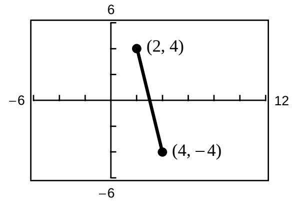
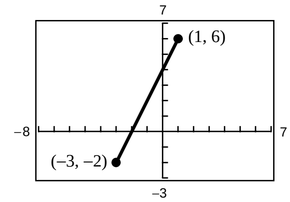
10. The line appears to go through (0, 1) and (6, 5).

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 1}{6 - 0} = \frac{2}{3}$$

12. $\text{Slope} = \dfrac{-4 - 4}{4 - 2} = -4$



14. $\text{Slope} = \dfrac{6 - (-2)}{1 - (-3)} = \dfrac{8}{4} = 2$



16. Because m is undefined, x does not change. Three other points are: $(-4, 0)$, $(-4, 3)$, $(-4, 5)$.

18. Since $m = -2$, y decreases 2 for every one unit increase in x. Three other parts are $(1, -11)$, $(2, -13)$, $(3, -15)$.

20. Since $m = -\frac{1}{2}$, y decrease 1 for every increase of 2 units in x. Three points are $(1, -7)$, $(3, -8)$, $(5, -9)$.

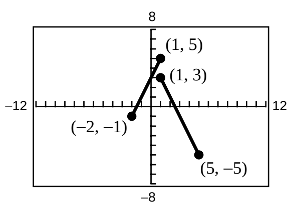
22. L_1: $(-2, -1)$, $(1, 5)$

$$m_1 = \frac{5 - (-1)}{1 - (-2)} = \frac{6}{3} = 2$$

L_2: $(1, 3)$, $(5, -5)$

$$m_2 = \frac{-5 - 3}{5 - 1} = \frac{-8}{4} = -2$$

The lines are neither parallel nor perpendicular.



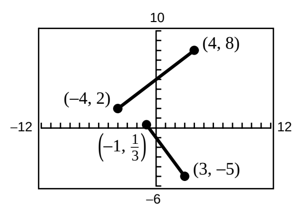
24. L_1: $(4, 8)$, $(-4, 2)$

$$m_1 = \frac{2 - 8}{-4 - 4} = \frac{-6}{-8} = \frac{3}{4}$$

L_2: $(3, -5)$, $\left(-1, \dfrac{1}{3}\right)$

$$m_2 = \frac{(1/3) - (-5)}{-1 - 3} = \frac{16/3}{-4} = -\frac{4}{3}$$

The lines are perpendicular.



26. (a) $2x + 3y - 9 = 0$

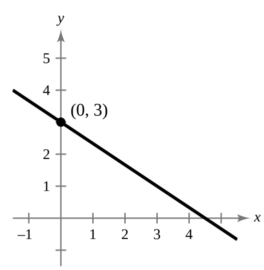
$$3y = -2x + 9$$

$$y = -\tfrac{2}{3}x + 3$$

Slope: $m = -\frac{2}{3}$

y-intercept: $(0, 3)$

(b)



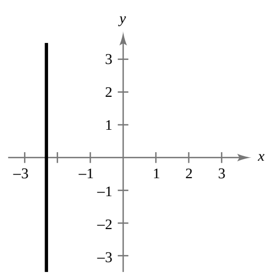
28. (a) $3x + 7 = 0$

$$x = -\tfrac{7}{3}$$

Slope: undefined

y-intercept: none

(b)



30. (a) $-11 - 8y = 0$

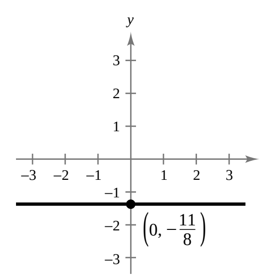
$$8y = -11$$

$$y = -\tfrac{11}{8}$$

Slope: $m = 0$

y-intercept: $\left(0, -\frac{11}{8}\right)$

(b)



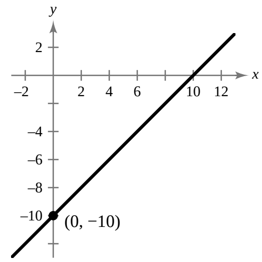
32. (a) $x - y - 10 = 0$

$x - 10 = y$

Slope: $m = 1$

y-intercept: $(0, -10)$

(b)

