

2.2 Exercise Set

FOR EXTRA HELP



Concept Reinforcement In each of Exercises 1–6, match the word with the most appropriate choice from the column on the right.

- | | |
|-----------------------------|--------------------------------------------------------------|
| 1. (f) y-intercept | a) $y = mx + b$ |
| 2. (c) Slope | b) Shifted |
| 3. (e) Rise | c) $\frac{\text{Difference in } y}{\text{Difference in } x}$ |
| 4. (d) Run | d) Difference in x |
| 5. (a) Slope–intercept form | e) Difference in y |
| 6. (b) Translated | f) $(0, b)$ |

Graph.

- | | |
|--------------------------------------------------------|---------------------------------------------------------|
| 7. $f(x) = 2x - 1$ <input type="checkbox"/> | 8. $g(x) = 3x + 4$ <input type="checkbox"/> |
| 9. $g(x) = -\frac{1}{3}x + 2$ <input type="checkbox"/> | 10. $f(x) = -\frac{1}{2}x - 5$ <input type="checkbox"/> |
| 11. $h(x) = \frac{2}{5}x - 4$ <input type="checkbox"/> | 12. $h(x) = \frac{4}{5}x + 2$ <input type="checkbox"/> |

Determine the y-intercept.

- | | |
|-----------------------------------------------------|-----------------------------------------------------|
| 13. $y = 5x + 3$ $(0, 3)$ | 14. $y = 2x - 11$ $(0, -11)$ |
| 15. $g(x) = -x - 1$ $(0, -1)$ | 16. $g(x) = -4x + 5$ $(0, 5)$ |
| 17. $y = -\frac{3}{8}x - 4.5$ $(0, -4.5)$ | 18. $y = \frac{15}{7}x + 2.2$ $(0, 2.2)$ |
| 19. $f(x) = 1.3x - \frac{1}{4}$ $(0, -\frac{1}{4})$ | 20. $f(x) = -1.2x + \frac{1}{5}$ $(0, \frac{1}{5})$ |
| 21. $y = 17x + 138$ $(0, 138)$ | 22. $y = -52x - 260$ $(0, -260)$ |

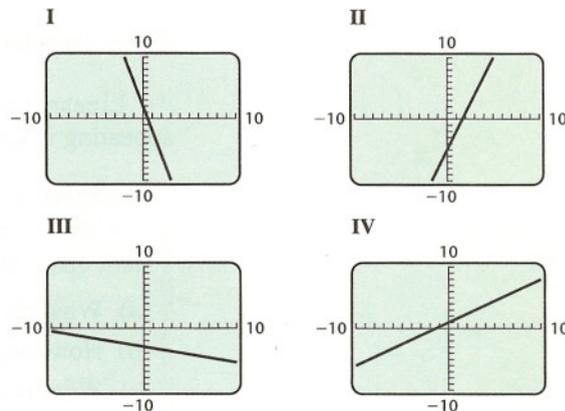
For each pair of points, find the slope of the line containing them.

- | |
|-------------------------------------------------------------------------------------|
| 23. $(10, 11)$ and $(8, 3)$ 4 |
| 24. $(2, 9)$ and $(12, 4)$ $-\frac{1}{2}$ |
| 25. $(13, 4)$ and $(-20, -7)$ $\frac{1}{3}$ |
| 26. $(-5, -11)$ and $(-8, -21)$ $\frac{10}{3}$ |
| 27. $(\frac{1}{2}, -\frac{2}{3})$ and $(\frac{1}{6}, \frac{1}{6})$ $-\frac{5}{2}$ |
| 28. $(\frac{3}{4}, -\frac{2}{5})$ and $(\frac{1}{3}, -\frac{1}{4})$ $-\frac{9}{25}$ |
| 29. $(-9.7, 43.6)$ and $(4.5, 43.6)$ 0 |
| 30. $(-2.8, -3.1)$ and $(-1.8, -2.6)$ $\frac{1}{2}$ |

Answers to Exercises 7–12 and 33–40 are on pp. IA-3 and IA-4.

