

Answers for 4.4

For use with pages 239–242

4.4 Skill Practice

- slope
- The line between the two points rises from left to right.
- The denominator should be $2 - 5$, not $5 - 2$;
$$m = \frac{6 - 3}{2 - 5} = \frac{3}{-3} = -1.$$
- positive; $\frac{2}{3}$ 5. undefined
- negative; $-\frac{1}{2}$
- The slope was calculated using $\frac{\text{run}}{\text{rise}}$, not $\frac{\text{rise}}{\text{run}}$;
$$m = \frac{0 - 3}{12 - 6} = \frac{-3}{6} = -\frac{1}{2}.$$
- 1 9. undefined
- 0 11. $-\frac{5}{2}$
- $-\frac{3}{7}$ 13. 1
- undefined 15. 0
- 5 17. C 18. A
- \$2.25 per day, it costs \$2.25 per day to rent a movie.
- 0, it does not matter how long a person stays at the park, the admission is the same.
- 0.3 22. 0.4 23. 0.1
- 12 25. -15 26. -4

- 2 28. 4 29. -3
- 6 31. -15 32. -24
- Yes; the slope of the line containing both points is -3 .
- No; a line with an undefined slope is a vertical line, which is not the graph of a function.
- Multiply $\frac{y_2 - y_1}{x_2 - x_1}$ by $\frac{-1}{-1}$ to get $\frac{-y_2 + y_1}{-x_2 + x_1}$, which, by the commutative property of addition, is equal to $\frac{y_1 - y_2}{x_1 - x_2}$; it does not matter which point you choose to be (x_2, y_2) and which point is (x_1, y_1) .

4.4 Problem Solving

- Sample answer:* The water level decreases until 8 A.M. and then it increases until 12 P.M.
- a. 0 h to 1.5 h
b. 4.65 h to 8.95 h
- Sample answer:* The altitude of the plane increases during the first 2 hours of the flight, then stays the same for about 45 minutes, and then decreases during the last hour and 45 minutes.

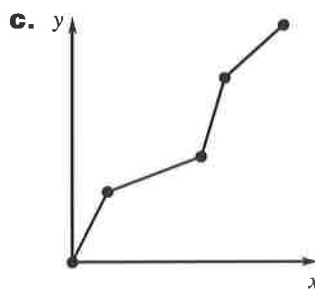
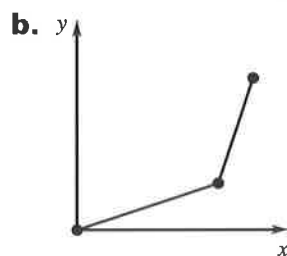
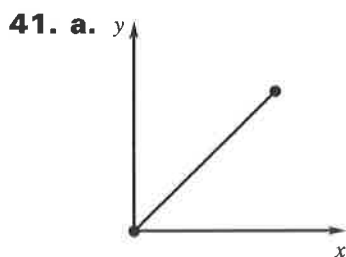
Answers for 4.4 *continued*
For use with pages 239–242

39. Sample answer: The elevation of the hiker increases for about 60 minutes, then stays the same for about 30 minutes, then decreases for the last 60 minutes.

40. a. 1996 to 1998;
about -1500 students per year

b. 1998 to 2000;
about 1500 students per year

c. It increased. *Sample answer:* Although the number of engineering majors went down, it was not by as much as the number of biological science majors and liberal arts majors decreased.



4.4 Mixed Review

42. solution **43.** not a solution

44. solution **45.** not a solution

46. not a solution

47. solution

48. 4 **49.** -3 **50.** ± 7

51. 12 **52.** ± 8 **53.** -6

54. ± 12 **55.** ± 16 **56.** 69

57. $-7, 7$ **58.** $-1, -1$

59. 4, 8 **60.** $-1\frac{2}{3}, 5$

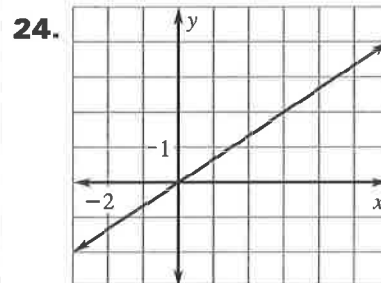
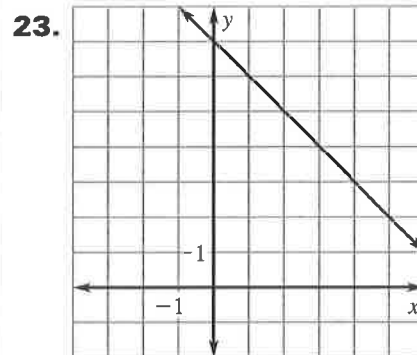
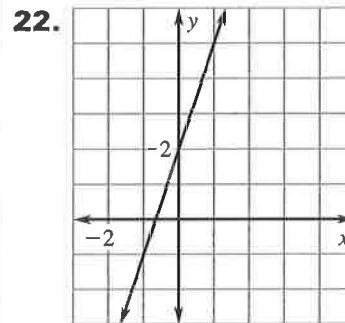
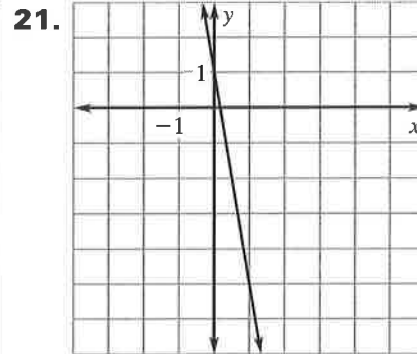
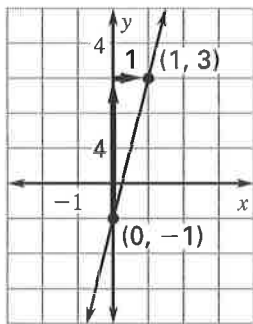
61. $2\frac{1}{2}, -10$ **62.** $1\frac{1}{2}, -9$

