Chapter 6 Get Ready

Chapter 6 Get Ready   **Question 1   Page 294**

a)

Time Worked (h)	Earnings ($)
3	30
5	50
6	60
9	90

b) The graph crosses the vertical axis at the point (0, 0). This point shows the earnings, $0, after zero hours.

Chapter 6 Get Ready   **Question 2   Page 294**

Labour (h)	Repair Cost ($)
1	100
2	140
3	180
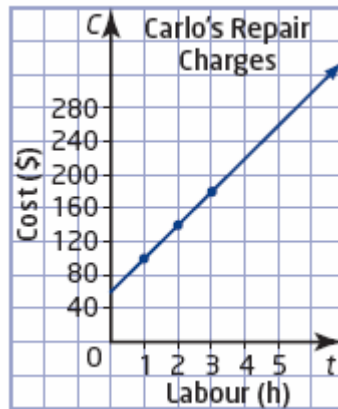
a)   The graph is shown.

b)   From the graph, the repair cost for a 5-h job is $260.

c)   The graph crosses the vertical axis at the point (0, 60). This point shows the repair cost, $60, for 0 h. It is Carlo's basic charge to make a house call.
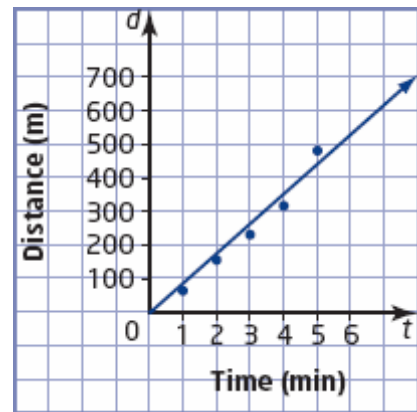
Chapter 6 Get Ready   **Question 3   Page 295**

Answers will vary slightly. Sample answers are shown.

a)   The distance travelled after 2.5 min is about 220 m.

b)   The distance travelled after 6 min is about 540 m.

Chapter 6 Get Ready   **Question 4   Page 295**

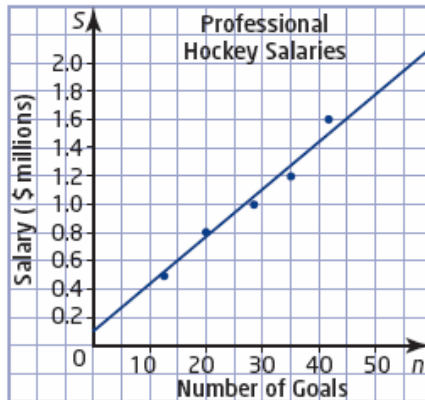Answers will vary slightly. Sample answers are shown.

a)   It took about 2 h 15 min to travel 200 m.

b)   It took about 7 h to travel 600 m.

Chapter 6 Get Ready   **Question 5   Page 295**

Number of Goals	Salary ($millions)
35	1.2
27	1.0
20	0.8
42	1.6
12	0.5

a) The graph and line of best fit are shown.

b) A player who scores 30 goals should be paid $1.1 million. A player who scores 50 goals should be paid $1.8 million.
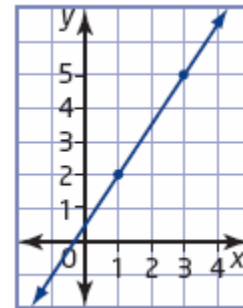
c) A player who is paid $1.4 million should score 38 goals. A player who is paid $2 million should score 56 goals.

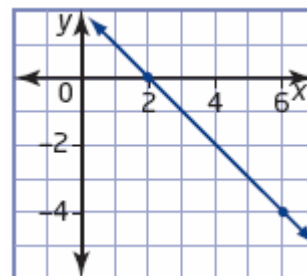**Chapter 6 Get Ready**   **Question 6   Page 295**

a) $m = \dfrac{\text{rise}}{\text{run}}$

$= \dfrac{3}{2}$

The slope is $\dfrac{3}{2}$.

b) $m = \dfrac{\text{rise}}{\text{run}}$
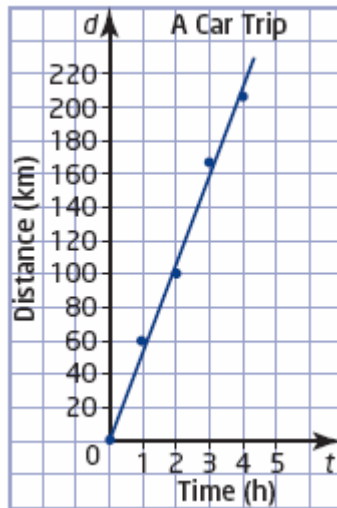
$= \dfrac{-4}{4}$

$= -1$

The slope is –1.

Chapter 6 Get Ready

Question 7   Page 295

Time (h)	Distance (km)
0	0
1	60
2	100
3	165
4	205

a) The graph and line of best fit are shown.

b) Answers will vary slightly. Sample answers are (2, 106), and (4, 209).

c) Use $(x_1, y_1) = (2, 106)$ and $(x_2, y_2) = (4, 209)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{209 - 106}{4 - 2}$$

$$= \frac{103}{2}$$

$$= 51.5$$

The slope is 51.5. This means that the average speed of the car is 51.5 km/h.

Chapter 6 Section 1: The Equation of a Line in Slope *y*-Intercept Form: $y = mx + b$
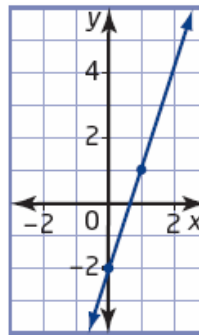
Chapter 6 Section 1   Question 1   Page 304

	Equation	Slope	y-intercept
a)	$y = 4x + 1$	4	1
b)	$y = \frac{2}{3}x + 3$	$\frac{2}{3}$	3
c)	$y = x - 2$	1	−2
d)	$y = -\frac{2}{3}x$	$-\frac{2}{3}$	0
e)	$y = 3$	0	3
f)	$y = -x - \frac{1}{2}$	−1	$-\frac{1}{2}$

Chapter 6 Section 1   Question 2   Page 304

a) $$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{1 - (-2)}{1 - 0}$$
$$= \frac{3}{1}$$
$$= 3$$

The slope is 3, and the *y*-intercept is –2.

b) $$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-1 - 3}{2 - 0}$$
$$= \frac{-4}{2}$$
$$= -2$$
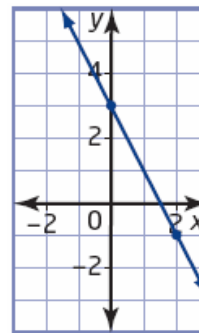
The slope is –2, and the *y*-intercept is 3.

c) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-1 - (-2)}{4 - 0}$

$= \dfrac{1}{4}$

The slope is $\dfrac{1}{4}$, and the *y*-intercept is –2.
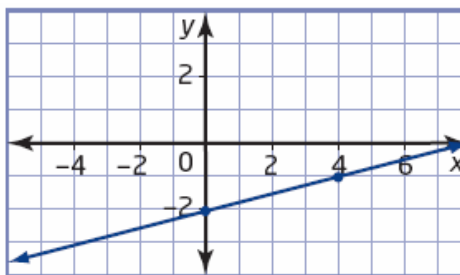
d) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-2 - 1}{0 - (-4)}$

$= -\dfrac{3}{4}$

The slope is $-\dfrac{3}{4}$, and the *y*-intercept is –2.
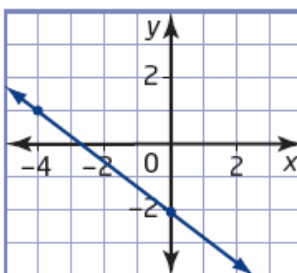
Chapter 6 Section 1   **Question 3   Page 304**

a) $y = 3x - 2$

b) $y = -2x + 3$
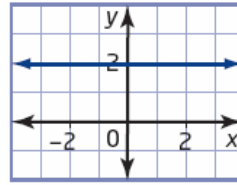
c) $y = \dfrac{1}{4}x - 2$

d) $y = -\dfrac{3}{4}x - 2$

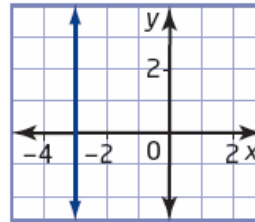**Chapter 6 Section 1**　　　　　**Question 4　Page 304**

a)　$y = 2$

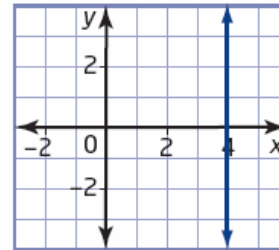The slope is 0, and the *y*-intercept is 2.

b)　$x = -3$

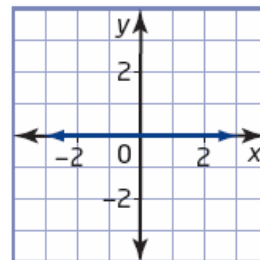The slope is undefined, and there is no
y-intercept.

c)　$x = 4$

The slope is undefined, and there is no
y-intercept.

d)　$y = 0$

The slope is 0, and the *y*-intercept is 0.
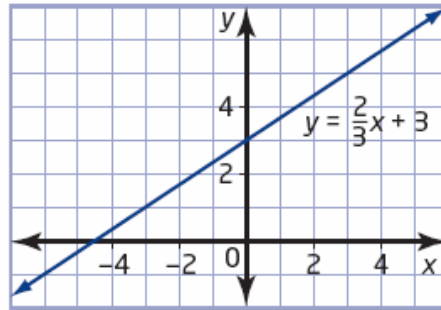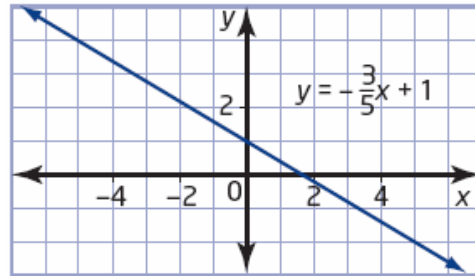
Chapter 6 Section 1　　　　　**Question 5　Page 304**

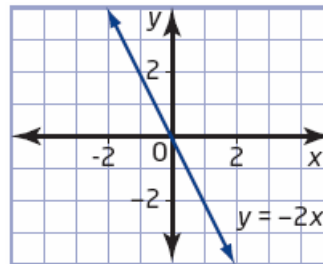The line in question 4, part d), is the *x*-axis.

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

b) $y = -\dfrac{3}{5}x + 1$

c) $y = -2x$

d) $y = \dfrac{4}{3}x - 4$
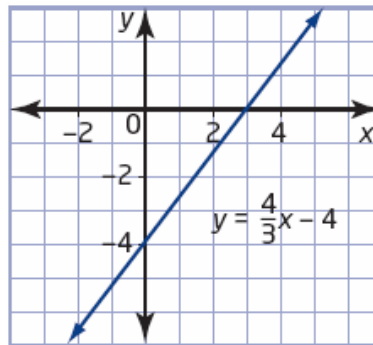
e) $y = -4$
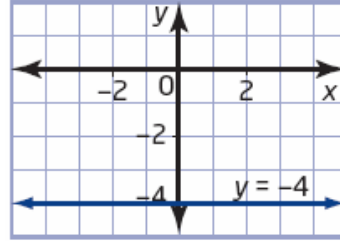
Chapter 6 Section 1 **Question 7** **Page 305**

a) The slope is 0, and the y-intercept is –5.

b) The slope is undefined, and there is no y-intercept.

c) The slope is 0, and the y-intercept is $\dfrac{7}{2}$.

d) The slope is undefined, and there is no y-intercept.
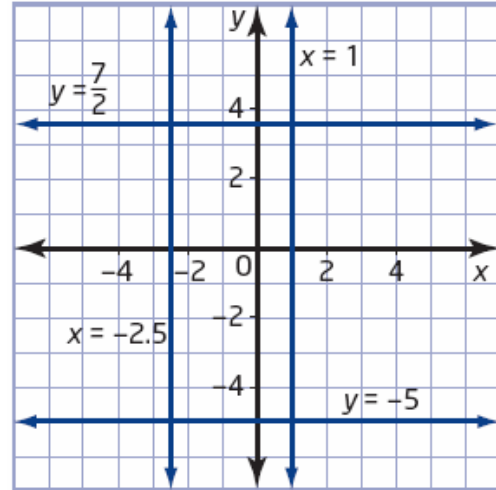
Chapter 6 Section 1 **Question 8** **Page 305**

a) The person was at an initial distance of 1 m from the sensor.

b) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$ = \dfrac{4-1}{6-0}$

$ = \dfrac{3}{6}$

$ = 0.5$
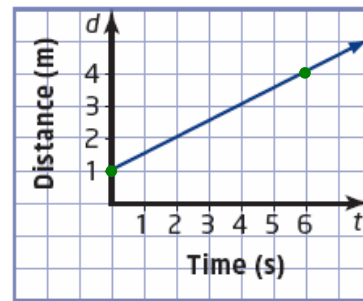
The person was walking at a speed of 0.5 m/s.

c) The person was walking away from the sensor. This is because on the graph, the person's distance from the sensor increases as time goes by.

a)

Eleanor's Walk

b)

Pierre's Walk

c)

Jesse's Walk

d)

Cassandra's Walk
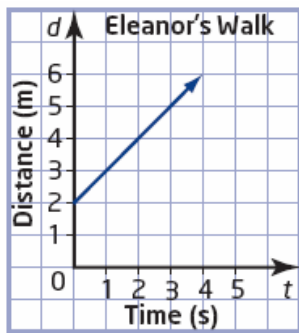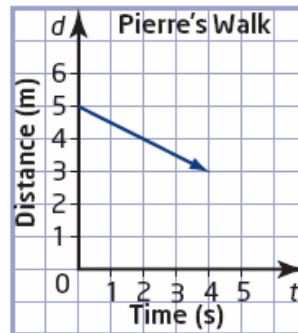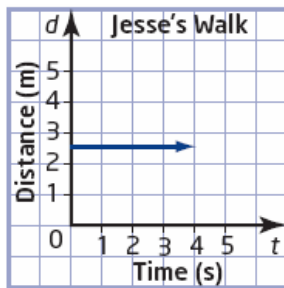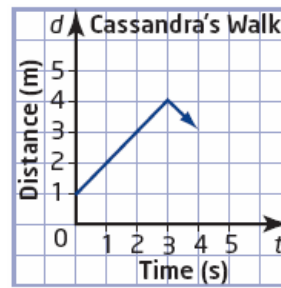
a) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{6.5 - 1.5}{5 - 0}$

$= \dfrac{5}{5}$

$= 1$

The slope is 1, and the *y*-intercept is 1.5.

