NAME

Module 9 Using Functions
Lesson 5 Solving Problems Using Functions

Solve. **Variables may vary.**

1a. Write an equation for the function that can be used to find the total area of the walls of a cube-shaped playhouse if each side is x feet long.

$s(x) = 4x^2$

1b. Use the function from exercise 1a to determine the total area of the walls of a cube-shaped playhouse if each side is five feet long.

100 ft^2

2a. Write an equation for the function that can be used to find the number of granola bars in b boxes, if each box contains eight granola bars.

$g(b) = 8b$

2b. Use the function from exercise 2a to determine the number of granola bars in six boxes.

48 granola bars

3a. Write an equation for the function that can be used to find the number of buses needed if n students go on a field trip. Each bus can carry 32 students.

$b(n) = \frac{n}{32}$

3b. Use the function from exercise 3a to determine the number of buses needed if 100 students go on a field trip.

4 buses

4a. Lizzie read the first 30 pages of a novel on vacation. When she returned home, she read ten pages every day. Write a function that can be used to find the total of number of pages Lizzie has read after being home for x days.

$p(x) = 10x + 30$

4b. Use the function from exercise 4a to determine the total number of pages Lizzie had read after being home six days.

90 pages

5a. Roxy borrowed \$190 from her aunt to buy a new DVD player. Each month, she pays her aunt \$15. Write a function that can be used to find the amount of money Roxy owes her aunt after x months.

$m(x) = 190 - 15x$

5b. Use the function from exercise 5a to determine the amount of money Roxy owes her aunt after one year.

\$10

6a. Write a function to show the number of blank pages remaining in a 150-page notebook after p pages have been used.

$f(p) = 150 - p$

6b. Use the function from exercise 6a to determine the number of blank pages remaining after 12 pages have been used.

138 pages

7a. At a basketball camp, 165 players wait to be assigned to teams of five. Write a function to show the number of players remaining after t teams have been assigned.

$f(t) = 165 - 5t$

7b. Use the function from exercise 7a to determine the number of players remaining after seven teams have been assigned.

130 players

8a. The cost for a bakery to produce heart-shaped cakes can be described by a linear function. It costs \$38 to produce ten cakes, and \$53 to produce 15 cakes. Write a linear function that can be used to find the cost of producing x heart-shaped cakes.

$c(x) = 3x + 8$

8b. Use the function from exercise 8b to determine the cost of producing 22 heart-shaped cakes.

\$74

9a. The cost of renting a moving truck can be described by a linear function. It costs \$23.95 to rent the truck and drive 20 miles, and it costs \$27.55 to rent the truck and drive 38 miles. Write a linear function that can be used to find the cost of renting a moving truck for x number of miles.

$c(x) = 0.2x + 19.95$

9b. Use the function from exercise 9a to determine the cost of renting the truck and driving 200 miles.

\$59.95

10a. The depth of the water in a tank t days after a leak forms can be described by a linear function. Write a linear function, if the water level is 41 in. after nine days, and 32 in. after 12 days.

$d(t) = 68 - 3t$

10b. Use the function from exercise 10a to determine the depth of the water before the leak formed.

68 in.

Journal

1. Explain how you know when a real-world situation can be modeled by a function. Give an example from daily life of a situation that might be modeled by a function.
2. In this lesson, the formula for the area of a square was written as $A(s) = s^2$. Explain what the notation $A(s)$ means. What does the notation indicate about the function?
3. When you are given data in a word problem, how do you determine which quantities are the *x*-coordinates and which are the *y*-coordinates of the ordered pairs? Explain by referencing exercises or examples from this lesson.
4. Describe how to write a linear function given two data points.
5. In several exercises and examples in this lesson, an answer had to be rounded up to the nearest whole number. Would it ever make sense to round an answer **down** to the nearest whole number? Explain.

Cumulative Review

Evaluate

1. $f(3)$ if $f(x) = 3x^2 - 4x - 5$ **10**
2. $f(-2)$ if $f(x) = (-2x)^2 - 5x$ **26**
3. $f(0)$ if $f(x) = |x - 5| + (x - 0)^2$ **5**
4. $f(9)$ if $f(x) = \sqrt{3x - 2}$ **5**
5. $f(-6)$ if $f(x) = \frac{3 - x}{2x + 3}$ **–1**
6. $f(9)$ if $f(x) = x^2 - (8 - x)^2$ **80**
7. $f\left(\frac{1}{2}\right)$ if $f(x) = \frac{4x}{x - 1}$ **–4**
8. $f(x + 3)$ if $f(x) = x - 4$ **$x - 1$**
9. $f(\sqrt{x})$ if $f(x) = x^2$ **x**
10. $f(x - 4)$ if $f(x) = x^2 - 2x$ **$x^2 - 10x + 24$**

Possible Journal Response

1. **A situation can be modeled by a function if one quantity depends on the value of another quantity according to a rule. For example, the amount of money spent on CDs depends on the number of CDs purchased.**
2. ***A*(*s*) can be thought of as "the area, *A*, when the length of a side is *s*" or "the area for side length *s*". The *A* was chosen to stand for *area* and the *s* stands for *side length*.**
3. **When given data consisting of two numbers, the independent variable will be the *x*-coordinate, and the dependent variable will be the *y*-coordinate. That is, the quantity that *depends on* the other will be the second element of the ordered pair. For example, the target systolic blood pressure *depends on* the age (not vice versa), so the ordered pairs take the form (age, target systolic blood pressure).**
4. **First, determine the correct order for the data in each ordered pair (see previous answer). Use the ordered pairs to find the slope. If one of the ordered pairs has first element 0, its second element is the *y*-intercept. If not, use the slope and one of the ordered pairs in the formula $y = mx + b$ to calculate *b*. Write the equation in slope–intercept form, using $f(x)$ instead of *y*. The final form will be $f(x) = mx + b$, where *m* and *b* are real numbers.**
5. **Yes. For example, there are *n* students graduating and 400 seats in the auditorium. The number of tickets each student can have (assuming each student must receive the same number of tickets) is $t(n) = \frac{400}{n}$. If $t(n)$ is not a whole number, the answer must be rounded down, since rounding up will result in more than 400 tickets being given out.**