Answers for 4.5

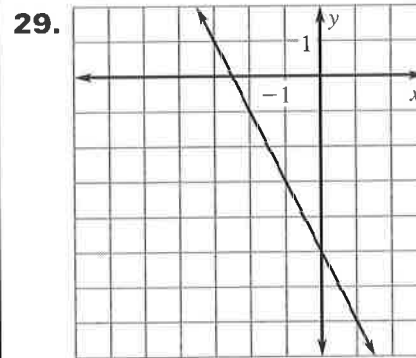
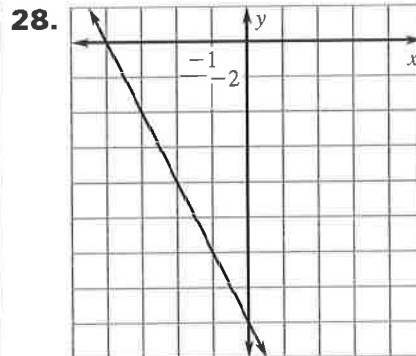
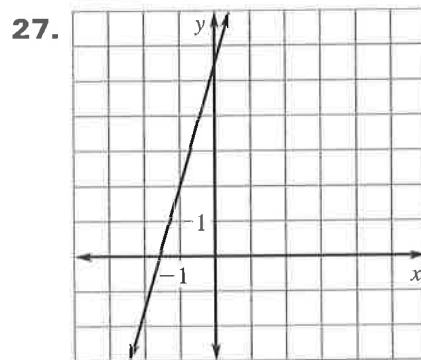
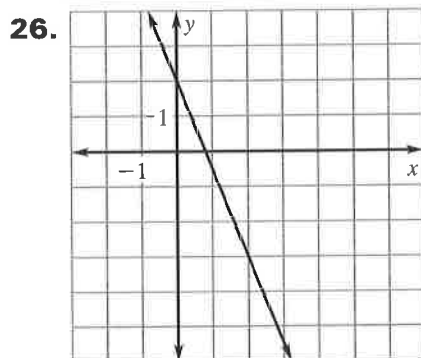
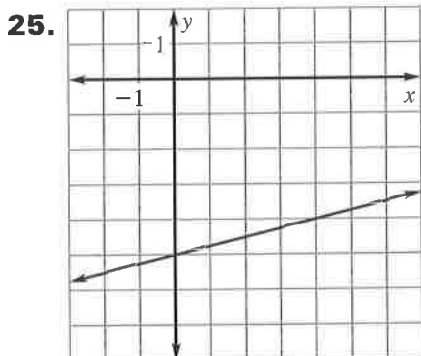
For use with pages 247–250

4.5 Skill Practice

1. parallel
2. $y = mx + b$; because m is the slope and b is the y -intercept.
3. 2, 1 4. $-1, 0$
5. $-3, 6$ 6. $5, -7$
7. $\frac{2}{3}, -1$ 8. $-\frac{1}{4}, 8$
9. A 10. C
11. $y = -4x + 1$; $-4, 1$
12. $y = x - 6$; $1, -6$
13. $y = 2x + 3$; $2, 3$
14. $y = -3x - \frac{1}{2}$; $-3, -\frac{1}{2}$
15. $y = -\frac{2}{5}x - 2$; $-\frac{2}{5}, -2$
16. $y = -\frac{1}{10}x - 2$; $-\frac{1}{10}, -2$
17. B 18. A 19. C
20. The y -intercept is -1 , not 1 ;



Answers for 4.5 *continued*
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30. blue and green
 31. red, blue, and green
 32. Not parallel; the slopes are 5 and -5 .
 33. Parallel; the slopes are both 3.
 34. Parallel; the slopes are both -0.5 .
 35. Not parallel; the slopes are -4 and $-\frac{1}{4}$.
 36. *Sample answer:* $y = -6x + 5$; the equation has the same slope as $6x + y = 24$, but a different y -intercept.

Answers for 4.5 *continued*
For use with pages 247–250

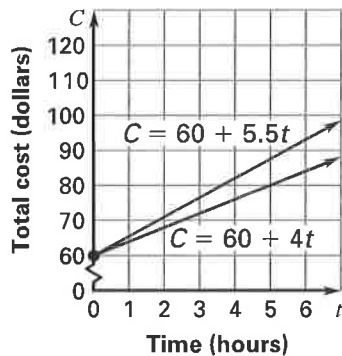
37. -2

38. -23

39. $m = -\frac{A}{B}$, y -intercept $= \frac{C}{B}$; $-\frac{3}{2}, 9$

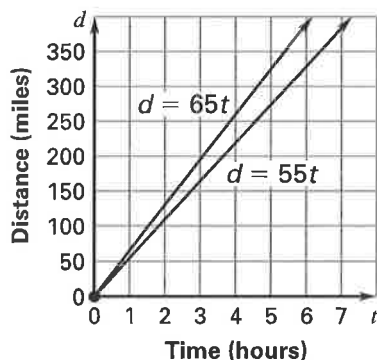
4.5 Problem Solving

40. a–b.



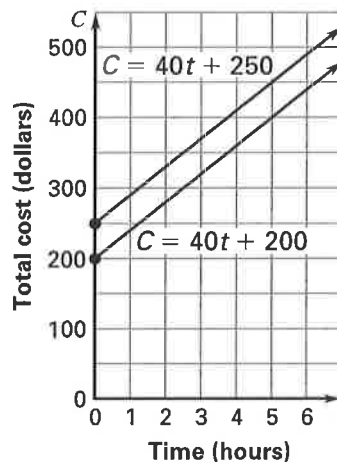
c. \$6

41. a.



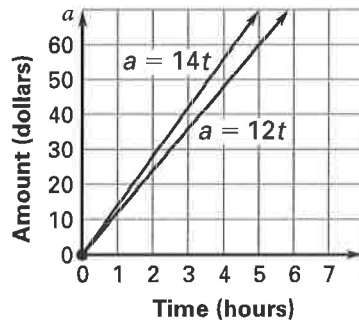
b. 30 mi

42. a.



b. \$50; \$50; the difference is \$50 no matter how many hours it takes to repair the car because the slopes are the same.

43. a.