The slope represents Shannon's walking speed of 1 m/s away from
the sensor. The *t*-intercept represents Shannon's initial distance of 1.5 m away from the sensor.

The equation is $d = t + 1.5$.
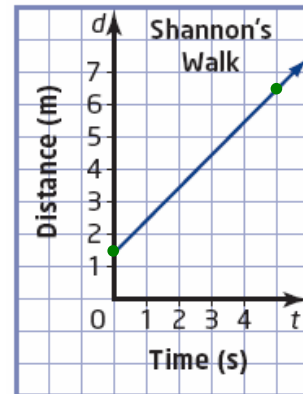
b) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{15 - 0}{5 - 0}$

$= \dfrac{15}{5}$

$= 3$

The slope is 3, and the *y*-intercept is 0.

The slope shows that the circumference of the trunk is three times
its age. The *a*-intercept shows that when the tree began to grow
from a seed, it had circumference zero.

The equation is $C = 3a$.
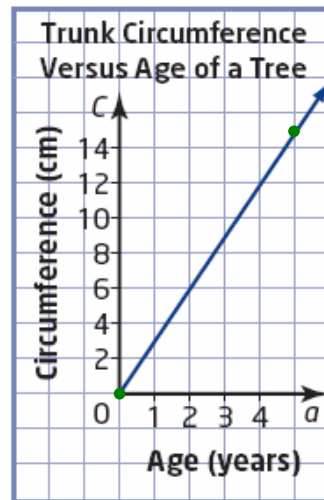
$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{14 - 1}{1 - 0}$

$= \dfrac{13}{1}$

$= 13$

The slope is 13, and the *y*-intercept is 1. The letters are m and a.
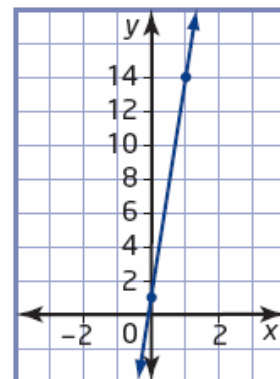
Chapter 6 Section 1   **Question 12**   **Page 306**

Answers will vary. Sample answers are shown.

Yuri left home at 08:18 on his rollerblades. He travelled the first kilometre to school in 12 minutes, or 0.2 h, at a speed of $\dfrac{1}{0.2}$, or 5 km/h. Concerned that he might be late, he increased his speed, travelling the second kilometre in 5 minutes, or $\dfrac{1}{12}$ h, at a speed of $\dfrac{1}{\frac{1}{12}}$, or 12 km/h.

Yuri arrived at school at 08:35, five minutes late.
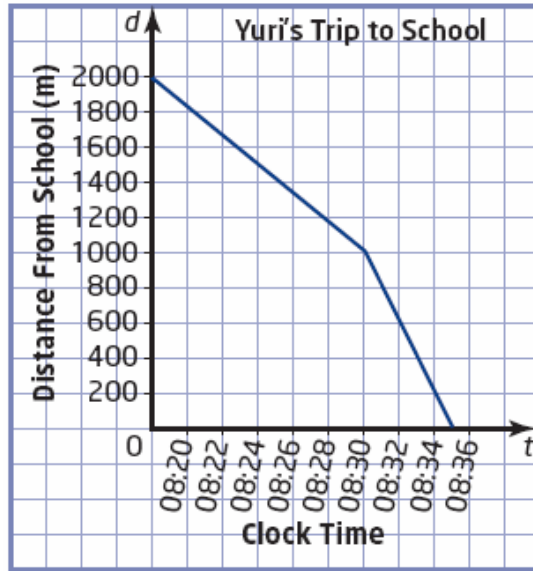
Chapter 6 Section 1   **Question 13**   **Page 307**

Answers will vary. A sample answer is shown.

If Yuri left 10 min earlier at 08:08, the graph would shift to the left by 10 min. He would have arrived at school at 08:25, five minutes early.

Chapter 6 Section 1   **Question 14**   **Page 307**

Answers will vary. Sample answers are shown.

Biff moves at a constant speed, reaching home in 20 s, at a speed of $\dfrac{30}{20}$, or 1.5 m/s. Rocco started 25 m from home, and moved at a constant speed up to 15 m in 14 s, at a speed of $\dfrac{15}{14}$, or about 1.07 m/s. He stopped for 2 s, and then ran the remaining 15 m in 4 s, at a speed of $\dfrac{15}{4}$, or 3.75 m/s. Both bears reached home at the same time, after 20 s.
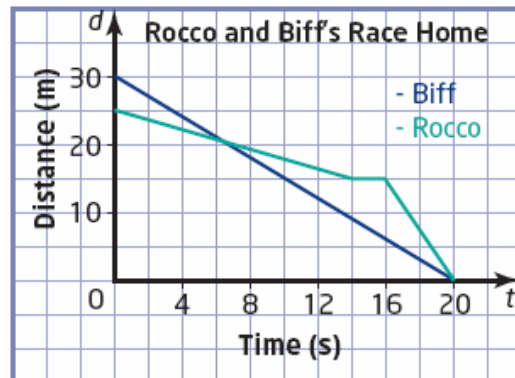
a) The value of the y-coordinate for any x-intercept is 0. In the graph shown, the x-intercept is (3, 0).

b)

$$y = 3x - 6$$
$$0 = 3x - 6$$
$$0 + 6 = 3x - 6 + 6$$
$$6 = 3x$$
$$\frac{6}{3} = \frac{3x}{3}$$
$$2 = x$$
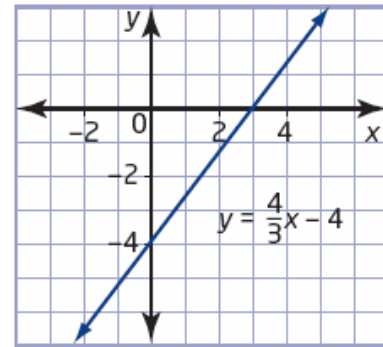
The x-intercept is 2.

$$y = \frac{2}{3}x + 5$$
$$0 = \frac{2}{3}x + 5$$
$$0 - 5 = \frac{2}{3}x + 5 - 5$$
$$-5 = \frac{2}{3}x$$
$$3(-5) = 3 \times \frac{2}{3}x$$
$$-15 = 2x$$
$$\frac{-15}{2} = \frac{2x}{2}$$
$$-\frac{15}{2} = x$$

The x-intercept is $-\dfrac{15}{2}$.

Chapter 6 Section 1   **Question 16   Page 307**

a) Use the "guess and check" method. The first positive integer that works is 11.

b) Continue using the "guess and check" method. Other numbers that work are 23, 35, 47, 59, and 71.

c) The pattern is add 12 to get the next term. You can find other numbers that work by multiplying a whole number by 12, and adding 11.

Chapter 6 Section 2   The Equation of a Line in Standard Form: $Ax + By + C = 0$

Chapter 6 Section 2   **Question 1   Page 312**

a) $x + y - 3 = 0$

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

$y = -x + 3$

b) $2x + 3y + 6 = 0$

$2x + 3y + 6 - 2x - 6 = 0 - 2x - 6$

$3y = -2x - 6$

$$\frac{3y}{3} = \frac{-2x - 6}{3}$$

$$y = \frac{-2x}{3} - \frac{6}{3}$$

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

c) $x - 4y + 12 = 0$

$x - 4y + 12 - x - 12 = 0 - x - 12$

$-4y = -x - 12$

$$\frac{-4y}{-4} = \frac{-x - 12}{-4}$$

$$y = \frac{-1x}{-4} + \frac{-12}{-4}$$

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

d) $3x + 2y - 5 = 0$

$3x + 2y - 5 - 3x + 5 = 0 - 3x + 5$

$2y = -3x + 5$

$$\frac{2y}{2} = \frac{-3x + 5}{2}$$

$$y = \frac{-3x}{2} + \frac{5}{2}$$

$$y = -\frac{3}{2}x + \frac{5}{2}$$

Chapter 6 Section 2   **Question 2   Page 312**

a) The slope is –1, and the y-intercept is 3.

b) The slope is $-\dfrac{2}{3}$, and the y-intercept is –2.

c) The slope is $\dfrac{1}{4}$, and the y-intercept is 3.

d) The slope is $-\dfrac{3}{2}$, and the y-intercept is $\dfrac{5}{2}$.
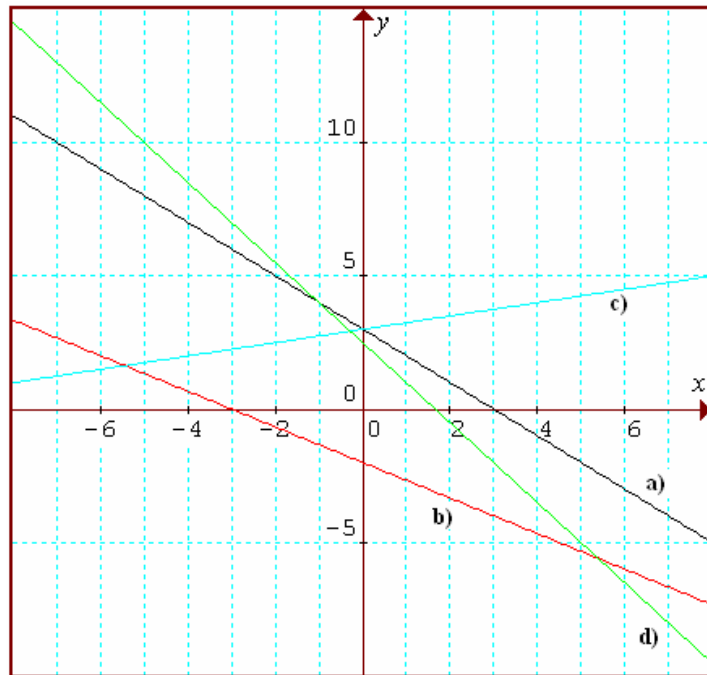
a) $x + 3y - 3 = 0$

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

$3y = -x + 3$

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

$y = \dfrac{-1x}{3} + \dfrac{3}{3}$

$y = -\dfrac{1}{3}x + 1$

The slope is $-\dfrac{1}{3}$, and the y-intercept is 1.

b) $2x - 5y + 8 = 0$

$2x - 5y + 8 - 2x - 8 = 0 - 2x - 8$

$-5y = -2x - 8$

$\dfrac{-5y}{-5} = \dfrac{-2x - 8}{-5}$

$y = \dfrac{-2x}{-5} + \dfrac{-8}{-5}$

$y = \dfrac{2}{5}x + \dfrac{8}{5}$

The slope is $\dfrac{2}{5}$, and the y-intercept is $\dfrac{8}{5}$.