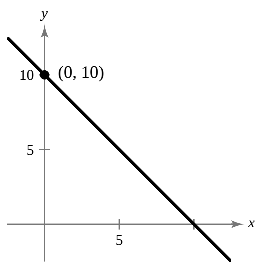


34. $m = -1, (0, 10)$

$y - 10 = -1(x - 0)$

$y - 10 = -x$

$x + y - 10 = 0$

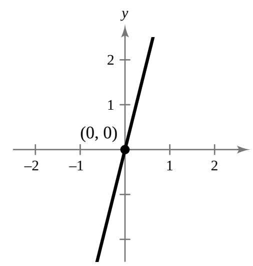


36. $m = 4, (0, 0)$

$y - 0 = 4(x - 0)$

$y = 4x$

$4x - y = 0$

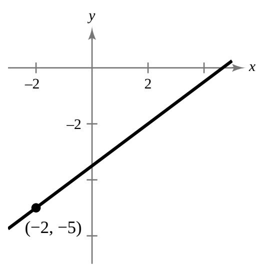


38. $m = \frac{3}{4}, (-2, -5)$

$y + 5 = \frac{3}{4}(x + 2)$

$4y + 20 = 3x + 6$

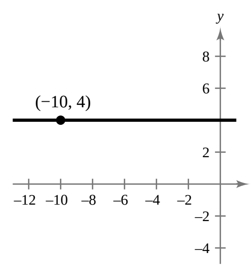
$0 = 3x - 4y - 14$



40. $m = 0, (-10, 4)$

$y - 4 = 0(x + 10)$

$y - 4 = 0$



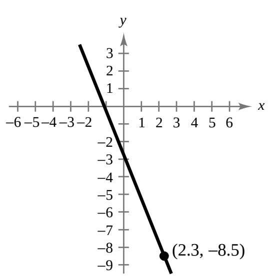
42. $m = -\frac{5}{2}, (2.3, -8.5)$

$y + 8.5 = -\frac{5}{2}(x - 2.3)$

$2y + 17 = -5x + 11.5$

$2y + 5x + 5.5 = 0$

$4y + 10x + 11 = 0$



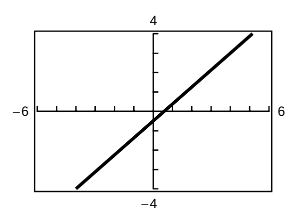
44. $(4, 3), (-4, -4)$

$$y - 3 = \frac{-4 - 3}{-4 - 4}(x - 4)$$

$$y - 3 = \frac{7}{8}(x - 4)$$

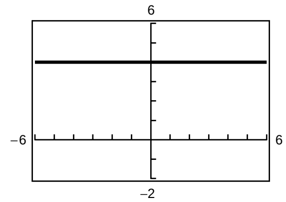
$$8y - 24 = 7x - 28$$

$$7x - 8y - 4 = 0$$



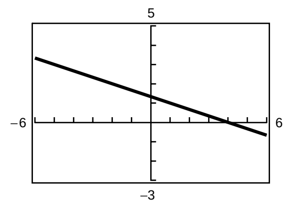
46. $(-1, 4), (6, 4)$

$$y - 4 = \frac{4 - 4}{6 - (-1)}(x + 1)$$
$$y - 4 = 0(x + 1)$$
$$y - 4 = 0$$



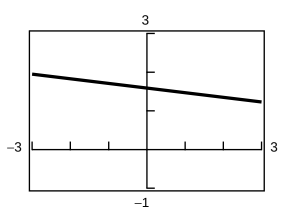
48. $(1, 1), \left(6, -\frac{2}{3}\right)$

$$y - 1 = \frac{-\frac{2}{3} - 1}{6 - 1}(x - 1)$$
$$y - 1 = -\frac{1}{3}(x - 1)$$
$$y - 1 = -\frac{1}{3}x + \frac{1}{3}$$
$$3y - 3 = -x + 1$$
$$x + 3y - 4 = 0$$