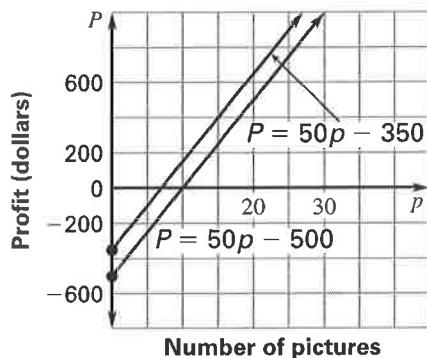
The slopes are the amount of money earned per hour. The a -intercepts show the amount of money made at 0 hours.

b. \$80

Answers for 4.5 *continued*

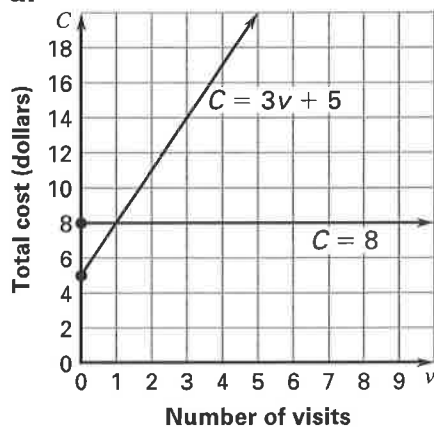
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44. a–b.



- c. Larger booth; if the artist rents the larger booth and sells all the paintings, the artist will make \$5500, if the artist rents the smaller booth and sells all the paintings, the artist will make only \$3650.

45. a.



(1, 8); the point represents when the costs are equal.

- b. A nonstudent pays more than a student after the first visit; a student pays more than a nonstudent when getting certified.

4.5 Mixed Review

46. $3x + 72$ 47. $5x - 25$
 48. $8x - 48$
 49. 2 50. -1.5 51. 1.875
 52. $\frac{1}{6}$ 53. -1 54. 0
 55. 40 56. 3.2 57. -2

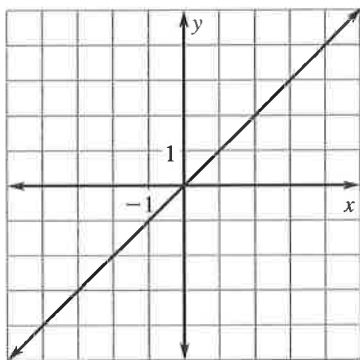
Answers for 4.6

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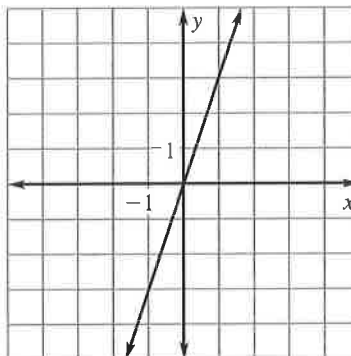
4.6 Skill Practice

1. direct variation
2. No; a direct variation equation has a y -intercept of 0.
3. direct variation; 1
4. not direct variation
5. not direct variation
6. direct variation; $\frac{1}{3}$
7. direct variation; -4
8. not direct variation
9. C
10. The coefficient of y should be 1, not 3; $y = \frac{5}{3}x$, the constant of variation is $\frac{5}{3}$.

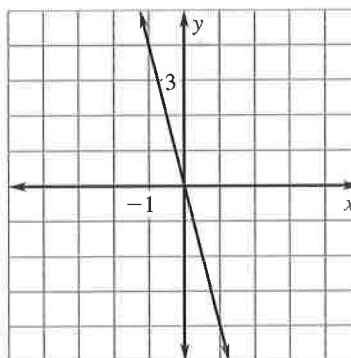
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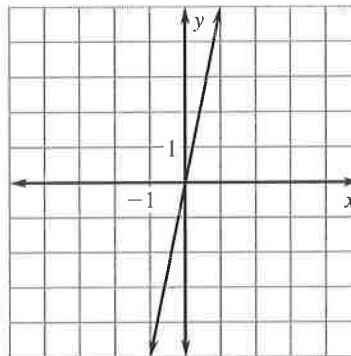
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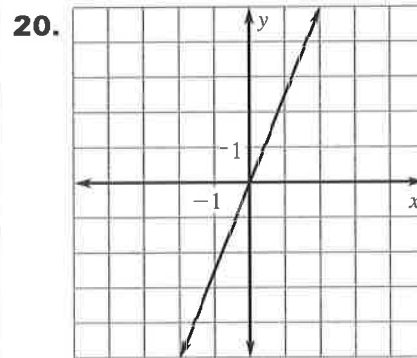
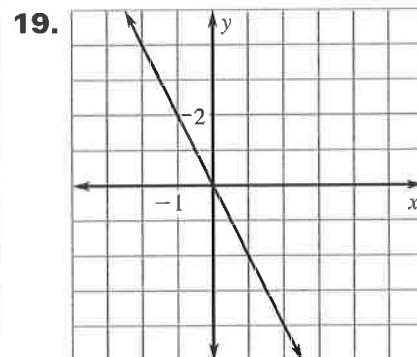
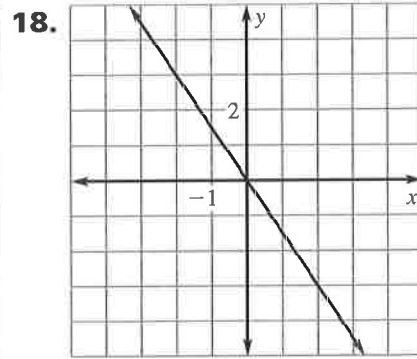
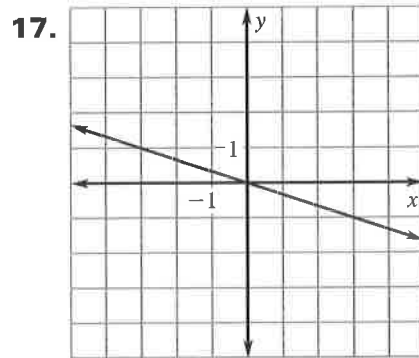
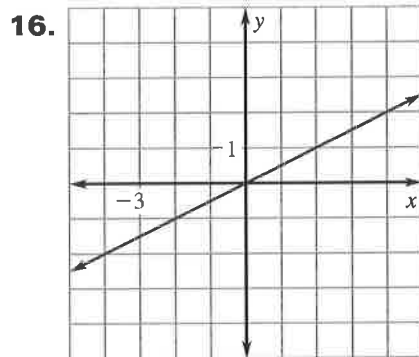
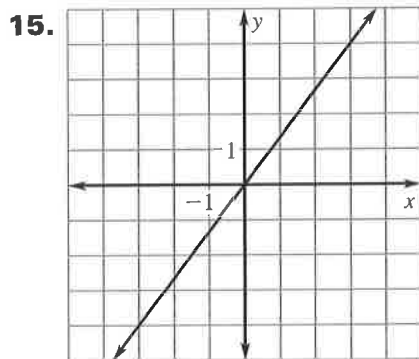
13.