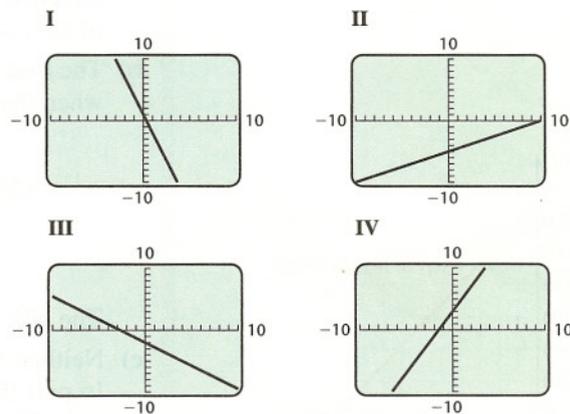
aha! 31. Use the slope and the y-intercept of each line to match each equation with the correct graph.

- | | |
|-------------------------|----------------------|
| a) $y = 3x - 5$ II | b) $y = 0.7x + 1$ IV |
| c) $y = -0.25x - 3$ III | d) $y = -4x + 2$ I |



32. Use the slope and the y-intercept of each line to match each equation with the correct graph.

- | | |
|------------------------------|--------------------------------|
| a) $y = \frac{1}{2}x - 5$ II | b) $y = 2x + 3$ IV |
| c) $y = -3x + 1$ I | d) $y = -\frac{3}{4}x - 2$ III |



Determine the slope and the y-intercept. Then draw a graph. Be sure to check as in Example 4 or Example 7.

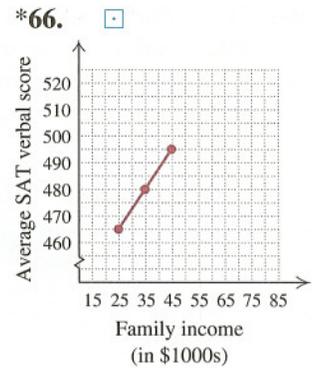
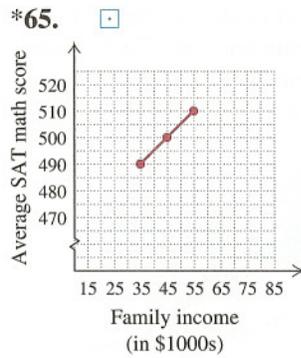
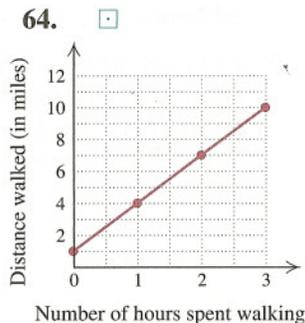
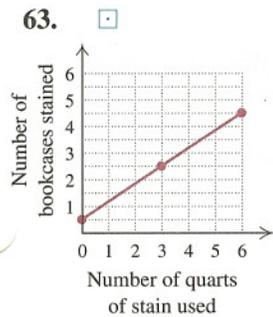
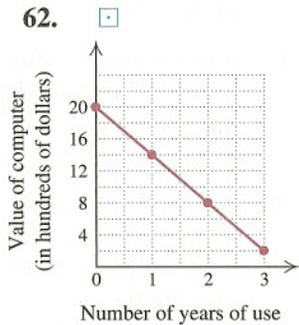
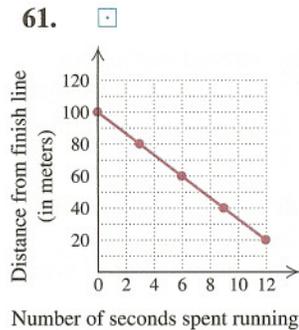
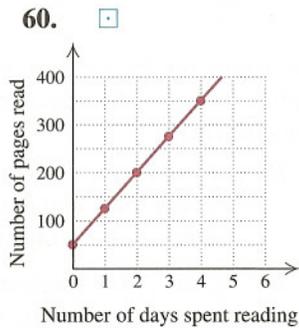
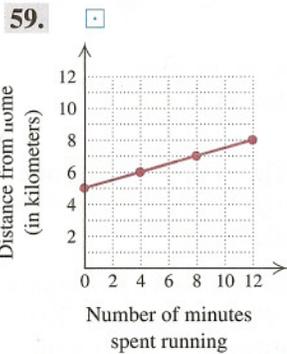
- | | |
|---------------------------------------------------------|---------------------------------------------------------|
| 33. $y = \frac{5}{2}x - 3$ <input type="checkbox"/> | 34. $y = \frac{2}{3}x - 4$ <input type="checkbox"/> |
| 35. $f(x) = -\frac{5}{2}x + 2$ <input type="checkbox"/> | 36. $f(x) = -\frac{2}{5}x + 3$ <input type="checkbox"/> |
| 37. $F(x) = 2x + 1$ <input type="checkbox"/> | 38. $g(x) = 3x - 2$ <input type="checkbox"/> |
| 39. $4x + y = 3$ <input type="checkbox"/> | 40. $4x - y = 1$ <input type="checkbox"/> |