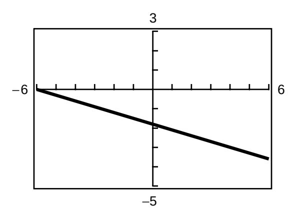
50. $\left(\frac{3}{4}, \frac{3}{2}\right), \left(-\frac{4}{3}, \frac{7}{4}\right)$

$$y - \frac{3}{2} = \frac{\frac{7}{4} - \frac{3}{2}}{-\frac{4}{3} - \frac{3}{4}}\left(x - \frac{3}{4}\right)$$
$$y - \frac{3}{2} = -\frac{3}{25}\left(x - \frac{3}{4}\right)$$
$$y - \frac{3}{2} = -\frac{3}{25}x + \frac{9}{100}$$
$$100y + 12x - 159 = 0$$



52. $(-8, 0.6), (2, -2.4)$

$$y - 0.6 = \frac{-2.4 - 0.6}{2 - (-8)}(x + 8)$$
$$y - 0.6 = -\frac{3}{10}(x + 8)$$
$$10y - 6 = -3(x + 8)$$
$$10y - 6 = -3x - 24$$
$$3x + 10y + 18 = 0$$

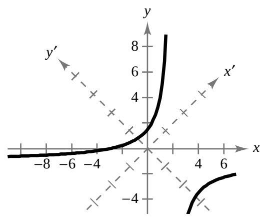


54. $\dfrac{x}{a} + \dfrac{y}{b} = 1$

$\dfrac{x}{-6} + \dfrac{y}{2} = 1$

$y = 2\left(1 + \dfrac{x}{6}\right)$

$y = \dfrac{x}{3} + 2$



a and b are the x- and y-intercepts.

56. $\dfrac{x}{a} + \dfrac{y}{b} = 1$

$\dfrac{x}{-5} + \dfrac{y}{-4} = 1$

$4x + 5y + 20 = 0$

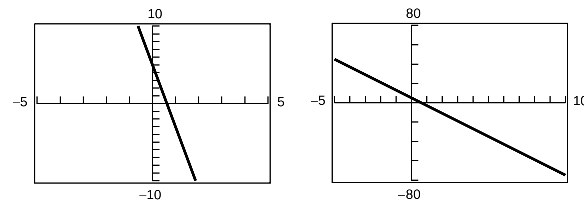
58. $\dfrac{x}{a} + \dfrac{y}{b} = 1$

$\dfrac{x}{\frac{3}{4}} + \dfrac{y}{\frac{4}{5}} = 1$

$\dfrac{4}{5}x + \dfrac{3}{4}y = \dfrac{3}{5}$

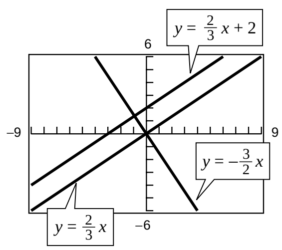
$16x + 15y - 12 = 0$

60.



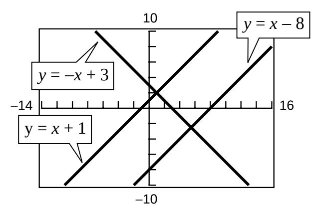
The first setting shows the x- and y-intercepts more clearly.

62. L_1: $y = \frac{2}{3}x$; L_2: $y = -\frac{3}{2}x$; L_3: $y = \frac{2}{3}x + 2$



L_1 is parallel to L_3. L_2 is perpendicular to L_1 and L_3.

64. L_1: $y = x - 8$; L_2: $y = x + 1$;
L_3: $y = -x + 3$



L_1 is parallel to L_2. L_3 is perpendicular to L_1 and L_2.