14.

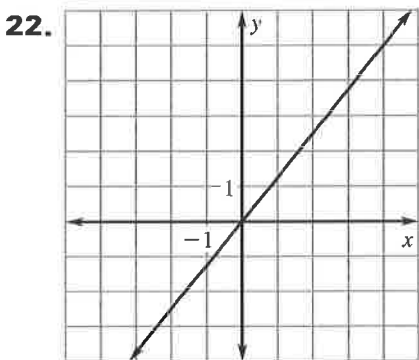
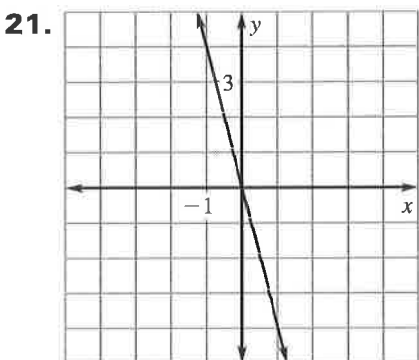


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Answers for 4.6 *continued*
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23. $y = -x; -8$

24. $y = \frac{5}{4}x; 10$

25. $y = -\frac{3}{4}x; -6$

26. direct variation; $y = 5x$

27. not a direct variation

28. *Sample answer:* Each of the ratios $\frac{y}{x}$ should be equal, $\frac{4}{8} \neq \frac{6}{16}$, so y does not vary directly with x .

29. $y = 3x$ 30. $y = 13x$

31. $y = \frac{1}{2}x$ 32. $y = -\frac{1}{3}x$

33. $y = x$ 34. $y = \frac{2}{9}x$

35. $y = 4x$ 36. $y = -\frac{5}{2}x$

37. $y = -\frac{7}{26}x$

38. Yes; the constants of variation are reciprocals of each other; if

$y = a_1x$, then $a_1 = \frac{y}{x}$ and if

$x = a_2y$, then $a_2 = \frac{x}{y}$, which

shows the constants of variation a_1 and a_2 are reciprocals of each other.

39. direct variation

4.6 Problem Solving

40. a. $d = 200r$ b. 3000 m

41. a. $v = \frac{3}{2}t$ b. 12 h

42. $s = 5d$; 15 bags

43. a. Compare the ratios, $\frac{f}{w}$, for all data pairs (w, f) . Since the ratios all equal 0.25, f varies directly with w .

b. $f = 0.25w$; \$7

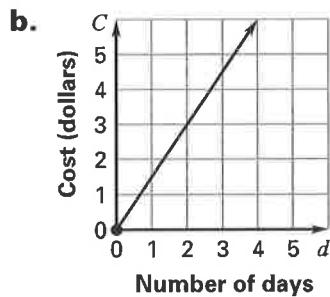
44. a. Compare the ratios, $\frac{p}{\ell}$, for all data pairs (ℓ, p) . Since the ratios all equal 1.25, p varies directly with ℓ .

b. $p = 1.25\ell$; 24 in.

Answers for 4.6 *continued*
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45. a. *Sample answer:*

d	C (dollars)
1	1.5
2	3
3	4.5



c. $C = 1.5d$; yes; it's in the form $y = ax$; \$33.

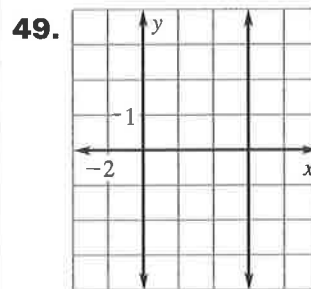
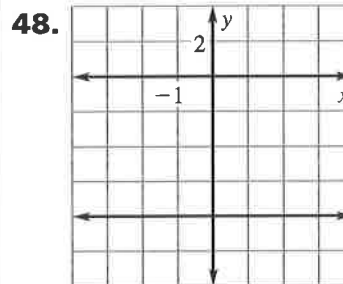
46. a. All of the ratios, $\frac{m}{t}$, are approximately equal to 0.4; $m = 0.4t$; 0.4.