Chapter 6 Section 2   **Question 4**   **Page 312**

a)
$$40n - C + 250 = 0$$
$$40n - C + 250 - 40n - 250 = 0 - 40n - 250$$
$$-C = -40n - 250$$
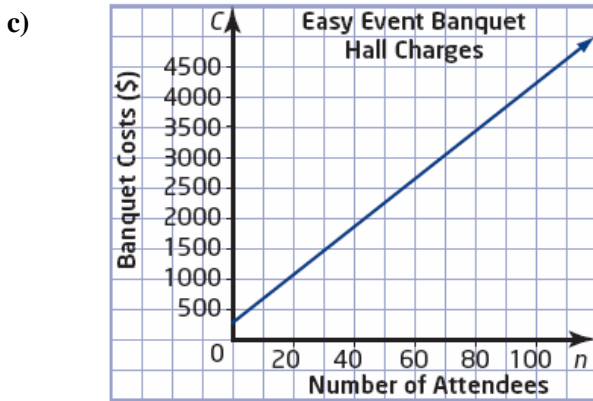$$\frac{-C}{-1} = \frac{-40n - 250}{-1}$$
$$C = \frac{-40n}{-1} + \frac{-250}{-1}$$
$$C = 40n + 250$$

b) The fixed cost is $250. The variable cost is $40 per person.

c)

d) $C = 40(100) + 250$
$$= 4000 + 250$$
$$= 4250$$

The cost for 100 people is $4250.

e) This is not a better deal than Celebrations. Celebrations charges $3750 for 100 people, whereas Easy Event charges $4250.

Chapter 6 Section 2   **Question 5**   **Page 312**

$$C = 40\left(50\right) + 250$$
$$= 2000 + 250$$
$$= 2250$$

The cost for 50 people at Easy Event is $2250.

$$C = 25\left(50\right) + 1250$$
$$= 1250 + 1250$$
$$= 2500$$

If only 50 people attend, then the cost at Celebrations is $2500 and the cost at Easy Event is $2250. In this case, Easy Event is a better deal. This is because the lower fixed cost at Easy Event offsets the higher variable cost when there are fewer people at a banquet.

Chapter 6 Section 2   **Question 6**   **Page 313**

$$n - E + 15 = 0$$
$$n - E + 15 - n - 15 = 0 - n - 15$$
$$-E = -n - 15$$
$$\frac{-E}{-1} = -\frac{n}{-1} - \frac{15}{-1}$$
$$E = n + 15$$

$$E = 0 + 15$$
$$= 15$$

$$E = 5 + 15$$
$$= 20$$

A beginning factory worker earns $15/h, while a factory worker with 5 years of experience earns $20/h.

The letters are o and t.

a)
$$9C - 5F + 160 = 0$$
$$9C - 5F + 160 + 5F - 160 = 0 + 5F - 160$$
$$9C = 5F - 160$$
$$\frac{9C}{9} = \frac{5F - 160}{9}$$
$$C = \frac{5F}{9} - \frac{160}{9}$$
$$C = \frac{5}{9}F - \frac{160}{9}$$

b)

Degrees Celsius Versus Degrees Fahrenheit

$C = \frac{5}{9}F - \frac{160}{9}$
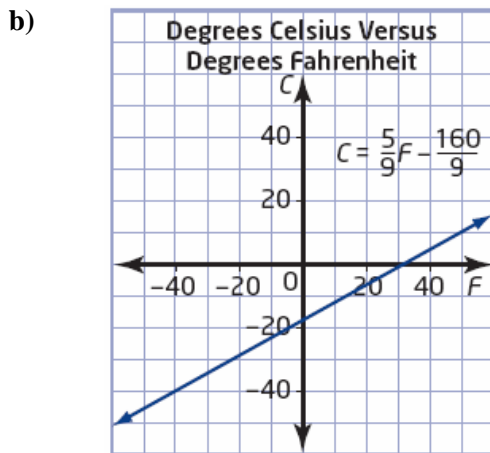
c)   The slope is $\frac{5}{9}$ and the C-intercept is $-\frac{160}{9}$. The slope is a multiplication coefficient and the C-intercept is a constant. To change a Fahrenheit temperature to a Celsius temperature, multiply the Fahrenheit temperature by the slope and add the C-intercept.

Chapter 6 Section 2   **Question 8   Page 313**
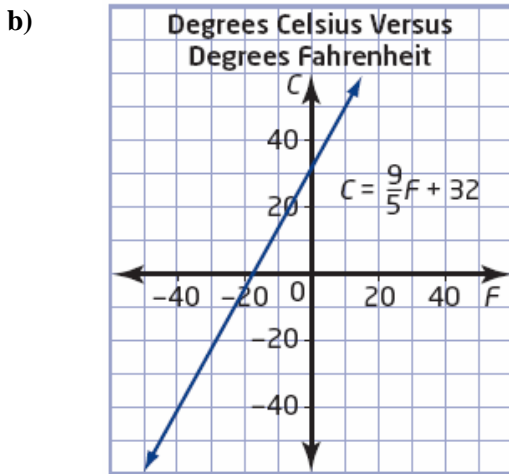
a)

$$9C - 5F + 160 = 0$$

$$9C - 5F + 160 - 9C - 160 = 0 - 9C - 160$$

$$-5F = -9C - 160$$

$$\frac{-5F}{-5} = \frac{-9C - 160}{-5}$$

$$F = \frac{-9C}{-5} + \frac{-160}{-5}$$

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

b)

c) The slope is $\dfrac{9}{5}$ and the F-intercept is 32. The slope is a coefficient and the F-intercept is a constant. To change a Celsius temperature to a Fahrenheit temperature, multiply the Celsius temperature by the slope and add the F-intercept.

Chapter 6 Section 2   **Question 9   Page 313**

a) The two graphs are similar in that they both have positive slope. They are different in that one has a positive vertical intercept while the other has a negative vertical intercept.

b) The slopes of the two graphs are reciprocals because $\dfrac{9}{5} \times \dfrac{5}{9} = 1$.

Chapter 6 Section 2   **Question 10   Page 313**

Solutions for Achievement Checks are shown in the Teacher's Resource.

a)
$$y = -2x + 7$$
$$y + 2x - 7 = -2x + 7 + 2x - 7$$
$$2x + y - 7 = 0$$

$A = 2, B = 1, C = -7$

b)
$$y = x - 3$$
$$y - x + 3 = x - 3 - x + 3$$
$$-x + y + 3 = 0$$
$$\frac{-x + y + 3}{-1} = \frac{0}{-1}$$
$$\frac{-1x}{-1} + \frac{y}{-1} + \frac{3}{-1} = 0$$
$$x - y - 3 = 0$$

$A = 1, B = -1, C = -3$

c)
$$y = \frac{3}{4}x - 2$$
$$4 \times y = 4 \times \left(\frac{3}{4}x - 2\right)$$
$$4y = 4 \times \frac{3}{4}x - 4 \times 2$$
$$4y = 3x - 8$$
$$4y - 3x + 8 = 3x - 8 - 3x + 8$$
$$-3x + 4y + 8 = 0$$
$$\frac{-3x + 4y + 8}{-1} = \frac{0}{-1}$$
$$\frac{-3x}{-1} + \frac{4y}{-1} + \frac{8}{-1} = 0$$
$$3x - 4y - 8 = 0$$

$A = 3, B = -4, C = -8$

f)

Chapter 6 Section 3   Graph a Line Using Intercepts

Chapter 6 Section 3   **Question 1   Page 319**

a) The *x*-intercept is –2. The *y*-intercept is 4.
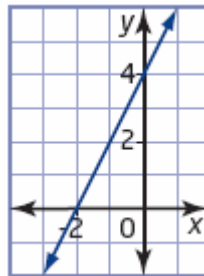
b) The *x*-intercept is –5. The *y*-intercept is 1.
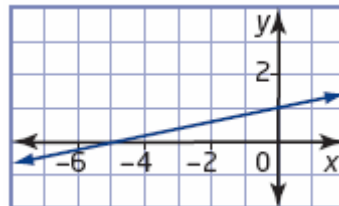
c) The *x*-intercept is 3. The *y*-intercept is 0.5.
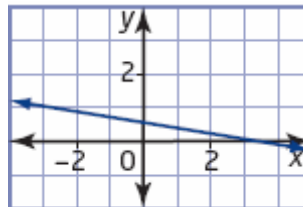
d) The *x*-intercept does not exist. The *y*-intercept is 3.
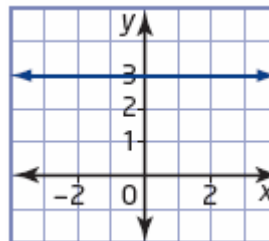
e) The *x*-intercept is –2. The *y*-intercept is does not exist.
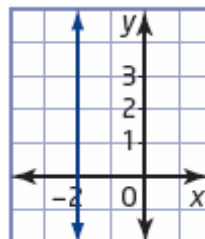
x-intercept	y-intercept
2	5
−3	3
1.5	−4
none	6
4	none
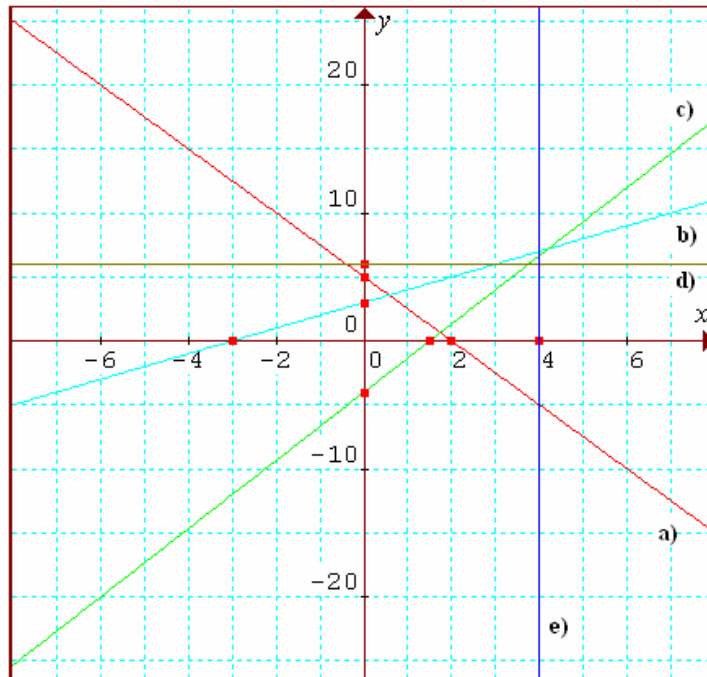
a)

$$2x + 3y = 12$$
$$2x + 3(0) = 12$$
$$2x = 12$$
$$\frac{2x}{2} = \frac{12}{2}$$
$$x = 6$$
$$2(0) + 3y = 12$$
$$3y = 12$$
$$\frac{3y}{3} = \frac{12}{3}$$
$$y = 4$$

The *x*-intercept is 6 and the *y*-intercept is 4.

b)

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

The *x*-intercept is 2 and the *y*-intercept is 6.

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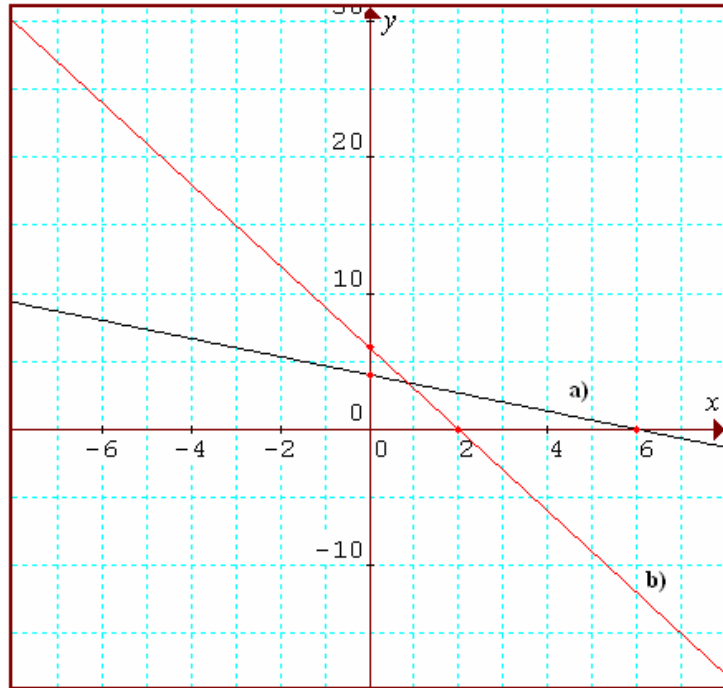
$$x - 4y = 4$$
$$x - 4(0) = 4$$
$$x = 4$$
$$(0) - 4y = 4$$
$$-4y = 4$$
$$\frac{-4y}{-4} = \frac{4}{-4}$$
$$y = -1$$

The *x*-intercept is 4 and the
y-intercept is –1.

d)

$$-5x + 2y = 10$$
$$-5x + 2(0) = 10$$
$$-5x = 10$$
$$\frac{-5x}{-5} = \frac{10}{-5}$$
$$x = -2$$
$$-5(0) + 2y = 10$$
$$2y = 10$$
$$\frac{2y}{2} = \frac{10}{2}$$
$$y = 5$$

The *x*-intercept is –2 and the *y*-intercept is 5.
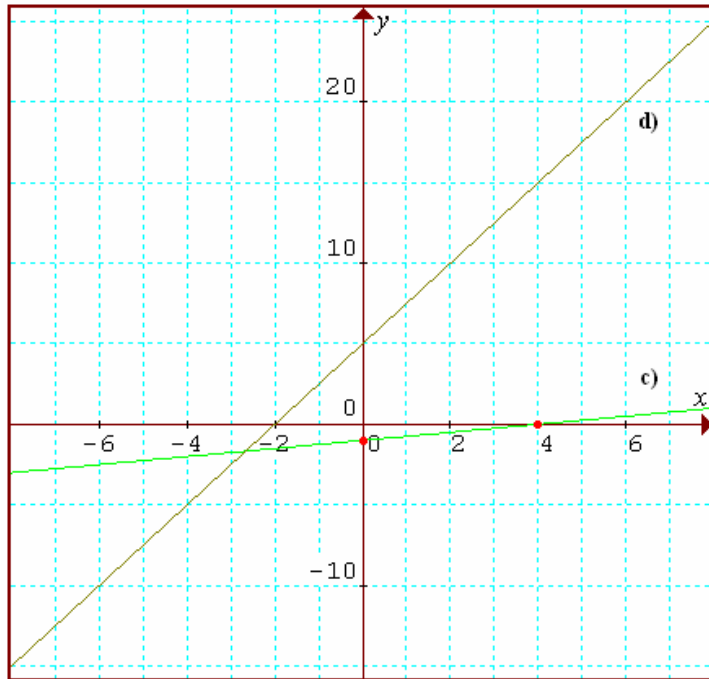
e)

$$4x = 12$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$x = 3$$

The *x*-intercept is 3 and the
y-intercept does not exist.

f)

$$3y = -9$$

$$\frac{3y}{3} = \frac{-9}{3}$$

$$y = -3$$

The *x*-intercept does not exist and
the *y*-intercept is –3.

