Exercises

Dynamic Solutions available at *BigIdeasMath.com*

3.2

Vocabulary and Core Concept Check

COMPLETE THE SENTENCE A linear equation in two variables is an equation that can be written in the form _____, where m and b are constants.

VOCABULARY Compare linear functions and nonlinear functions.

VOCABULARY Compare discrete domains and continuous domains.

WRITING How can you tell whether a graph shows a discrete domain or a continuous domain?

Monitoring Progress and Modeling with Mathematics

In Exercises 5–10, determine whether the graph represents a *linear* or *nonlinear* function. Explain. *(See Example 1.)*

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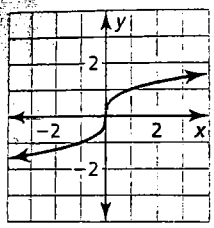

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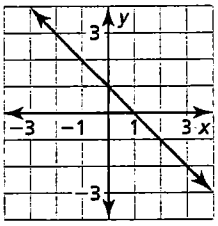

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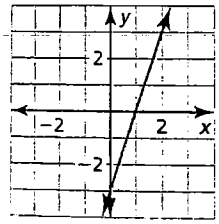

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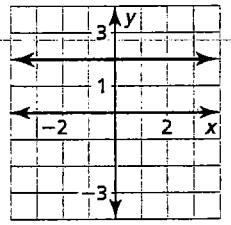

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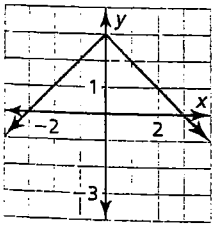

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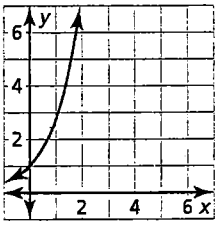


In Exercises 11–14, determine whether the table represents a *linear* or *nonlinear* function. Explain. *(See Example 2.)*

11.

x	1	2	3	4
y	5	10	15	20

12.

x	5	7	9	11
y	−9	−3	−1	3

13.

x	4	8	12	16
y	16	12	7	1

14.

x	−1	0	1	2
y	35	20	5	−10

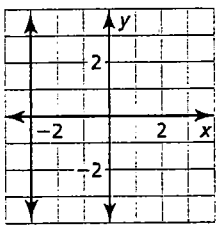
ERROR ANALYSIS In Exercises 15 and 16, describe and correct the error in determining whether the table or graph represents a linear function.

15. ✗

	+2	+2	+2
x	2	4	6	8
y	4	16	64	256
	×4	×4	×4

As x increases by 2, y increases by a constant factor of 4. So, the function is linear.

16. ✗



The graph is a line. So, the graph represents a linear function.

In Exercises 17–24, determine whether the equation represents a *linear* or *nonlinear* function. Explain. *(See Example 3.)*

17. $y = x^2 + 13$

18. $y = 7 - 3x$

19. $y = \sqrt[3]{8} - x$

20. $y = 4x(8 - x)$

21. $2 + \frac{1}{6}y = 3x + 4$

22. $y - x = 2x - \frac{2}{3}y$

23. $18x - 2y = 26$

24. $2x + 3y = 9xy$

25. CLASSIFYING FUNCTIONS Which of the following equations *do not* represent linear functions? Explain.

Ⓐ $12 = 2x^2 + 4y^2$

Ⓑ $y - x + 3 = x$

Ⓒ $x = 8$

Ⓓ $x = 9 - \frac{3}{4}y$

Ⓔ $y = \frac{5x}{11}$

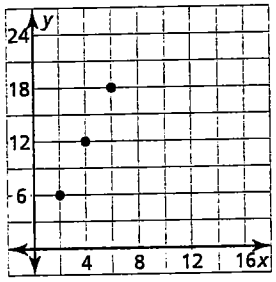
Ⓕ $y = \sqrt{x} + 3$

26. USING STRUCTURE Fill in the table so it represents a linear function.

x	5	10	15	20	25
y	−1				11

In Exercises 27 and 28, find the domain of the function represented by the graph. Determine whether the domain is *discrete* or *continuous*. Explain.

27.



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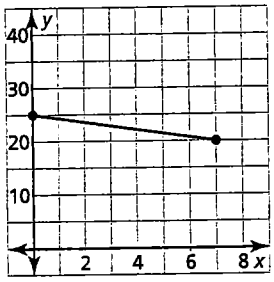


In Exercises 29–32, determine whether the domain is *discrete* or *continuous*. Explain.

29.

Input Bags, x	2	4	6
Output Marbles, y	20	40	60

30.

Input Years, x	1	2	3
Output Height of tree (feet), y	6	9	12

31.

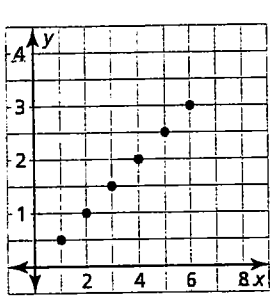
Input Time (hours), x	3	6	9
Output Distance (miles), y	150	300	450

32.

Input Relay teams, x	0	1	2
Output Athletes, y	0	4	8

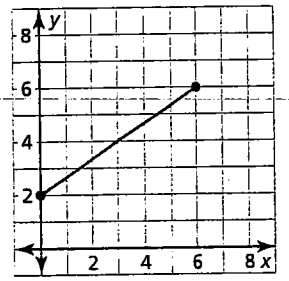
ERROR ANALYSIS In Exercises 33 and 34, describe and correct the error in the statement about the domain.

33.



2.5 is in the domain.

34.



The graph ends at $x = 6$, so the domain is discrete.

35. MODELING WITH MATHEMATICS The linear function $m = 55 - 8.5b$ represents the amount m (in dollars) of money that you have after buying b books. *(See Example 4.)*

a. Find the domain of the function. Is the domain discrete or continuous? Explain.

b. Graph the function using its domain.