b. about 26 field goals

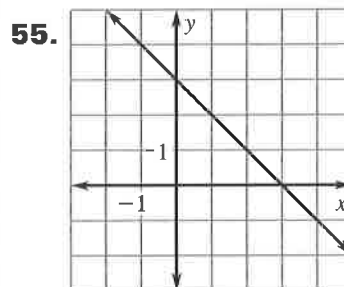
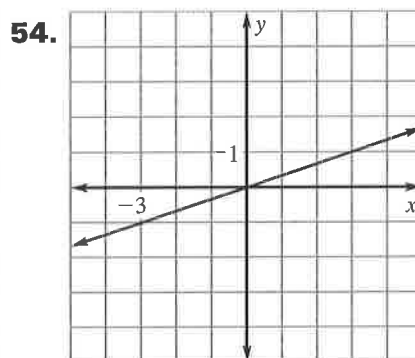
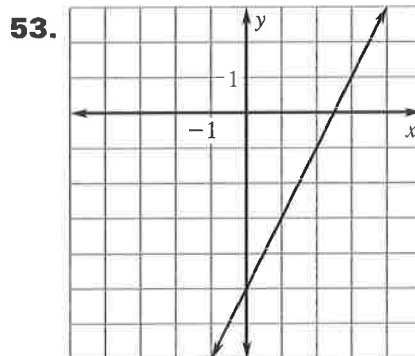
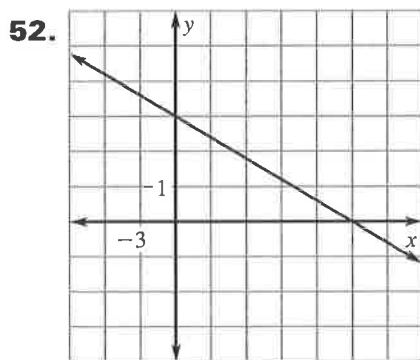
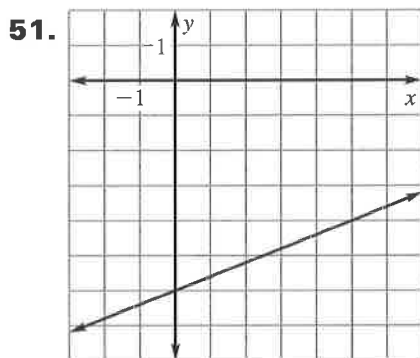
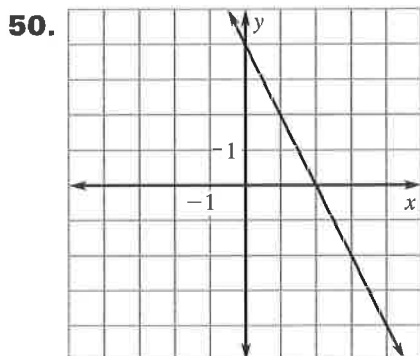
c. No; the ratios, $\frac{m}{t}$, for each season would not be equal to each other.

47. Because $d = 200r$ and r varies directly with p , you can write the equation $r = ap$. When $d = 130$ centimeters, $r = 0.65$. Substitute 0.65 for r when $p = 5$, to get $0.65 = 5a$. Solve to find $a = 0.13$. If you substitute ap for r into the equation $d = 200r$, you get $d = 200(0.13)p$, giving the direct variation equation $d = 26p$.

4.6 Mixed Review



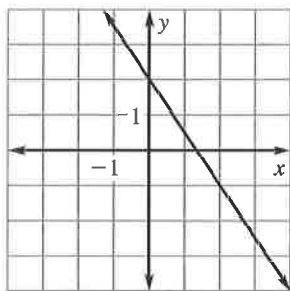
Answers for 4.6 *continued*
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Answers for 4.6 *continued*
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56.



57. 3, 5 58. -3, 0 59. 2, -5

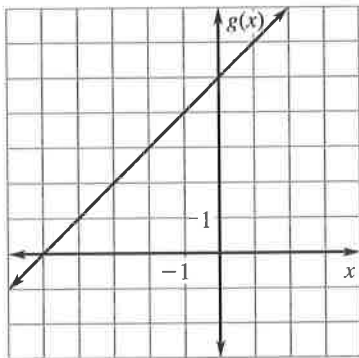
60. 4, -11 61. $\frac{4}{5}, -3$ 62. $\frac{5}{4}, 3.1$

Answers for 4.7

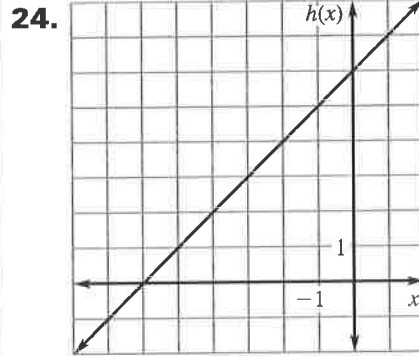
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4.7 Skill Practice

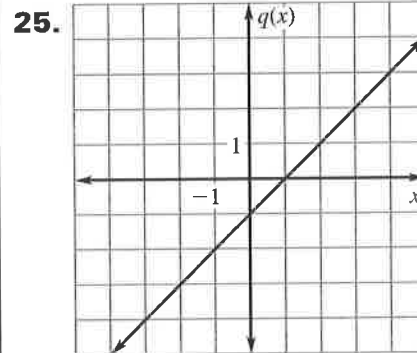
1. function notation
2. Yes; they are all linear functions.
3. $-23, 1, 37$ 4. $11, 5, -4$
5. $14, -2, -26$ 6. $-4.5, 0, 6.75$
7. $13, 0, -19.5$ 8. $0.5, -1, -3.25$
9. $2\frac{1}{5}, 3, 4\frac{1}{5}$ 10. $8, 5, \frac{1}{2}$
11. $-7\frac{1}{2}, -6, -3\frac{3}{4}$
12. $g(-3)$ does not mean multiply -3 and g , it means to find the value of the function when $g = -3, g(-3) = 18$.
13. D 14. -1
15. 3 16. 3
17. -6 18. $\frac{1}{3}$
19. -7.5 20. -2.75
21. 3.5 22. C
- 23.



Because the graphs of g and f have the same slope, $m = 1$, the lines are parallel. The y -intercept of the graph of g is 5 more than the y -intercept of the graph of f .

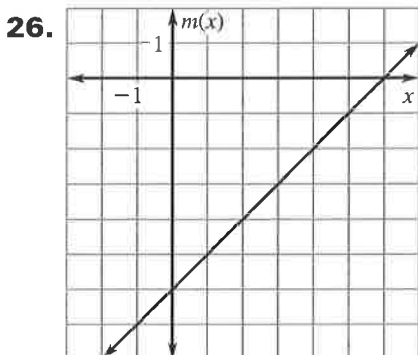


Because the graphs of h and f have the same slope, $m = 1$, the lines are parallel. The y -intercept of the graph of h is 6 more than the y -intercept of the graph of f .

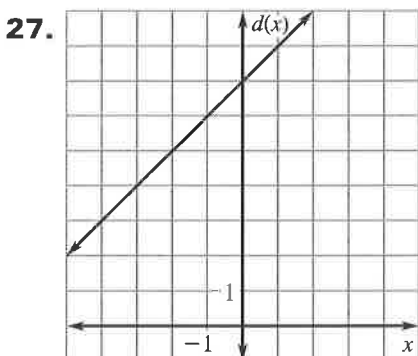


Because the graphs of q and f have the same slope, $m = 1$, the lines are parallel. The y -intercept of the graph of q is 1 less than the y -intercept of the graph of f .