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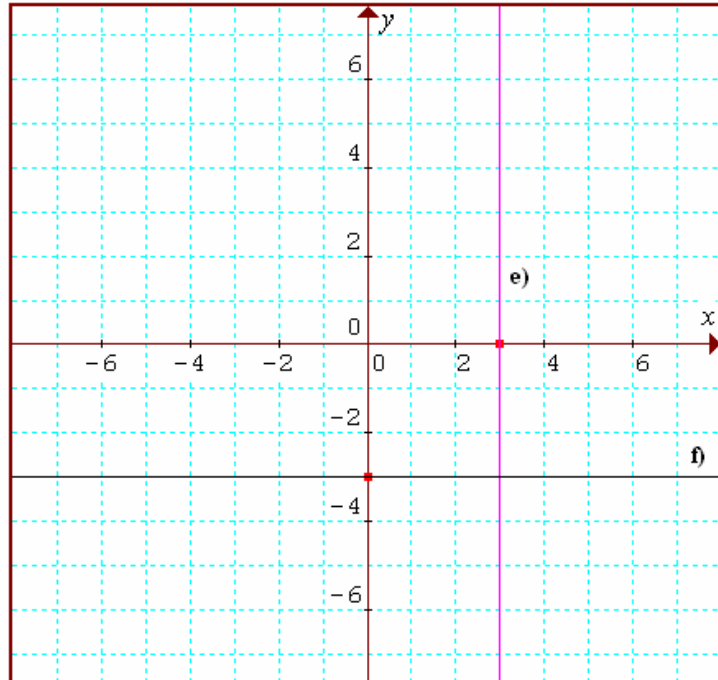
$$4x + 2y = 6$$
$$4x + 2(0) = 6$$
$$4x = 6$$
$$\frac{4x}{4} = \frac{6}{4}$$
$$x = \frac{3}{2}$$
$$4(0) + 2y = 6$$
$$2y = 6$$
$$\frac{2y}{2} = \frac{6}{2}$$
$$y = 3$$

The x-intercept is $\dfrac{3}{2}$ and the y-intercept is 3.

h)

$$x - 3y = 5$$
$$x - 3(0) = 5$$
$$x = 5$$
$$(0) - 3y = 5$$
$$-3y = 5$$
$$\frac{-3y}{-3} = \frac{5}{-3}$$
$$y = -\frac{5}{3}$$

The x-intercept is 5 and the y-intercept is $-\dfrac{5}{3}$.
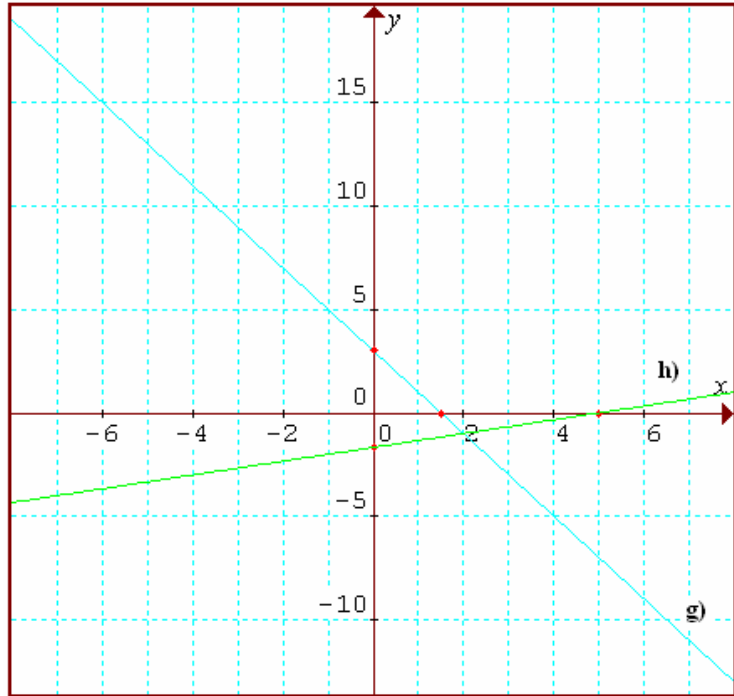
a) $m = \dfrac{\text{rise}}{\text{run}}$

$= \dfrac{5}{5}$

$= 1$
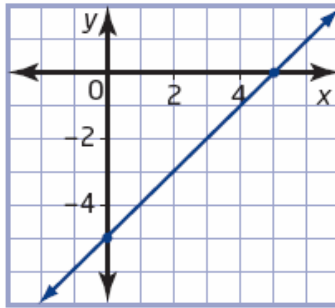
b) $m = \dfrac{\text{rise}}{\text{run}}$

$= \dfrac{3}{2}$
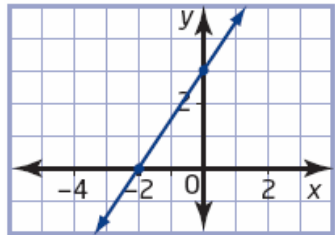
c) The slope is undefined.
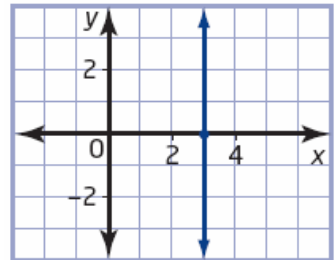
d) $m = \dfrac{\text{rise}}{\text{run}}$

$= \dfrac{4}{2.5}$

$= \dfrac{40}{25}$

$= \dfrac{8}{5}$ or 1.6
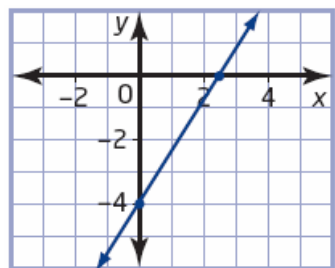
Chapter 6 Section 3   Question 5   Page 320

a) Use the points (6, 0) and (0, 5).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{5 - 0}{0 - 6}$$
$$= -\frac{5}{6}$$

b) Use the points (3, 0) and (0, –4).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{-4 - 0}{0 - 3}$$
$$= \frac{-4}{-3}$$
$$= \frac{4}{3}$$

c) Use the points (–6, 0) and (0, 3).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{3 - 0}{0 - (-6)}$$
$$= \frac{3}{6}$$
$$= \frac{1}{2}$$

d) Since there is no x-intercept, the line is horizontal. The slope is 0.

Chapter 6 Section 3   Question 6   Page 320

a) The d-intercept, 3.5, represents Carlo's initial distance from the motion sensor because the t-value at the d-intercept is 0.

b) The t-intercept, 7, represents the time at which Carlo's distance from the motion sensor is 0 because the d-value at the t-intercept is 0.

c) Answers will vary. A sample answer is shown.
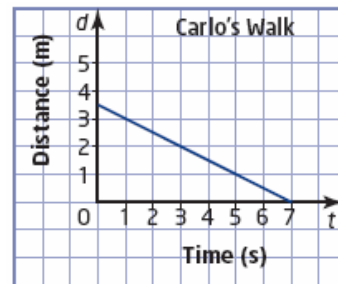
Start 3.5 m away from the motion sensor and walk towards it at a speed of 0.5 m/s.

Chapter 6 Section 3   **Question 7**   **Page 321**

Answers will vary. A sample answer is shown.

The coefficient of x is 1. This makes it easy to determine the x-intercept.

Chapter 6 Section 3   **Question 8**   **Page 321**

a)
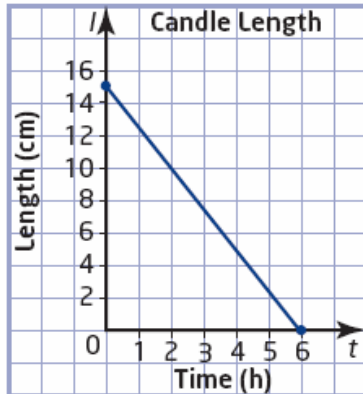
b) The slope should be negative because the candle's length decreases with time.

c) Refer to the graph in part a).

d) After 3 h, the candle will have burned $3 \times 2.5 = 7.5$ cm. The length left is $15 - 7.5$, or 7.5 cm.

After 4.5 h, the will have burned $4.5 \times 2.5 = 11.25$ cm. The length left is $15 - 11.25$, or 3.75 cm.

e) The t-intercept, 6, represents the time it takes for the candle to burn out completely.

f) The graph has no meaning below the t-axis because a candle cannot have negative length.

a) A line can have no *x*-intercept. A horizontal line having a *y*-intercept not equal to 0 has no *x*-intercept.

b) It is not possible for a line to have more than one *x*-intercept. Two distinct lines intersect at one point at most. Considering the *x*-axis as a line, no other line will cross the axis twice.

c) It is not possible for a line to have neither an *x*-intercept nor a *y*-intercept. A line can have no *x*-intercept or no *y*-intercept, but not both. A line that has no *x*-intercept is parallel to the *x*-axis and a line that has no *y*-intercept is parallel to the *y*-axis. No line can be parallel to both the *x*-axis and the *y*-axis at the same time.

Chapter 6 Section 3   Question 10   Page 321
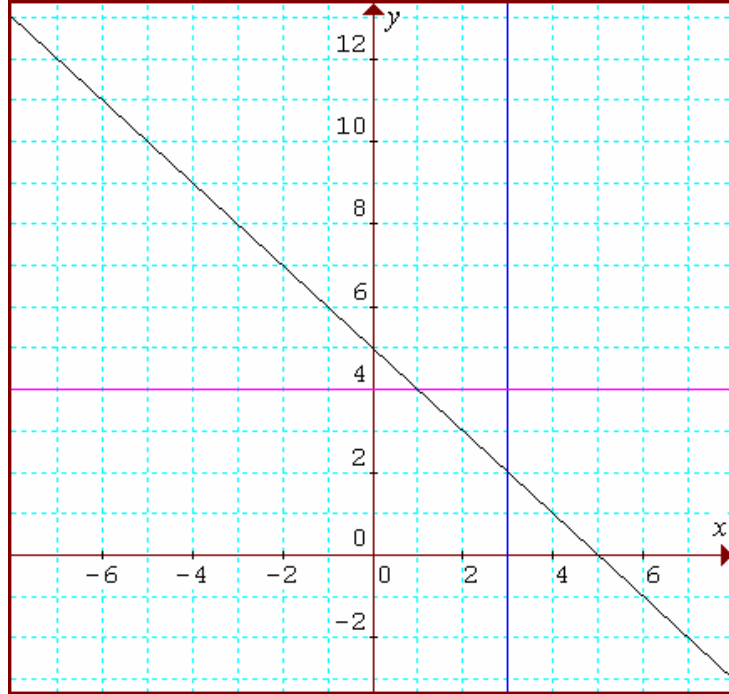
Answers will vary. Sample answers are shown. Click here to load the sketch.

