Got It? **5. a.** If you have 7 qt of paint, what domain and range are reasonable for Problem 5?

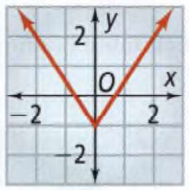
b. Reasoning Why does it *not* make sense to have domain values less than 0 or greater than 3 in Problem 5?

Lesson Check

Do you know HOW?

1. Identify the domain and range of the relation $\{(-2, 3), (-1, 4), (0, 5), (1, 6)\}$. Represent the relation with a mapping diagram. Is the relation a function?

2. Is the relation in the graph shown at the right a function? Use the vertical line test.



3. What is $f(2)$ for the function $f(x) = 4x + 1$?

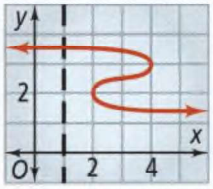
4. The domain of $f(x) = \frac{1}{2}x$ is $\{-4, -2, 0, 2, 4\}$. What is the range?

Do you UNDERSTAND? MATHEMATICAL PRACTICES

5. Vocabulary Write $y = 2x + 7$ using function notation.

6. Compare and Contrast You can use a mapping diagram or the vertical line test to tell if a relation is a function. Which method do you prefer? Explain.

7. Error Analysis A student drew the dashed line on the graph shown and concluded that the graph represented a function. Is the student correct? Explain.



Practice and Problem-Solving Exercises MATHEMATICAL PRACTICES

A Practice

Identify the domain and range of each relation. Use a mapping diagram to determine whether the relation is a function. See Problem 1.

8. $\{(3, 7), (3, 8), (3, -2), (3, 4), (3, 1)\}$

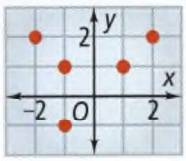
9. $\{(6, -7), (5, -8), (1, 4), (7, 5)\}$

10. $\{(0.04, 0.2), (0.2, 1), (1, 5), (5, 25)\}$

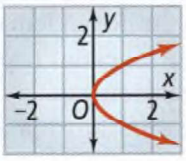
11. $\{(4, 2), (1, 1), (0, 0), (1, -1), (4, -2)\}$

Use the vertical line test to determine whether the relation is a function. See Problem 2.

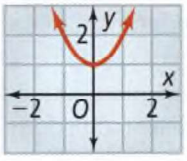
12.



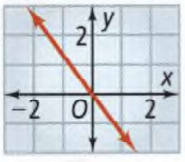
13.



14.



15.



STEM **16. Physics** Light travels about 186,000 mi/s. The function $d(t) = 186{,}000t$ gives the distance $d(t)$, in miles, that light travels in t seconds. How far does light travel in 30 s? See Problem 3.

17. Shopping You are buying orange juice for \$4.50 per container and have a gift card worth \$7. The function $f(x) = 4.50x - 7$ represents your total cost $f(x)$ if you buy x containers of orange juice and use the gift card. How much do you pay to buy 4 containers of orange juice?

Find the range of each function for the given domain. See Problem 4.

18. $f(x) = 2x - 7; \{-2, -1, 0, 1, 2\}$

19. $g(x) = -4x + 1; \{-5, -1, 0, 2, 10\}$

20. $h(x) = x^2; \{-1.2, 0, 0.2, 1.2, 4\}$

21. $f(x) = 8x - 3; \left\{-\frac{1}{2}, \frac{1}{4}, \frac{3}{4}, \frac{1}{8}\right\}$

Find a reasonable domain and range for each function. Then graph the function. See Problem 5.

22. Fuel A car can travel 32 mi for each gallon of gasoline. The function $d(x) = 32x$ represents the distance $d(x)$, in miles, that the car can travel with x gallons of gasoline. The car's fuel tank holds 17 gal.

23. Nutrition There are 98 International Units (IUs) of vitamin D in 1 cup of milk. The function $V(c) = 98c$ represents the amount $V(c)$ of vitamin D, in IUs, you get from c cups of milk. You have a 16-cup jug of milk.

B Apply

Determine whether the relation represented by each table is a function. If the relation is a function, state the domain and range.

24.

x	0	3	3	5
y	2	1	−1	3

25.

x	−4	−1	0	3
y	−4	−4	−4	−4

26. Open-Ended Make a table that represents a relation that is not a function. Explain why the relation is not a function.

27. Reasoning If $f(x) = 6x - 4$ and $f(a) = 26$, what is the value of a? Explain.

28. Think About a Plan In a factory, a certain machine needs 10 min to warm up. It takes 15 min for the machine to run a cycle. The machine can operate for as long as 6 h per day including warm-up time. Draw a graph showing the total time the machine operates during 1 day as a function of the number of cycles it runs.

- What domain and range are reasonable?
- Is the function a linear function?

29. Carwash A theater group is having a carwash fundraiser. The group can only spend \$34 on soap, which is enough to wash 40 cars. Each car is charged \$5.

a. If c is the total number of cars washed and p is the profit, which is the independent variable and which is the dependent variable?

b. Is the relationship between c and p a function? Explain.

c. Write an equation that shows this relationship.

d. Find a reasonable domain and range for the situation.

30. Open-Ended What value of x makes the relation $\{(1, 5), (x, 8), (-7, 9)\}$ a function?

Determine whether each relation is a function. Assume that each different variable has a different value.

31. $\{(a, b), (b, a), (c, c), (e, d)\}$

32. $\{(b, b), (c, d), (d, c), (c, a)\}$

33. $\{(c, e), (c, d), (c, b)\}$

34. $\{(a, b), (b, c), (c, d), (d, e)\}$