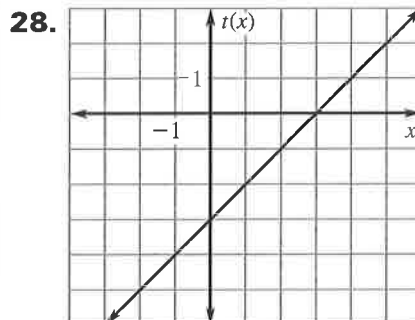
Answers for 4.7 *continued*
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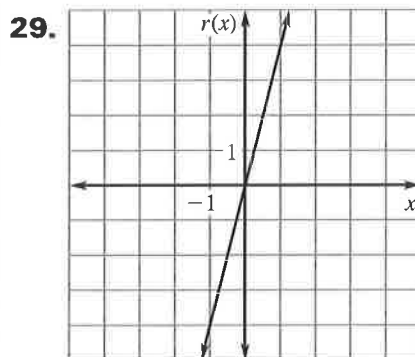
Because the graphs of m and f have the same slope, $m = 1$, the lines are parallel. The y -intercept of the graph of m is 6 less than the y -intercept of the graph of f .



Because the graphs of d and f have the same slope, $m = 1$, the lines are parallel. The y -intercept of the graph of d is 7 more than the y -intercept of the graph of f .

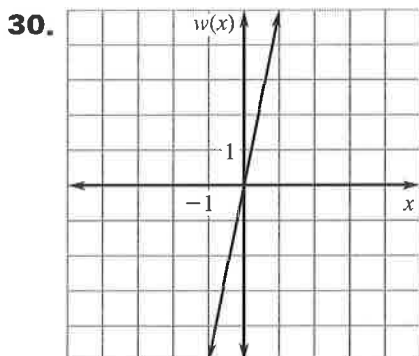


Because the graphs of t and f have the same slope, $m = 1$, the lines are parallel. The y -intercept of the graph of t is 3 less than the y -intercept of the graph of f .

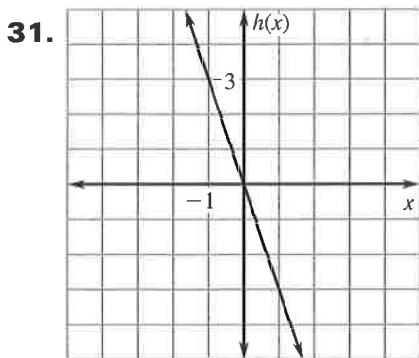


Because the slope of the graph of r is greater than the slope of the graph of f , the graph of r rises faster from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.

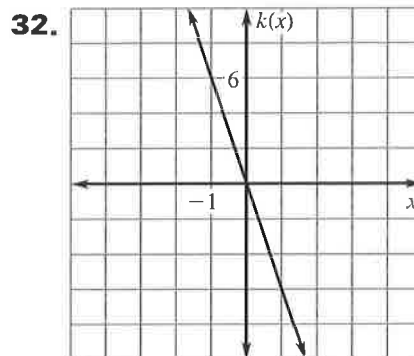
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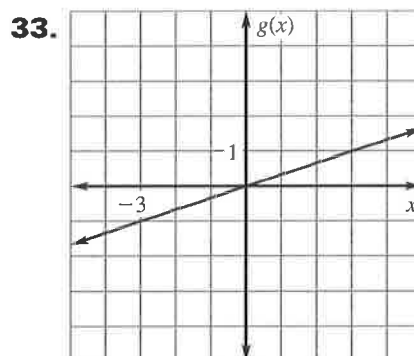
Because the slope of the graph of w is greater than the slope of the graph of f , the graph of w rises faster from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.



Because the slope of the graph of h is negative, the graph of h falls from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.

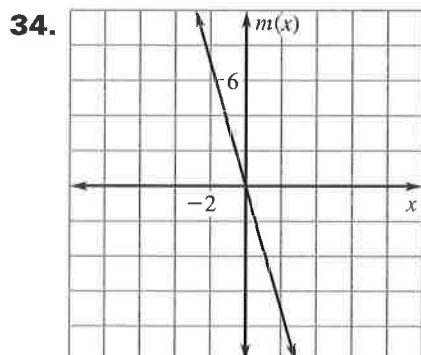


Because the slope of the graph of k is negative, the graph of k falls from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.



Because the slope of the graph of g is less than the slope of the graph of f , the graph of g rises slower from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.

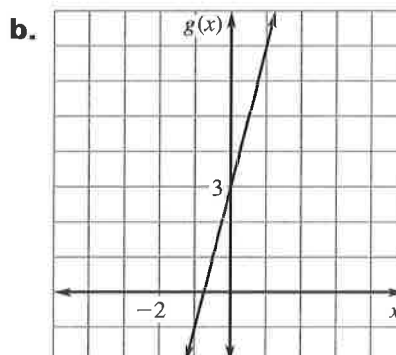
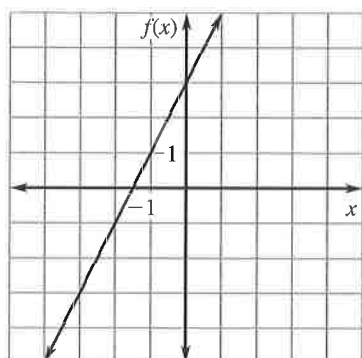
Answers for 4.7 *continued*
 For use with pages 265–269



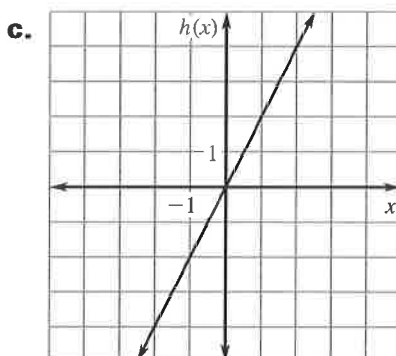
Because the slope of the graph of m is negative, the graph of m falls from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.