a)
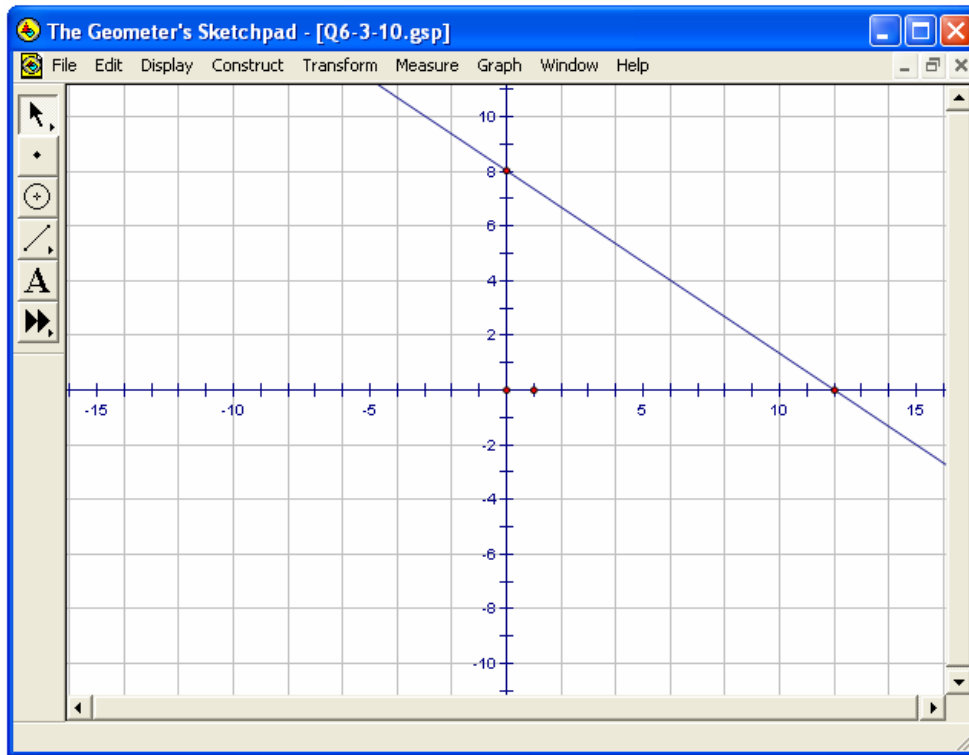
b) If the *x*-intercept is increased, the steepness of the slope decreases.
If the *x*-intercept is decreased, the steepness of the slope increases.
If the *y*-intercept is increased, the steepness of the slope increases.
If the *y*-intercept is decreased, the steepness of the slope decreases.

c) The increase in the price of comic books means that Joanne will be able to buy fewer comic books. This means that the linear model will have a lower horizontal intercept. Joanne's buying power will be less.

d) The decrease in the price of novels means that Joanne will be able to buy more novels. This means that the linear model will have a higher vertical intercept. Joanne's buying power will be greater.

Chapter 6 Section 3   **Question 11   Page 321**

a) The computer originally cost $1000.

b) The computer no longer has any value after 5 years.

c) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{0 - 1000}{5 - 0}$

$= \dfrac{-1000}{5}$

$= -200$
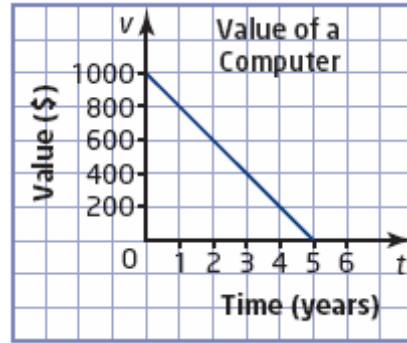
The slope is –200. The value of the computer decreases by $200 per year.

Chapter 6 Section 3   **Question 12   Page 322**

a)

Time (years)	Computer's Value
0	$1000.00
1	$500.00
2	$250.00
3	$125.00
4	$62.50
5	$31.25

b)
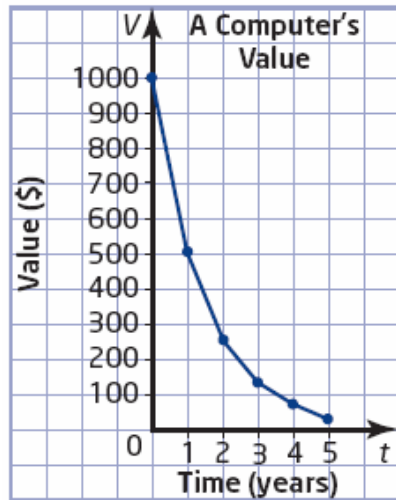
The relation is non-linear. The points form a curve.

Answers will vary for the remaining parts of the question. Sample answers are shown.

c) The computer will be worth less than 10% of its value after 3.5 years. It will never be worth $0 because half of a positive number is always another positive number.

d) The t-intercept does not exist. It does not exist because the computer's value will never reach 0.

e) The computer's value depreciates faster in the system where its value is halved each year. This is because half of $1000 is more than $200, which is the amount subtracted each year in the other model.

Chapter 6 Section 3 **Question 13** **Page 322**

a) This graph has two *x*-intercepts, at 3 and –3.

b) This graph has one *y*-intercept, at 9.

Answers will vary for the remaining parts of this question. Sample answers are shown.
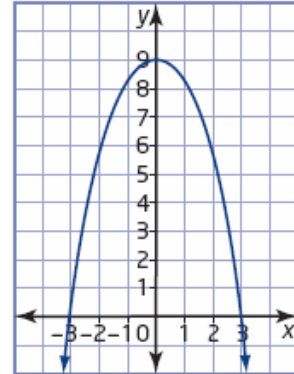
c) A relation that has two *y*-intercepts is shown.

d) A relation that has three *x*-intercepts is shown.

e) A relation that has two *x*-intercepts and two *y*-intercepts is shown.
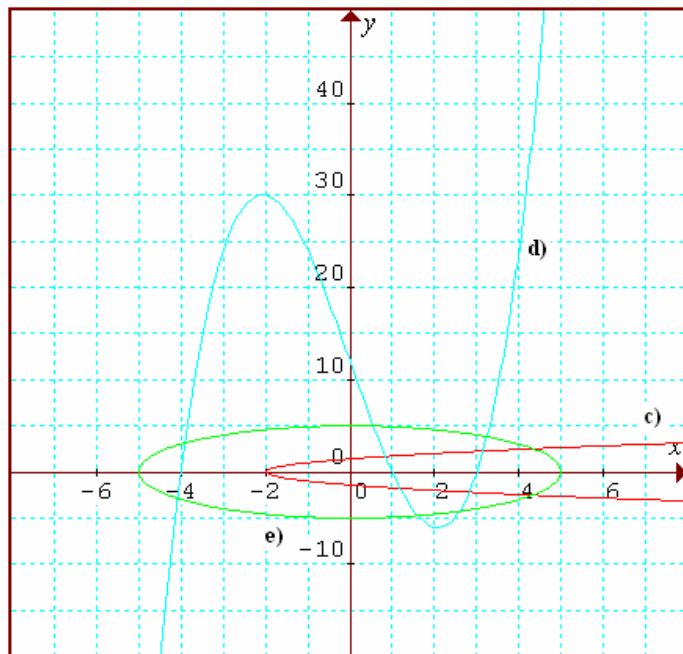
Chapter 6 Section 3   **Question 14   Page 322**

Answers will vary. A sample answer is shown.

Locate B by moving 5 units right, 3 units down, and 1 unit out of the page. Locate C by moving 2 units left, 0 units down, and 4 units out of the page. The resulting figure is a triangle.

Chapter 6 Section 3   **Question 15   Page 322**

$$6x - 2y - 18 = 0$$
$$6x - 2y - 18 - 6x + 18 = 0 - 6x + 18$$
$$-2y = -6x + 18$$
$$\frac{-2y}{-2} = \frac{-6x + 18}{-2}$$
$$y = \frac{-6x}{-2} + \frac{18}{-2}$$
$$y = 3x - 9$$
$$y = 3(x - 3)$$

The value of a, in this case 3, is the x-intercept.

For an equation in the form $y = m(x - a)$, the value of a is the x-intercept of the graph of the line.

Chapter 6 Section 4   **Question 1   Page 328**

a) Each line has a slope of $\dfrac{1}{4}$.

The lines are parallel.

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

$$y = \frac{1}{4}x - 2$$
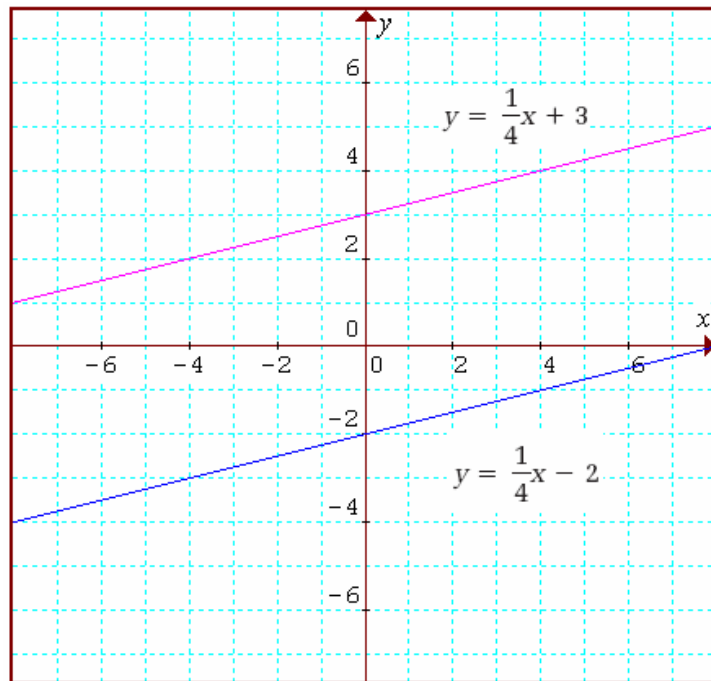
b) Each line has a slope of 2.
The lines are parallel.

$$y = 2x + 5$$

$$4x - 2y + 6 = 0$$
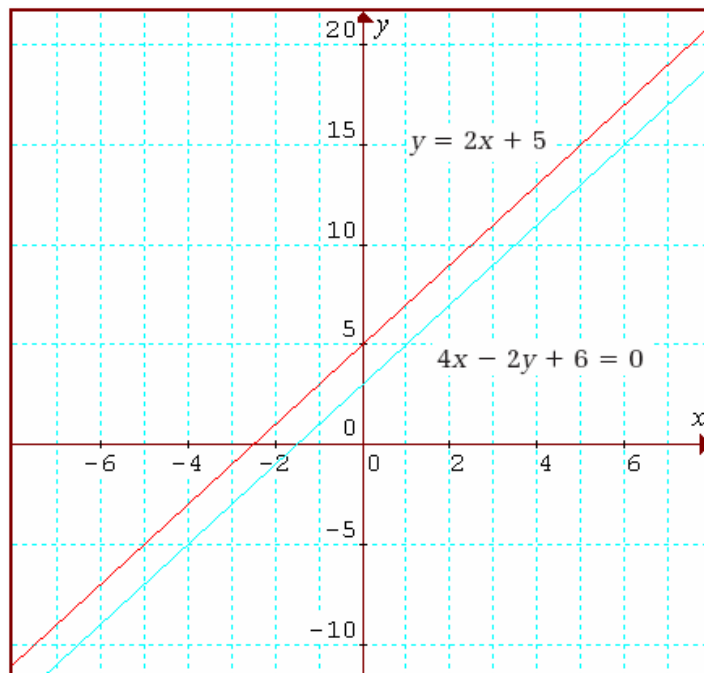
c) The slope of the first graph is –1, while the slope of the second is 1. The lines are perpendicular.
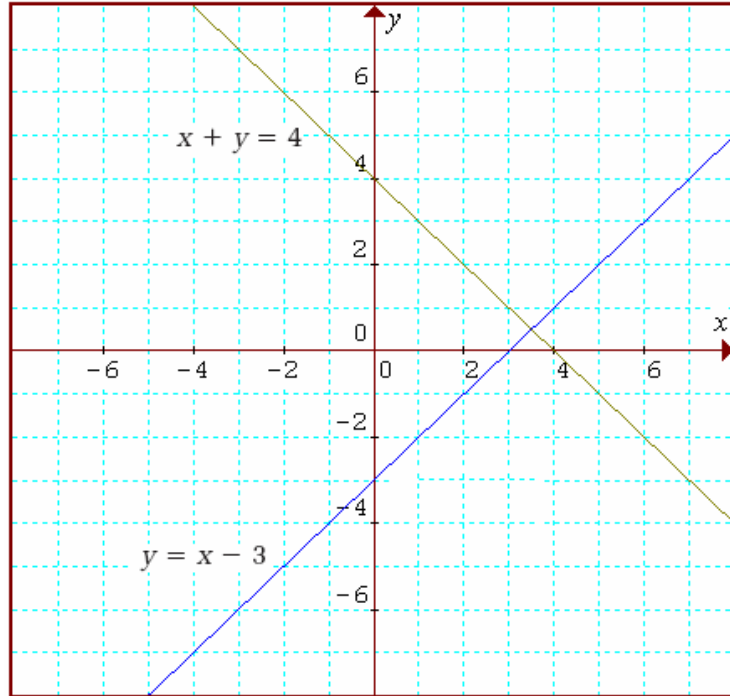
d) The slope of each line is $\frac{1}{2}$.

