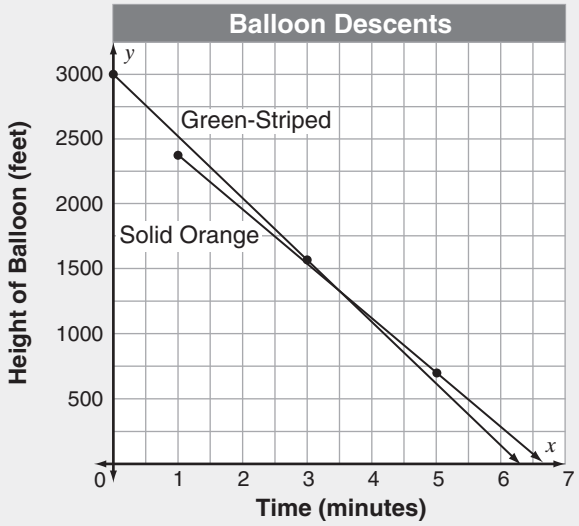
Representation 2 Use a graph of both functions.

Green-Striped Balloon:

- Use the slope-intercept equation from Representation 1 to find the x-intercept and y-intercept. When $x = 0$, $y = 3000$ and when $y = 0$, $x = 6.25$. Plot these points and draw a line.

Solid Orange Balloon:

- Plot the three points from the table and draw a line.



- **Compare the equations and the graphs.**

The equations show that the green-striped balloon started exactly 200 feet higher than the solid orange balloon. The graphs show that the green-striped balloon reached the ground first. Both equations and graphs show decreasing functions with negative slope, but the slope for the green-striped balloon is steeper, so it descended faster.

1. Discuss and Write Which representation of a function would be most efficient to use to compare intercepts? Explain.

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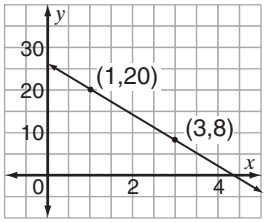
Compare the function described in the graph, table, or verbal description to the function represented by the equation $y = 10x$.

2.



3.

x	y
−14	12
−9	15
−4	19
1	21

4. A bag of dog food initially contains 20 pounds of food pellets. Leo's dog eats 10 ounces of food pellets per day. Let x be the number of days since the bag was opened and y be the number of ounces of food pellets in the bag.

5. Hector drops a ball from his bedroom window. The initial velocity of the ball is 0 m/s. Each second, gravity causes the velocity of the ball to increase by 9.8 m/s. Let x be time, in s, and y the velocity of the ball, in m/s.

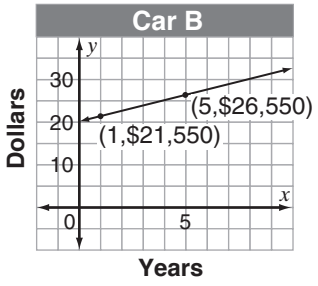
Problem Solving

Write equations using the given information. Then answer the questions.

6. Leah and Dana are sprinting. Leah started 5 feet ahead of Dana. They both started running at the same time. Let x be time, in seconds, and $L(x)$ and $D(x)$ be their distances, in feet, from the start. Dana ran 14 feet per second. Leah's data are in the table below. Who was first to reach 300 feet? By how many feet was she ahead?

x	$L(x)$
1	18.5
3	45.5
5	72.5

7. Two cars have different prices and different operating costs. Assume the total spent on the car, in dollars, is a linear function of the number of years the car is owned. Car A costs $22,500 to buy and $29,500 after 7 years. The graph describes the total cost of Car B. Which car is more expensive after 8 years? How much more?



CRITICAL THINKING

8. In exercise 8, assume there is another car whose total cost is given by the equation $y = 28{,}000 + 900x$, where x is the time, in years, and y is total cost, in dollars. When will the total cost for this car be the same as the total cost for Car B? Explain how you found the answer.