66. $x + y = 7$

$y = -x + 7$

Slope: $m = -1$

(a) $m = -1, (-3, 2)$

$y - 2 = -1(x + 3)$

$y = -x - 1$

$x + y + 1 = 0$

(b) $m = 1, (-3, 2)$

$y - 2 = 1(x + 3)$

$y = x + 5$

$x - y + 5 = 0$

68. $5x + 3y = 0$

$3y = -5x$

$y = -\frac{5}{3}x$

Slope: $m = -\frac{5}{3}$

(a) $m = -\frac{5}{3}, \left(\frac{7}{8}, \frac{3}{4}\right)$

$y - \frac{3}{4} = -\frac{5}{3}\left(x - \frac{7}{8}\right)$

$24y - 18 = -40\left(x - \frac{7}{8}\right)$

$24y - 18 = -40x + 35$

$40x + 24y - 53 = 0$

(b) $m = \frac{3}{5}, \left(\frac{7}{8}, \frac{3}{4}\right)$

$y - \frac{3}{4} = \frac{3}{5}\left(x - \frac{7}{8}\right)$

$40y - 30 = 24\left(x - \frac{7}{8}\right)$

$40y - 30 = 24x - 21$

$24x - 40y + 9 = 0$

70. $6x + 2y = 9$

$$2y = -6x + 9$$

$$y = -3x + \tfrac{9}{2}$$

Slope: $m = -3$

(a) $m = -3, (-3.9, -1.4)$

$$y + 1.4 = -3(x + 3.9)$$

$$y = -3x - 13.1$$

$$30x + 10y + 131 = 0$$

(b) $m = \frac{1}{3}, (-3.9, -1.4)$

$$y + 1.4 = \tfrac{1}{3}(x + 3.9)$$

$$3y + 4.2 = x + 3.9$$

$$-x + 3y + 0.3 = 0$$

$$10x - 30y - 3 = 0$$

72. Set the distance between $(3, -2)$ and (x, y) equal to the distance between $(-7, 1)$ and (x, y).

$$\sqrt{(x-3)^2 + (y+2)^2} = \sqrt{(x+7)^2 + (y-1)^2}$$

$$(x^2 - 6x + 9) + (y^2 + 4y + 4) = (x^2 + 14x + 49) + (y^2 - 2y + 1)$$

$$-6x + 4y + 13 = 14x - 2y + 50$$

$$-20x + 6y - 37 = 0$$

$$20x - 6y + 37 = 0$$

This line is the perpendicular bisector of the line segment connecting $(3, -2)$ and $(-7, 1)$.

74. (a) $m = 400$. The revenues are increasing \$400 per day.

(b) $m = 100$. The revenues are increasing \$100 per day.

(c) $m = 0$. There is no change in revenue. (Revenue remains constant.)

76. (a)

Years	Slope
1988–1989	$0.39 - 0.37 = 0.02$
1989–1990	$0.45 - 0.39 = 0.06$
1990–1991	$0.51 - 0.45 = 0.06$
1991–1992	$0.58 - 0.51 = 0.07$
1992–1993	$0.67 - 0.58 = 0.09$
1993–1994	$0.77 - 0.67 = 0.10$
1994–1995	$0.88 - 0.77 = 0.11$
1995–1996	$0.94 - 0.88 = 0.06$
1996–1997	$1.06 - 0.94 = 0.12$
1997–1998	$1.10 - 1.06 = 0.04$

Greatest increase: 1996–1997

Smallest increase: 1998–1989

(b) (1988, 0.37), (1998, 1.10): $y - 0.37 = \dfrac{1.10 - 0.37}{11 - 1}(x - 1)$

$$y - 0.37 = 0.073(x - 1)$$

$$y = 0.073x + 0.297$$

$$73x - 1000y + 297 = 0$$

(c) Between 1988 and 1998, the dividend per share increased at a rate of \$0.073 per year

(d) For 2001, $y = 0.073(14) + 0.297 \approx \$1.32$, which seems reasonable.

78. $\dfrac{\text{rise}}{\text{run}} = \dfrac{3}{4} = \dfrac{x}{\frac{1}{2}(32)}$

$$\frac{3}{4} = \frac{x}{16}$$

$$4x = 48$$

$$x = 12$$

The maximum height in the attic is 12 feet.

80. $(1, 156)$, $m = 4.50$

$$V - 156 = 4.50(t - 1)$$

$$V - 156 = 4.5t - 4.5$$

$$V = 4.5t + 151.5$$

82. $(1, 245{,}000)$, $m = -5600$

$$V - 245{,}000 = -5600(t - 1)$$

$$V - 245{,}000 = -5600t + 5600$$

$$V = -5600t + 250{,}600$$

84. The y-intercept is 12.5 and the slope is 1.5, which represents the increase in hourly wage per unit produced. Matches graph (c).