The lines are parallel.
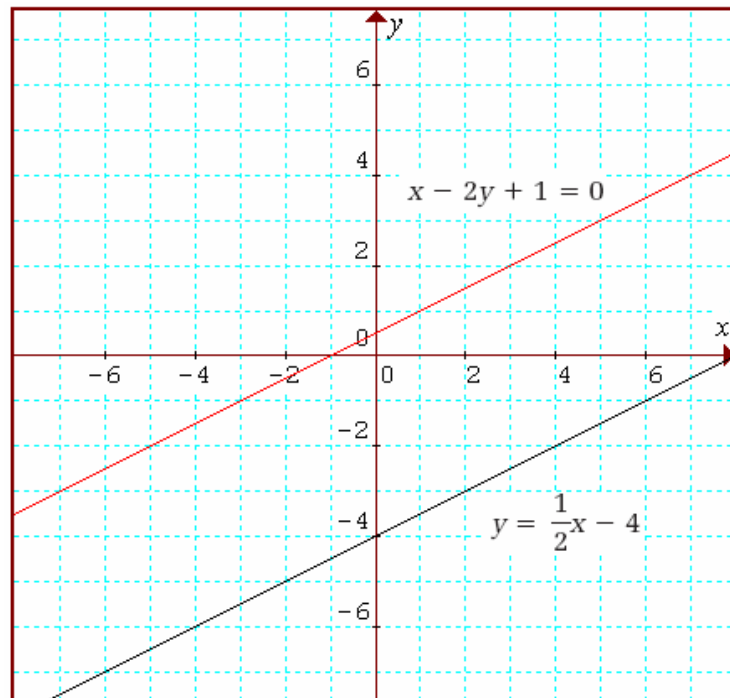
a) The slope of the horizontal line is 0. The slope of the vertical line is undefined. The lines are perpendicular.
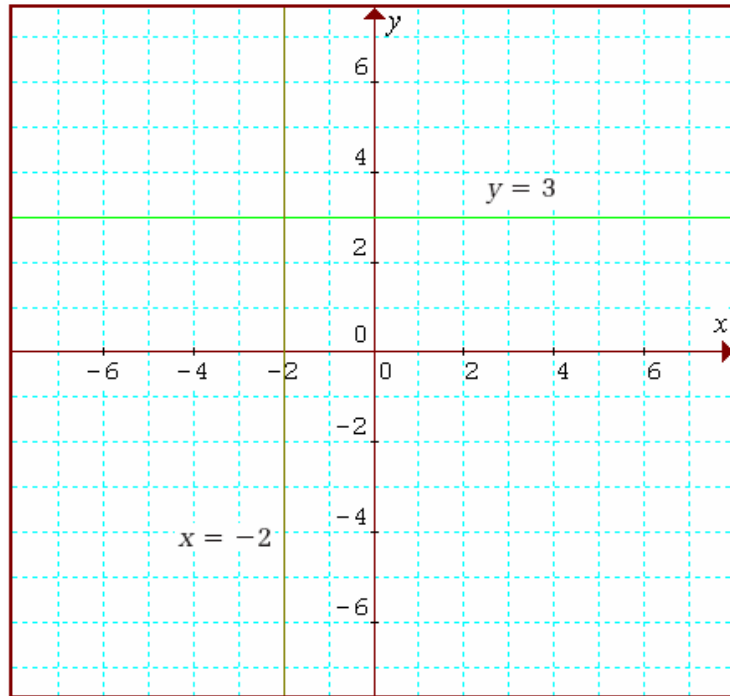
b) The slope of the horizontal line is 0. The slope of the angled line is 1. The lines are neither parallel nor perpendicular.
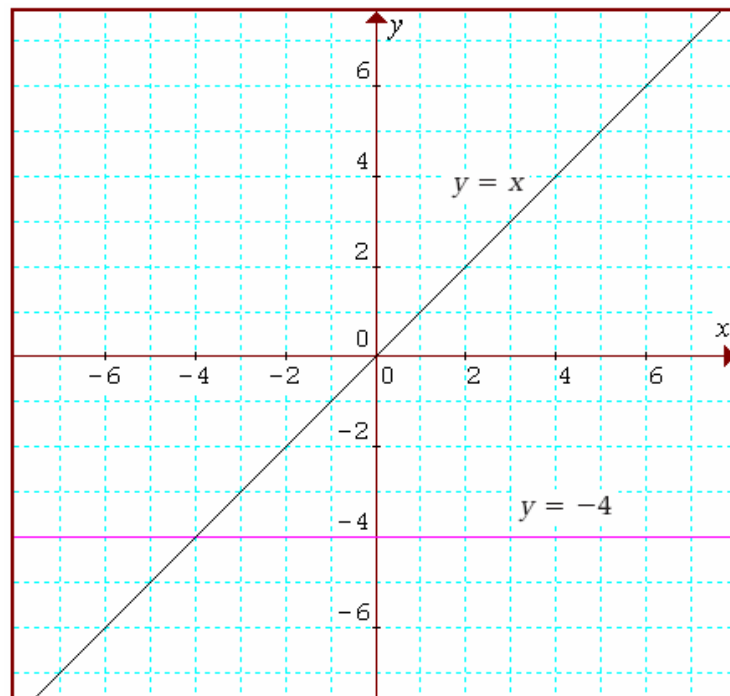
c) The two lines are vertical. Their slopes are undefined. The lines are parallel.

$x = 0$

$x = 5$
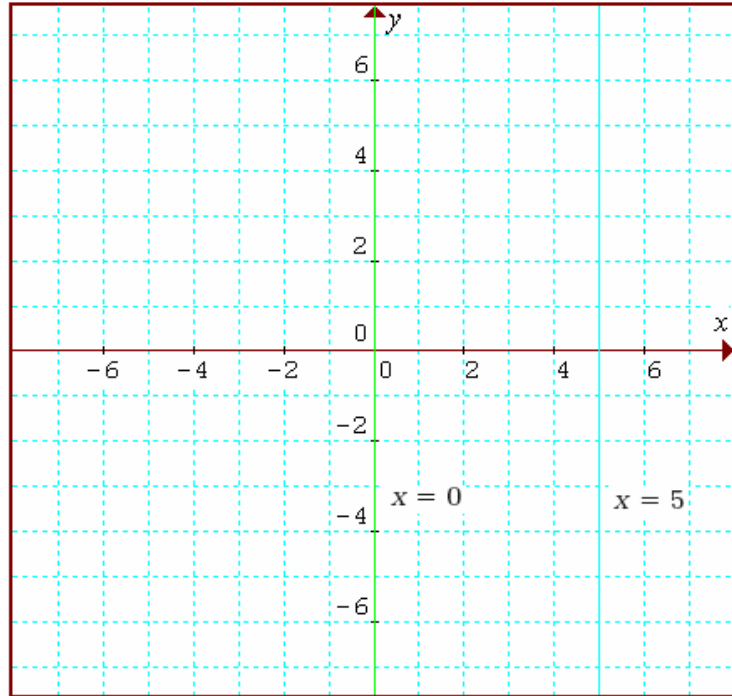
d) The slope of the ascending line is 1. The slope of the descending line is –1. The lines are perpendicular.

$y = x + 1$

$y = -x$
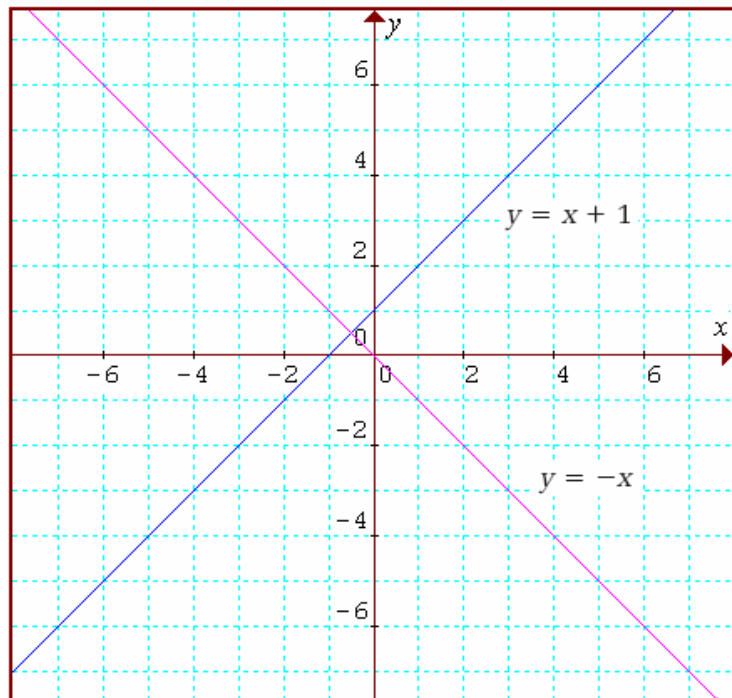
Chapter 6 Section 4   **Question 3**   **Page 328**

a) The lines are parallel. Their slopes, $\dfrac{2}{3}$ and $\dfrac{4}{6}$, are equivalent.

b) The lines are perpendicular. Their slopes, $\dfrac{3}{4}$ and $-\dfrac{4}{3}$, are negative reciprocals.

c) The lines are neither parallel nor perpendicular. Their slopes, 2 and –2, are not equal, and are not negative reciprocals.

d) The lines are perpendicular. Their slopes, 1 and –1, are negative reciprocals.

e) The lines are parallel. Their slopes, $\dfrac{1}{5}$ and 0.2, are equivalent.

f) The lines are perpendicular. Their slopes, $\dfrac{9}{4}$ and $-\dfrac{4}{9}$, are negative reciprocals.

Chapter 6 Section 4   **Question 4**   **Page 328**

a) The slope of the line is $\dfrac{3}{5}$. The slope of a line that is parallel to this line is $\dfrac{3}{5}$.

b) The slope of the line is –1. The slope of a line that is parallel to this line is –1.

c)
$$2x - y + 3 = 0$$
$$2x - y + 3 + y = 0 + y$$
$$2x + 3 = y$$

The slope of the line is 2. The slope of a line that is parallel to this line is 2.

d)
$$4x + 3y = 12$$
$$4x + 3y - 4x = 12 - 4x$$
$$3y = -4x + 12$$
$$\frac{3y}{3} = \frac{-4x + 12}{3}$$
$$y = \frac{-4x}{3} + \frac{12}{3}$$
$$y = -\frac{4}{3}x + 4$$

The slope of the line is $-\dfrac{4}{3}$. The slope of a line that is parallel to this line is $-\dfrac{4}{3}$.

e) This line is horizontal. The slope of the line is 0. The slope of a line that is parallel to this line is 0.

f) This line is vertical. The slope of the line is undefined. The slope of a line that is parallel to this line is undefined.

Chapter 6 Section 4   **Question 5   Page 328**

a) The slope of a line that is perpendicular to the given line is $-\dfrac{5}{3}$.

b) The slope of a line that is perpendicular to the given line is 1.

c) The slope of a line that is perpendicular to the given line is $-\dfrac{1}{2}$.

d) The slope of a line that is perpendicular to the given line is $\dfrac{3}{4}$.

e) The slope of a line that is perpendicular to the given line is undefined.

f) The slope of a line that is perpendicular to the given line is 0.