41. $6y + x = 6$ 42. $4y + 20 = x$
 Ah! 43. $g(x) = -0.25x$ 44. $F(x) = 1.5x$
 45. $4x - 5y = 10$ 46. $5x + 4y = 4$
 47. $2x + 3y = 6$ 48. $3x - 2y = 8$
 49. $5 - y = 3x$ 50. $3 + y = 2x$
 Aha! 51. $g(x) = 4.5$ 52. $g(x) = \frac{1}{2}$

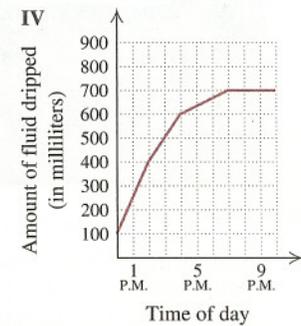
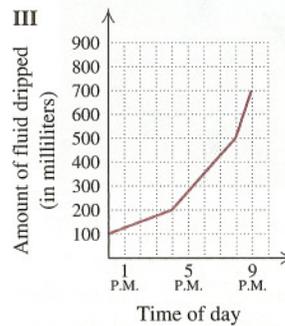
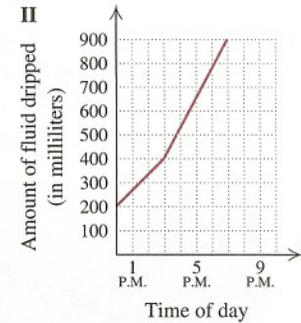
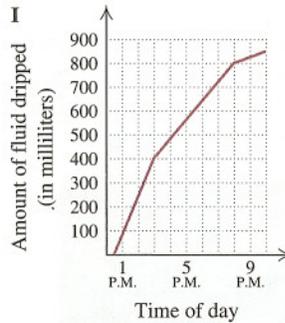
Find a linear function whose graph has the given slope and y-intercept.

53. Slope 2, y-intercept (0, 5) $f(x) = 2x + 5$
 54. Slope -4, y-intercept (0, 1) $f(x) = -4x + 1$
 55. Slope $-\frac{2}{3}$, y-intercept (0, -2) $f(x) = -\frac{2}{3}x - 2$
 56. Slope $-\frac{3}{4}$, y-intercept (0, -5) $f(x) = -\frac{3}{4}x - 5$
 57. Slope -7, y-intercept $(0, \frac{1}{3})$ $f(x) = -7x + \frac{1}{3}$
 58. Slope 8, y-intercept $(0, -\frac{1}{4})$ $f(x) = 8x - \frac{1}{4}$

For each graph, find the rate of change. Remember to use appropriate units. See Example 9.



67. **Nursing.** Match each sentence with the most appropriate of the four graphs shown.
- The rate at which fluids were given intravenously was doubled after 3 hr. **II**
 - The rate at which fluids were given intravenously was gradually reduced to 0. **IV**
 - The rate at which fluids were given intravenously remained constant for 5 hr. **I**
 - The rate at which fluids were given intravenously was gradually increased. **III**



68. **Running Rate.** An ultra-marathoner passes the 15-mi point of a race after 2 hr and reaches the 22-mi point 56 min later. Assuming a constant rate, find the speed of the marathoner. **7.5 mph**

*Based on data from the College Board Online.