35. B

36. a. *Sample answer:* $f(x) = 2x + 3$;



Because the slope of the graph of g is greater than the slope of the graph of f , the graph of g rises faster from left to right. The y -intercept for both graphs is the same, so both lines pass through the point $(0, 3)$.



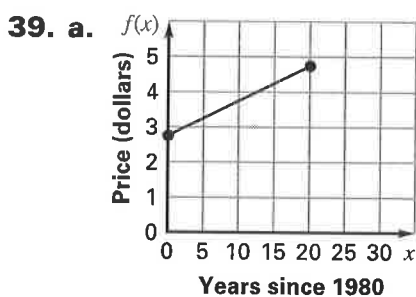
Because the graphs of h and f have the same slope, $m = 2$, the lines are parallel. The y -intercept of the graph of h is 3 less than the y -intercept of the graph of f .

Answers for 4.7 *continued*
For use with pages 265–269

37. Since the graphs of g and h have the same slope, $m = 0$, the lines are parallel. The y -intercept of the graph of h is 2 less than the y -intercept of the graph of g .

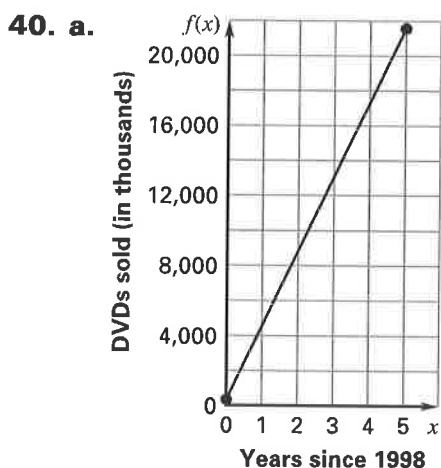
38. $8x + 14$; $8x + 7$

4.7 Problem Solving



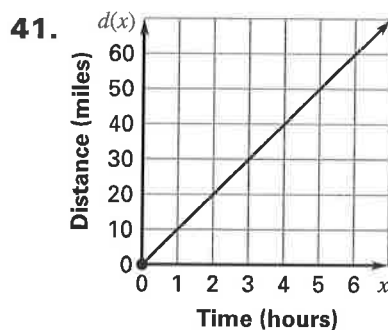
domain: $0 \leq x \leq 20$,
range: $2.75 \leq f(x) \leq 4.75$

b. 18; in 1998, 18 years after 1980, the price of a movie ticket was \$4.55.

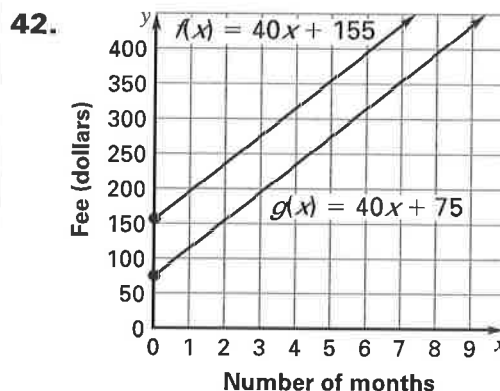


domain: $0 \leq x \leq 5$,
range: $330 \leq f(x) \leq 21,580$

b. 3; in 2001, 3 years after 1998, the number of DVD players sold was 13,080.



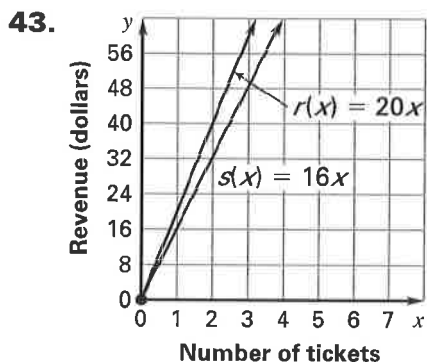
domain: $x \geq 0$, range $d(x) \geq 0$;
1.5 h; substitute 15 for $d(x)$ to get the equation $15 = 10x$, solve for x .



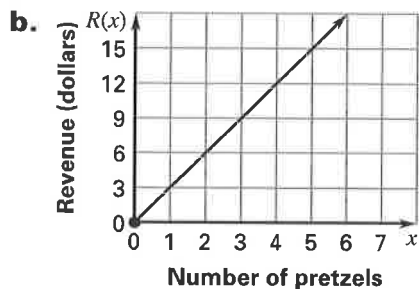
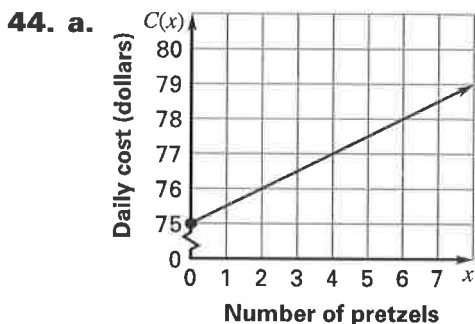
Because the graphs of g and f have the same slope, $m = 40$, the lines are parallel. The y -intercept of the graph of g is 80 less than the y -intercept of the graph of f .

Answers for 4.7 *continued*

For use with pages 265–269

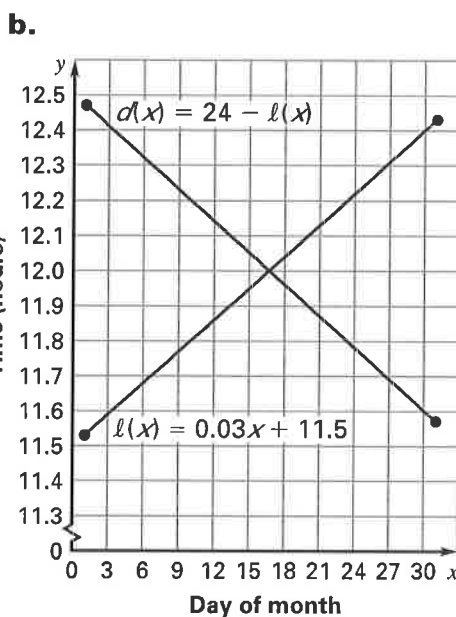


Because the slope of the graph of r is greater than the slope of the graph of s , the graph of r rises faster from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.



c. Sample answer: Find the values of y on each graph for any value of x . Subtract $C(x)$ from $R(x)$ to find the vendor's profit.