Chapter 6 Section 4   **Question 6   Page 328**

$$
\begin{aligned}
3x - 6y - 5 &= 0 \\
3x - 6y - 5 - 3x + 5 &= 0 - 3x + 5 \\
-6y &= -3x + 5 \\
\frac{-6y}{-6} &= \frac{-3x + 5}{-6} \\
y &= \frac{-3x}{-6} + \frac{5}{-6} \\
y &= \frac{1}{2}x - \frac{5}{6}
\end{aligned}
$$

Answers will vary. Sample answers are shown.

$$y = \frac{1}{2}x + 1$$

$$y = \frac{1}{2}x - 1$$

Chapter 6 Section 4   **Question 7   Page 328**

$$4x + y - 2 = 0$$
$$4x + y - 2 - 4x + 2 = 0 - 4x + 2$$
$$y = -4x + 2$$

Answers will vary. Sample answers are shown.

$$y = \frac{1}{4}x + 1$$

$$y = \frac{1}{4}x - 1$$

Chapter 6 Section 4   **Question 8   Page 328**

a)
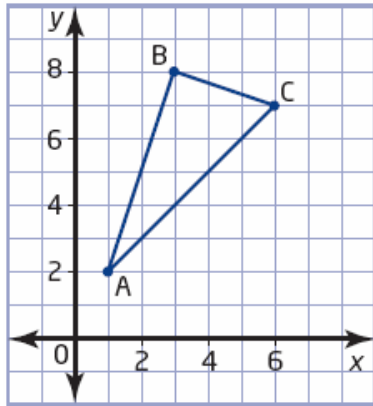
b) The triangle appears to be a right triangle with the right angle at B.

c) The slope of AB is 3. The slope of AC is 1. The slope of BC is $-\frac{1}{3}$.

d) The slopes of AB and BC are negative reciprocals. This means that AB and BC are perpendicular. Perpendicular lines meet at right angles, so this is a right triangle.

a)

$$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{5 - 1}{-2 - 1}$$

$$= \frac{4}{-3}$$

$$= -\frac{4}{3}$$

$$m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$$

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

$$= \frac{-7}{5}$$

$$= -\frac{7}{5}$$

$$m_{AC} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-2 - 1}{3 - 1}$$

$$= \frac{-3}{2}$$

$$= -\frac{3}{2}$$

No pair of slopes are negative reciprocals. $\triangle ABC$ is not a right triangle.

b)

$$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{2 - 4}{-2 - 2}$$

$$= \frac{-2}{-4}$$

$$= \frac{1}{2}$$

$$m_{QR} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-2 - 2}{5 - (-2)}$$

$$= \frac{-4}{7}$$

$$= -\frac{4}{7}$$

$$m_{PR} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-2 - 4}{5 - 2}$$

$$= \frac{-6}{3}$$

$$= -2$$

The slope of PQ is $\frac{1}{2}$. The slope of PR is –2. These are negative reciprocals. $\triangle PQR$ is a right triangle.
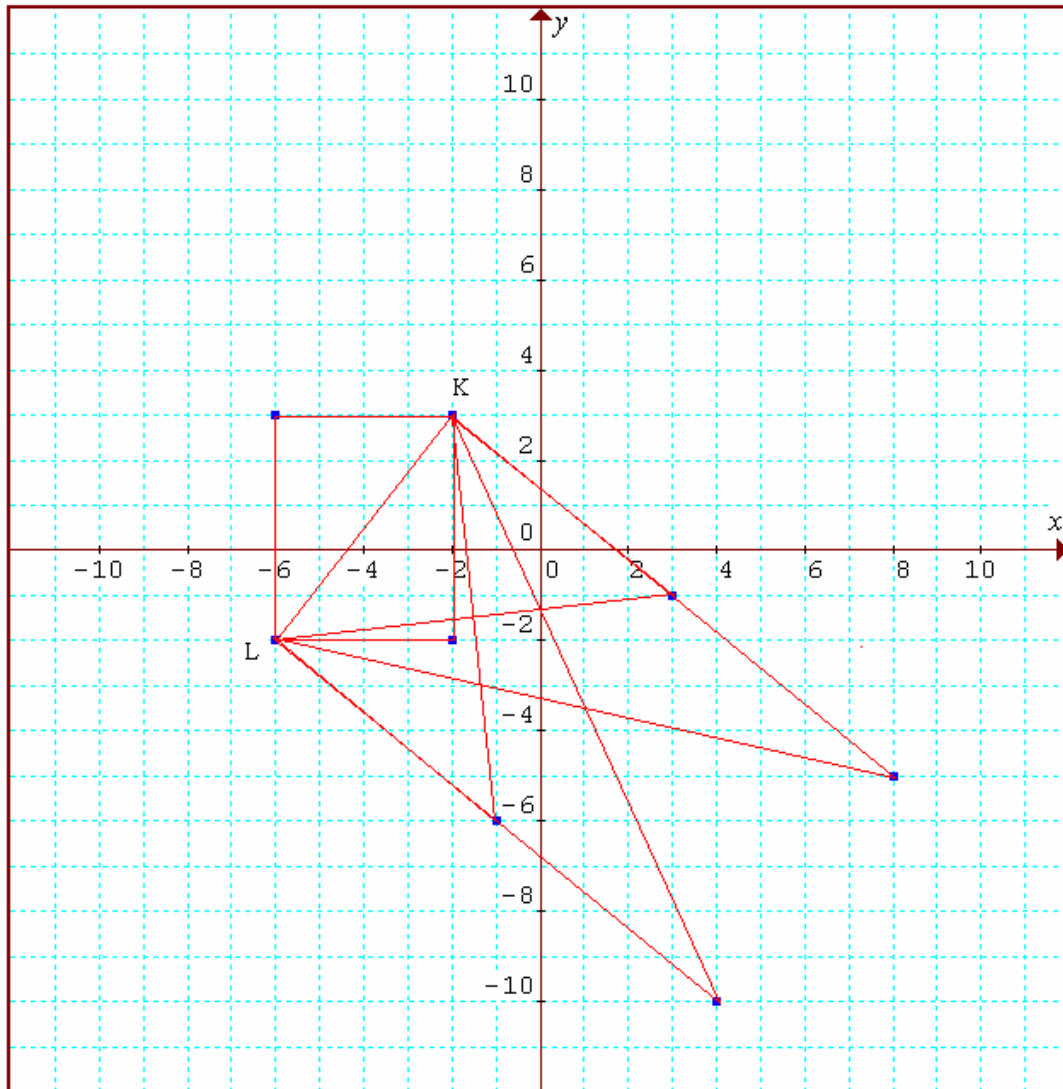
a) Some possible answers are (–2, –2), (–6, 3), (3, –1), (8, –5), (–1, –6), and (4, –10).

b) There are many other possible answers. All you need is one right angle.

Solutions for Achievement Checks are shown in the Teacher's Resource.

Chapter 6 Section 4   **Question 12   Page 329**

a) For the line $2x + 5y = 10$, the x-intercept is 5, and the y-intercept is 2.

For the line $2x + 5y = -10$, the x-intercept is –5, and the y-intercept is –2.
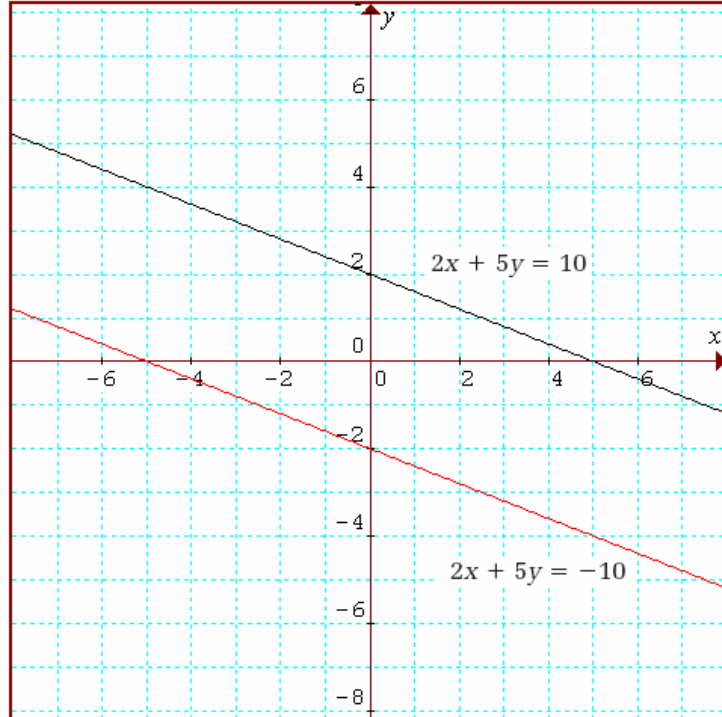
b) For the line $3x + 4y = 12$, the x-intercept is 4, and the y-intercept is 3.

For the line $3x + 4y = -12$, the x-intercept is –4, and the y-intercept is –3.

c) Answers will vary.
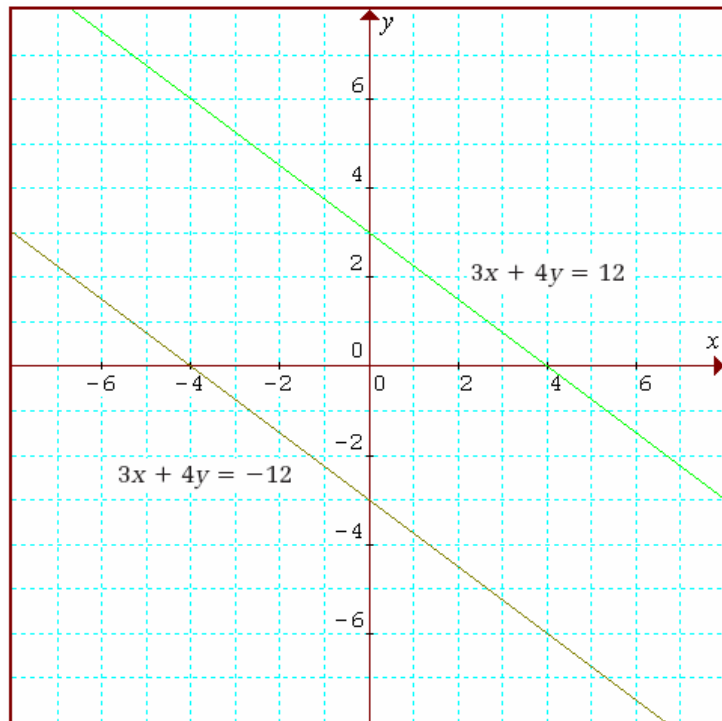
a) For the line $3x + 5y = 15$, the
x-intercept is 5, and the
y-intercept is 3.

For the line $5x - 3y = -15$, the x-intercept is –3, and the
y-intercept is 5.

$3x + 5y = 15$
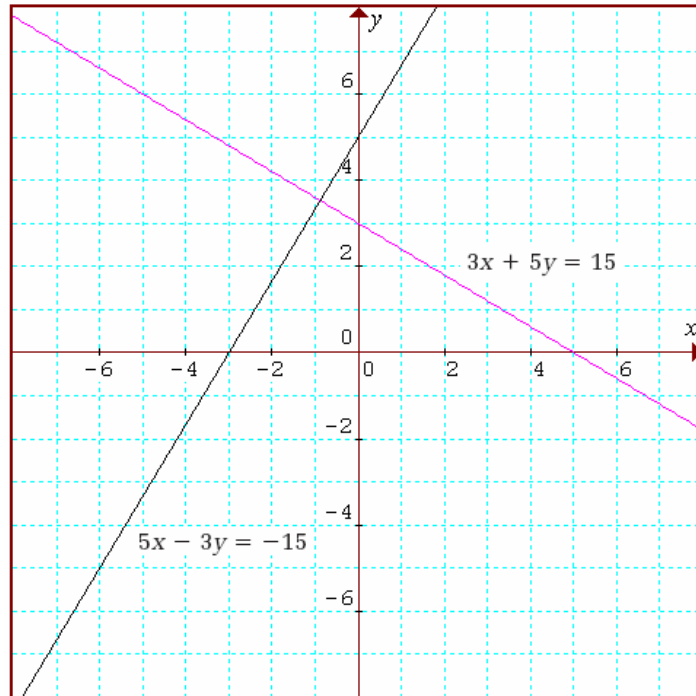
$5x - 3y = -15$

b) For the line $2x + 7y = 14$, the
x-intercept is 7, and the
y-intercept is 2.

For the line $7x - 2y = -14$, the x-intercept is –2, and the
y-intercept is 7.

c) Answers will vary.
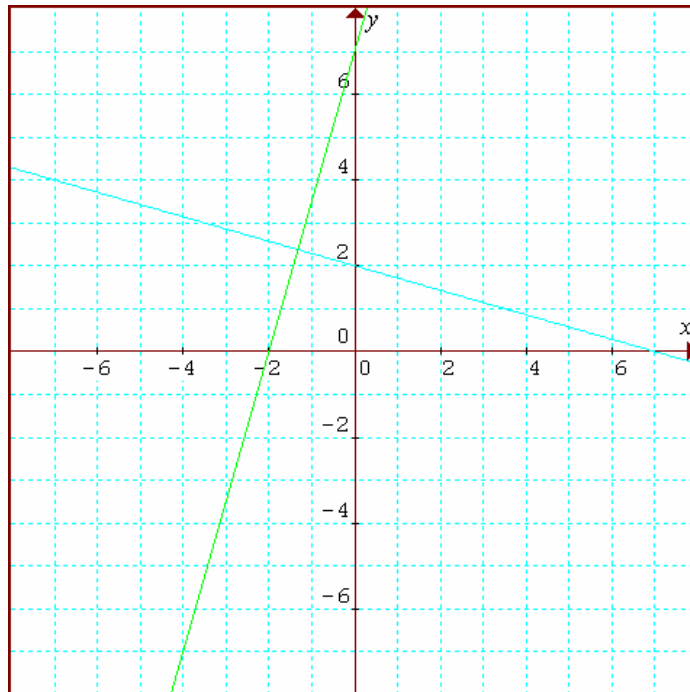
a)
$$Ax - 3y + 15 = 0$$
$$Ax - 3y + 15 - Ax - 15 = 0 - Ax - 15$$
$$-3y = -Ax - 15$$
$$\frac{-3y}{-3} = \frac{-Ax - 15}{-3}$$
$$y = \frac{-Ax}{-3} + \frac{-15}{-3}$$
$$y = \frac{A}{3}x + 5$$

Since A and k are one-digit numbers, A can be –9, –6, –3, 0, 3, 6, or 9. This gives corresponding values for k of –3, –2, –1, 0, 1, 2, and 3. There are 7 pairs of values for A and k for which the two lines are parallel.

b) If the lines are to be perpendicular, $k = -\dfrac{3}{A}$. A can be –3, –1, 1, or 3. This gives corresponding value of k of 1, 3, –3, and –1. There are 4 pairs of values for A and k for which the two lines are perpendicular.

c) The first line has a y-intercept of 5. The second line has a y-intercept of 7. Since the values of A and k affect only the slopes of the lines, there is no pair of values that make the lines coincident.