69. **Skiing Rate.** A cross-country skier reaches the 3-km mark of a race in 15 min and the 12-km mark 45 min later. Assuming a constant rate, find the speed of the skier. **12 km/h**

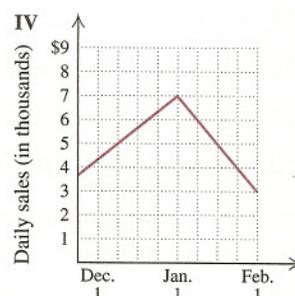
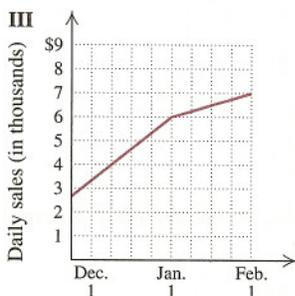
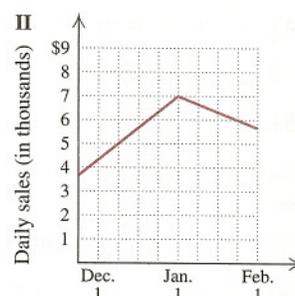
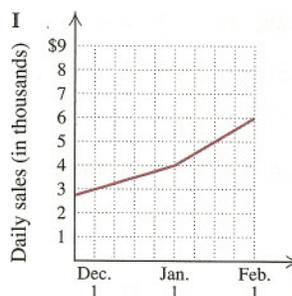


70. **Recycling.** The number of Freecycle recycling groups grew from 2936 at the end of August 2005, to 4224 at the beginning of January 2008. Determine the rate at which the number of Freecycle groups were being established. **46 groups per month**
Source: www.freecycle.org
71. **Work Rate.** As a painter begins work, one-fourth of a house has already been painted. Eight hours later, the house is two-thirds done. Calculate the painter's work rate. **$\frac{5}{96}$ of the house per hour**
72. **Rate of Descent.** A plane begins to descend to sea level from 12,000 ft after being airborne for $1\frac{1}{2}$ hr. The entire flight time is 2 hr 10 min. Determine the average rate of descent of the plane. **300 ft/min**



73. **Rate of Computer Hits.** At the beginning of 2007, Starfarm.com had already received 80,000 hits at their Web site. At the beginning of 2009, that number had climbed to 430,000. Calculate the rate at which the number of hits is increasing. **175,000 hits/yr**
74. **Market Research.** Match each sentence with the most appropriate of the four graphs shown.
- After January 1, daily sales continued to rise, but at a slower rate. **III**
 - After January 1, sales decreased faster than they ever grew. **IV**

- The rate of growth in daily sales doubled after January 1. **I**
- After January 1, daily sales decreased at half the rate that they grew in December. **II**



In Exercises 75–84, each model is of the form $f(x) = mx + b$. In each case, determine what m and b signify.

75. **Cost of Renting a Truck.** The cost, in dollars, of a one-day truck rental is given by $C(d) = 0.75d + 30$, where d is the number of miles driven. \square
76. **Weekly Pay.** Each salesperson at Super Electronics is paid $P(x)$ dollars, where $P(x) = 0.05x + 200$ and x is the value of the salesperson's sales for the week. \square
77. **Hair Growth.** After Lauren donated her hair to Locks of Love, the length $L(t)$ of her hair, in inches, was given by $L(t) = \frac{1}{2}t + 5$, where t is the number of months after she had the haircut. \square
78. **Electricity Demand.** The demand, in billions of kilowatt-hours, of electricity is estimated by $D(t) = \frac{191}{5}t + 3439$, where t is the number of years after 2000. \square
Source: Based on data from the U.S. Energy Information Administration
79. **Life Expectancy of American Women.** The life expectancy of American women t years after 1970 is given by $A(t) = \frac{1}{8}t + 75.5$. \square
Source: Based on data from the National Center for Health Statistics