45. a. See graph in part (b);
domain: $1 \leq x \leq 31$,
range: $11.53 \leq \ell(x) \leq 12.43$



domain: $11.53 \leq \ell(x) \leq 12.43$,
range: $11.57 \leq d(x) \leq 12.47$

c. The graph of d is a reflection of the line ℓ .

d. The number of hours of daylight equals the number of hours of darkness.

Answers for 4.7 *continued*
For use with pages 265–269

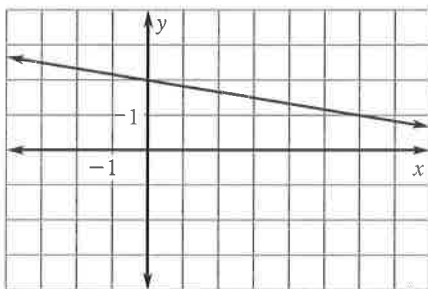
4.7 Mixed Review

46. 4 **47.** 11 **48.** -4

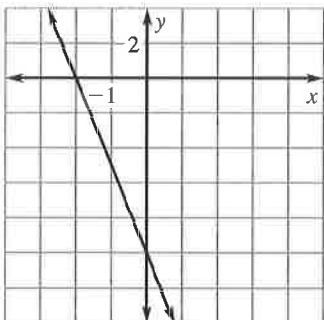
49. 8 **50.** -1 **51.** 3

52. 4 **53.** 49 **54.** 12.5

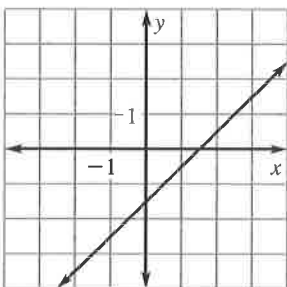
55. $y = -\frac{1}{6}x + 2$



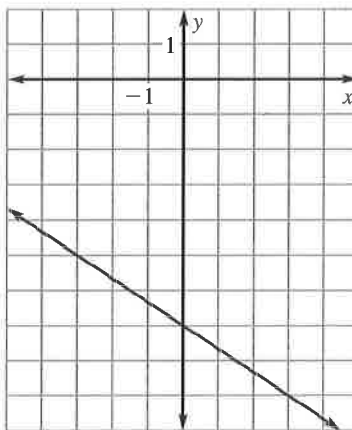
56. $y = -5x - 10$



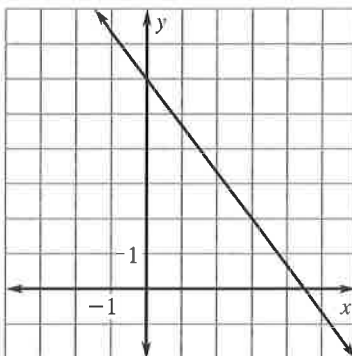
57. $y = x - \frac{3}{2}$



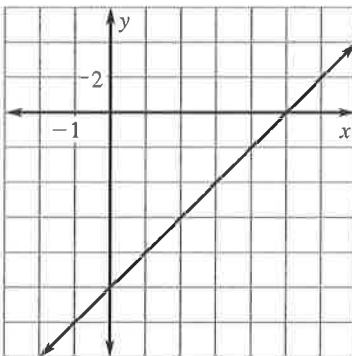
58. $y = -\frac{2}{3}x - 7$



59. $y = -\frac{4}{3}x + 6$



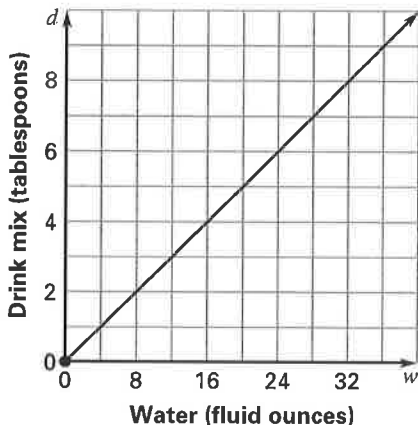
60. $y = 2x - 10$



Answers for 4.7 *continued*
For use with pages 265–269

4.4–4.7 Mixed Review of Problem Solving

1. a.



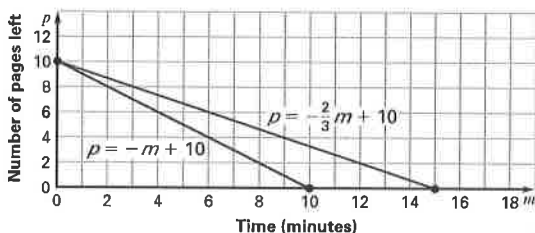
b. 8 tbsp

2. a. $s = 25t$

b. \$2250

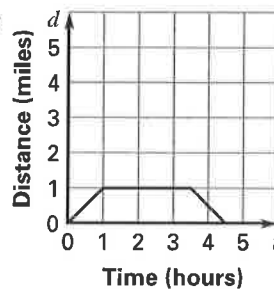
c. 133 adult tickets

3.

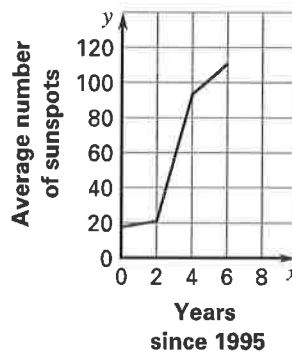


Find the m -intercepts of each line and subtract the m -intercept of your friend's line from the m -intercept of your line to find your friend takes 5 more minutes to read the essay.

4. Sample:



5. a.



b. 1997 to 1999;
36.1 sunspots per year

c. 1995 to 1997;
1.75 sunspots per year

d. Subtract 17.5 from 110.9 and divide by 6 to find 15.6 sunspots per year.

Answers for 4.7 *continued*
 For use with pages 265–269

6. 50 units down;

		5	0
	0	0	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5		5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9