86. The y-intercept is 600 and the slope is -100, which represents the decrease in the value of the word processor each year. Matches graph (d).

88. $F = \frac{9}{5}C + 32$

$F = 0°$: $0 = \frac{9}{5}C + 32$

$-32 = \frac{9}{5}C$

$-17.7 \approx C$

$C = -10°$: $F = \frac{9}{5}(-10) + 32$

$F = -18 + 32$

$F = 14$

$C = 10°$: $F = \frac{9}{5}(10) + 32$

$F = 18 + 32$

$F = 50$

$F = 68°$: $68 = \frac{9}{5}C + 32$

$36 = \frac{9}{5}C$

$20 = C$

$F = 90°$: $90 = \frac{9}{5}C + 32$

$58 = \frac{9}{5}C$

$32.2 \approx C$

$C = 177°$: $F = \frac{9}{5}(177) + 32$

$F = 318.6 + 32$

$F = 350.6$

C	$-17.8°$	$-10°$	$10°$	$20°$	$32.2°$	$177°$
F	$0°$	$14°$	$50°$	$68°$	$90°$	$350.6°$

90. $(1998, 2546)$, $(2000, 2702)$

$$y - 2546 = \frac{2702 - 2546}{2000 - 1998}(x - 1998)$$

$$y - 2546 = 78(x - 1998)$$

$$y = 78x - 153{,}298$$

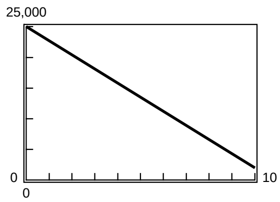
For $x = 2004$, $y = 78(2004) - 153{,}298 = 3014$ students.

92. (a) (0, 25,000), (10, 2000)

$$V - 25{,}000 = \frac{2000 - 25{,}000}{10 - 0}(t - 0)$$

$$V - 25{,}000 = -2300t$$

$$V = -2300t + 25{,}000$$

(b) 

t	0	1	2	3	4	5	6	7	8	9	10
V	25,000	22,700	20,400	18,100	15,800	13,500	11,200	8,900	6,600	4,300	2000

(c) $t = 0$: $V = -2300(0) + 25{,}000 = 25{,}000$

$t = 1$: $V = -2300(1) + 25{,}000 = 22{,}700$

etc.

94. (a) (580, 50), (625, 47)

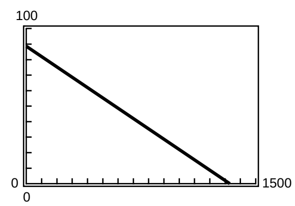
$$x - 50 = \frac{47 - 50}{625 - 580}(p - 580)$$

$$x - 50 = \frac{-1}{15}(p - 580)$$

$$x = \frac{-1}{15}p + \frac{266}{3}$$

(c) If $p = 595$, $x = 49$ units.

Algebraically, $x = -\frac{1}{15}(595) + \frac{266}{3} = 49$.



If $p = 65$, $x = 45$ units.

Algebraically, $x = -\frac{1}{15}(655) + \frac{266}{3} = 45$.

96. False. The slopes are different: $\frac{4 - 2}{-1 + 8} \neq \frac{7 + 4}{-7 - 0}$

98. One way is to calculate the lengths of the sides.

$d(A, B) = \sqrt{(2 - 2)^2 + (3 - 9)^2} = 6$

$d(B, C) = \sqrt{(2 - 7)^2 + (9 - 3)^2} = \sqrt{25 + 36} = \sqrt{61}$

$d(A, C) = \sqrt{(2 - 7)^2 + (3 - 3)^2} = \sqrt{25} = 5$

Then $[d(A, B)]^2 + [d(A, C)]^2 = [d(B, C)]^2$, and the triangle is a right triangle.

100. Yes, any pair of points on a line can be used to calculate the slope of the line. The rate of change remains the same on the line.