80. **Landscaping.** After being cut, the length $G(t)$ of the lawn, in inches, at Great Harrington Community College is given by $G(t) = \frac{1}{8}t + 2$, where t is the number of days since the lawn was cut. \square
81. **Cost of a Sports Ticket.** The average price $P(t)$, in dollars, of a major-league baseball ticket is given by $P(t) = 0.89t + 16.63$, where t is the number of years since 2000. \square
Source: Based on data from Team Marketing Report
82. **Cost of a Taxi Ride.** The cost, in dollars, of a taxi ride in New York City is given by $C(d) = 2d + 2.5$,* where d is the number of miles traveled. \square
83. **Organic Cotton.** The function given by $c(t) = 849t + 5960$ can be used to estimate the number of U.S. acres planted with organic cotton, where t is the number of years since 2006. \square
Source: Based on data from the Organic Trade Association



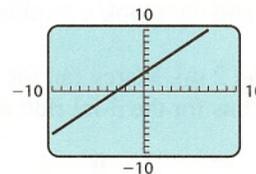
84. **Catering.** When catering a party for x people, Chrissie's Catering uses the formula $C(x) = 25x + 75$, where $C(x)$ is the cost of the food, in dollars. \square
85. **Salvage Value.** Green Glass Recycling uses the function given by $F(t) = -5000t + 90,000$ to determine the salvage value $F(t)$, in dollars, of a waste removal truck t years after it has been put into use.
a) What do the numbers -5000 and $90,000$ signify? \square
b) How long will it take the truck to depreciate completely? 18 yr
c) What is the domain of F ? $\{t|0 \leq t \leq 18\}$
86. **Salvage Value.** Consolidated Shirt Works uses the function given by $V(t) = -2000t + 15,000$ to determine the salvage value $V(t)$, in dollars, of a color separator t years after it has been put into use.

*Rates are higher between 4 P.M. and 8 P.M. (Source: Based on data from New York City Taxi and Limousine Commission, 2010)

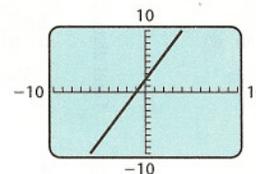
\square Answers to Exercises 80–84, 85(a), 86(a), 87(a), 88(a), and 88(b) are on pp. IA-4 and IA-5.

- a) What do the numbers -2000 and $15,000$ signify? \square
- b) How long will it take the machine to depreciate completely? 7.5 yr
- c) What is the domain of V ? $\{t|0 \leq t \leq 7.5\}$
87. **Trade-in Value.** The trade-in value of a Jamis Dakar mountain bike can be determined using the function given by $v(n) = -200n + 1800$. Here $v(n)$ is the trade-in value, in dollars, after n years of use.
a) What do the numbers -200 and 1800 signify? \square
b) When will the trade-in value of the mountain bike be \$600? After 6 yr of use
c) What is the domain of v ? $\{n|0 \leq n \leq 9\}$
88. **Trade-in Value.** The trade-in value of a John Deere riding lawnmower can be determined using the function given by $T(x) = -300x + 2400$. Here $T(x)$ is the trade-in value, in dollars, after x summers of use.
a) What do the numbers -300 and 2400 signify? \square
b) When will the value of the mower be \$1200? \square
c) What is the domain of T ? $\{x|0 \leq x \leq 8\}$

- TV 89. A student makes a mistake when using a graphing calculator to draw $4x + 5y = 12$ and the following screen appears. Use algebra to show that a mistake has been made. What do you think the mistake was?



- TV 90. A student makes a mistake when using a graphing calculator to draw $5x - 2y = 3$ and the following screen appears. Use algebra to show that a mistake has been made. What do you think the mistake was?



SKILL REVIEW

To prepare for Section 2.3, review working with 0.

Simplify. [1.2]

$$91. \frac{-8 - (-8)}{6 - (-6)} \quad 0$$

$$92. \frac{-2 - 2}{-3 - (-3)} \quad \text{Undefined}$$