Chapter 6 Section 5   **Question 1   Page 335**

a) $y = mx + b$

$5 = 1(3) + b$

$5 = 3 + b$

$5 - 3 = 3 + b - 3$

$2 = b$

$y = x + 2$

b)   The y-intercept is given as –4.

$y = -3x - 4$

c)

$y = mx + b$

$6 = \dfrac{2}{3}(-2) + b$

$6 = -\dfrac{4}{3} + b$

$6 + \dfrac{4}{3} = -\dfrac{4}{3} + b + \dfrac{4}{3}$

$\dfrac{18}{3} + \dfrac{4}{3} = b$

$\dfrac{22}{3} = b$

$y = \dfrac{2}{3}x + \dfrac{22}{3}$

d)

$y = mx + b$

$-2 = -\dfrac{1}{2}(5) + b$

$-2 = -\dfrac{5}{2} + b$

$-2 + \dfrac{5}{2} = -\dfrac{5}{2} + b + \dfrac{5}{2}$

$\dfrac{-4}{2} + \dfrac{5}{2} = b$

$\dfrac{1}{2} = b$

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

e) The *y*-intercept is given as 0.

$$y = -\frac{4}{5}x$$

f)

$$y = mx + b$$

$$\textcolor{red}{\frac{3}{4}} = 2\left(\frac{1}{2}\right) + b$$

$$\frac{3}{4} = 1 + b$$

$$\frac{3}{4} - 1 = 1 + b - 1$$

$$\frac{3}{4} - \frac{4}{4} = b$$

$$-\frac{1}{4} = b$$

$$y = 2x - \frac{1}{4}$$

a) The *y*-intercept is given as 0.

$y = -3x$

b)

$$y = mx + b$$

$$-5 = \frac{2}{3}(4) + b$$

$$-5 = \frac{8}{3} + b$$

$$-5 - \frac{8}{3} = \frac{8}{3} + b - \frac{8}{3}$$

$$\frac{-15}{3} - \frac{8}{3} = b$$

$$-\frac{23}{3} = b$$

$$y = \frac{2}{3}x - \frac{23}{3}$$

c) The slope of the line is 0. The equation is $y = -6$.

d) The *y*-intercept is given as 0.

$$y = \frac{5}{2}x$$

e) The given line is vertical. The required line is horizontal, with a slope of 0. The equation is $y = -3$.

f)

$$y = mx + b$$

$$7 = -\frac{1}{4}(-2) + b$$

$$7 = \frac{1}{2} + b$$

$$7 - \frac{1}{2} = \frac{1}{2} + b - \frac{1}{2}$$

$$\frac{14}{2} - \frac{1}{2} = b$$

$$\frac{13}{2} = b$$

$$y = -\frac{1}{4}x + \frac{13}{2}$$

a)
$$C = md + b$$
$$40 = 10(2.5) + b$$
$$40 = 25 + b$$
$$40 - 25 = 25 + b - 25$$
$$15 = b$$

$$C = 10d + 15$$

b) $C = 10d + 15$
$$C = 10(6.5) + 15$$
$$= 65 + 15$$
$$= 80$$

A 6.5 km ride costs $80.

c)
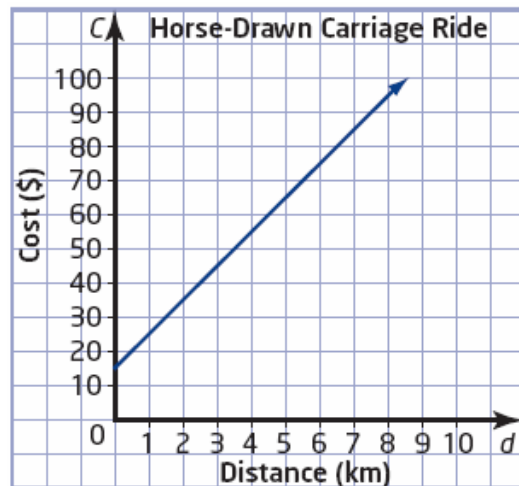
d) From the graph, the cost of a 6.5 km ride is $80.

a)

Distance (km)	Cost ($)	First Differences
2.5	40	
3.5	50	10
4.5	60	10
5.5	70	10
6.5	80	10

This method uses a table of values to determine the cost of a 6.5 km ride.

b)
$$C = 10d + 15$$
$$100 = 10d + 15$$
$$100 - 15 = 10d + 15 - 15$$
$$85 = 10d$$
$$\frac{85}{10} = \frac{10d}{10}$$
$$8.5 = d$$

From the equation, $100 will get you 8.5 km.

From the graph, $100 will get you 8.5 km.

Continue the table for two more rows. The table shows that $100 will get you 8.5 km.

Distance (km)	Cost ($)	First Differences
2.5	40	
3.5	50	10
4.5	60	10
5.5	70	10
6.5	80	10
7.5	90	10
8.5	100	10

c)
$$C = 10d + 15$$
$$C = 10(5.8) + 15$$
$$= 58 + 15$$
$$= 73$$

From the equation, a 5.8 km ride costs $73.

From the graph, a 5.8 km ride costs about $73.

From the table, you can estimate that a 5.8 km ride costs about $73.

d) Answers will vary. Sample answers are shown.

The equation method gives accurate answers, but requires solving. The graph method is easy, but gives less exact answers. The table method is easy, but gives less exact answers.

Chapter 6 Section 5   **Question 5   Page 336**

$$2x - 3y + 6 = 0$$
$$2x - 3y + 6 - 2x - 6 = 0 - 2x - 6$$
$$-3y = -2x - 6$$
$$\frac{-3y}{-3} = \frac{-2x - 6}{-3}$$
$$y = \frac{-2x}{-3} + \frac{-6}{-3}$$
$$y = \frac{2}{3}x + 2$$

The desired slope is $\dfrac{2}{3}$. The desired y-intercept is -1. The equation is $y = \dfrac{2}{3}x - 1$.

Chapter 6 Section 5   **Question 6   Page 336**

$$4x - 5y = 20$$
$$4x - 5y - 4x = 20 - 4x$$
$$-5y = -4x + 20$$
$$\frac{-5y}{-5} = \frac{-4x + 20}{-5}$$
$$y = \frac{-4x}{-5} + \frac{20}{-5}$$
$$y = \frac{4}{5}x - 4$$

The desired slope is $-\dfrac{5}{4}$. The equation is $y = -\dfrac{5}{4}x - 4$.

The desired slope is $-\dfrac{8}{9}$.

$$y = mx + b$$
$$-8 = -\frac{8}{9}(18) + b$$
$$-8 = -16 + b$$
$$-8 + 16 = -16 + 16 + b$$
$$8 = b$$

$$y = -\frac{8}{9}x + 8$$

$$0 = -\frac{8}{9}x + 8$$
$$0 - 8 = -\frac{8}{9}x + 8 - 8$$
$$-8 = -\frac{8}{9}x$$
$$9 \times (-8) = 9 \times \left(-\frac{8}{9}x\right)$$
$$-72 = -8x$$
$$\frac{-72}{-8} = \frac{-8x}{-8}$$
$$9 = x$$

The *x*-intercept is 9 and the *y*-intercept is 8. The letters are h and i.

a) The ordered pair (3, 300) means that Aki has 300 km left to drive after 3 h.

b) The slope $m = -80$ means that the distance remaining between Aki and Ottawa is decreasing at a rate of 80 km/h.

c)
$$d = mt + b$$
$$300 = -80(3) + b$$
$$300 = -240 + b$$
$$300 + 240 = -240 + b + 240$$
$$540 = b$$

d) $d = -80t + 540$

e)
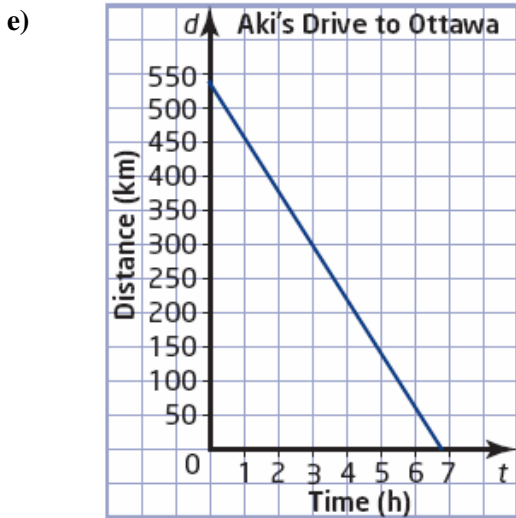
The d-intercept represents Aki's distance from Ottawa just as he started this trip.

f)
$$0 = -80t + 540$$
$$0 - 540 = -80t + 540 - 540$$
$$-540 = -80t$$
$$\frac{-540}{-80} = \frac{-80t}{-80}$$
$$6.75 = t$$

The trip to Ottawa will take 6.75 h.

g) No. Aki has driven for 3 h at 80 km/h. So, he has driven 240 km. He still has 300 km to drive.
At 80 km/h, this will take him another $3\frac{3}{4}$ h.

Chapter 6 Section 5   **Question 9   Page 337**

a) Click here to load the sketch.

The Geometer's Sketchpad - [Q6-5-9.gsp]

File   Edit   Display   Construct   Transform   Measure   Graph   Window   Help

$b = 5.00$

$f(x) = 2 \cdot x + b$

b) Answers will vary.

Chapter 6 Section 5   Question 10   Page 337
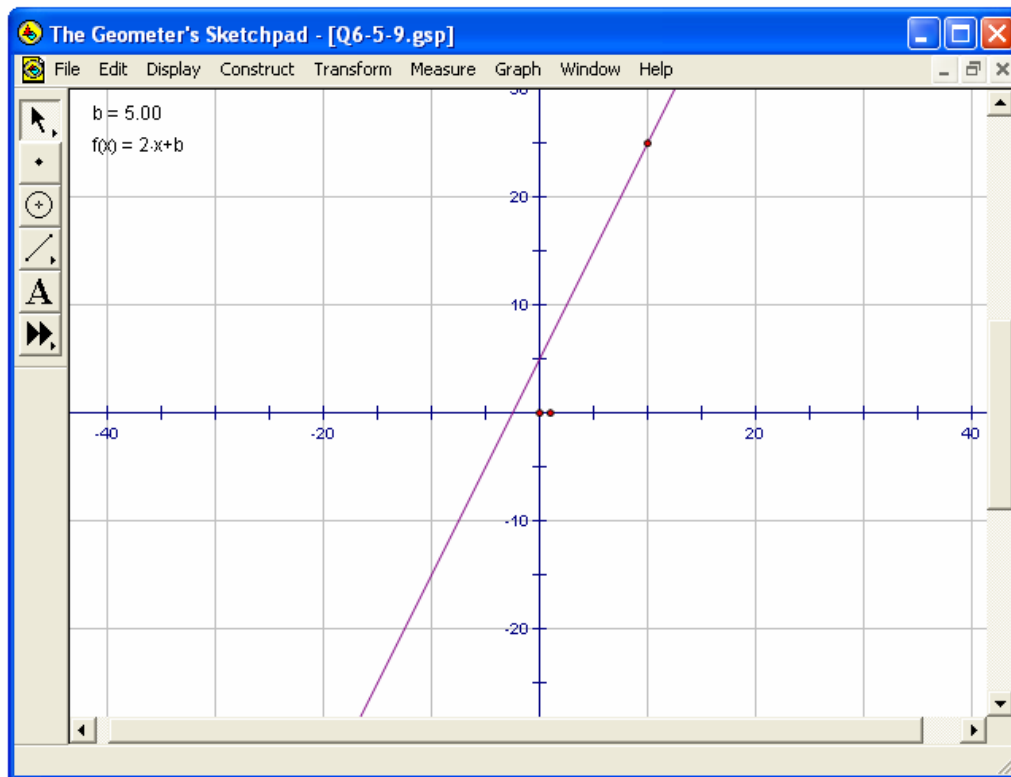
a) Click here to load the sketch.
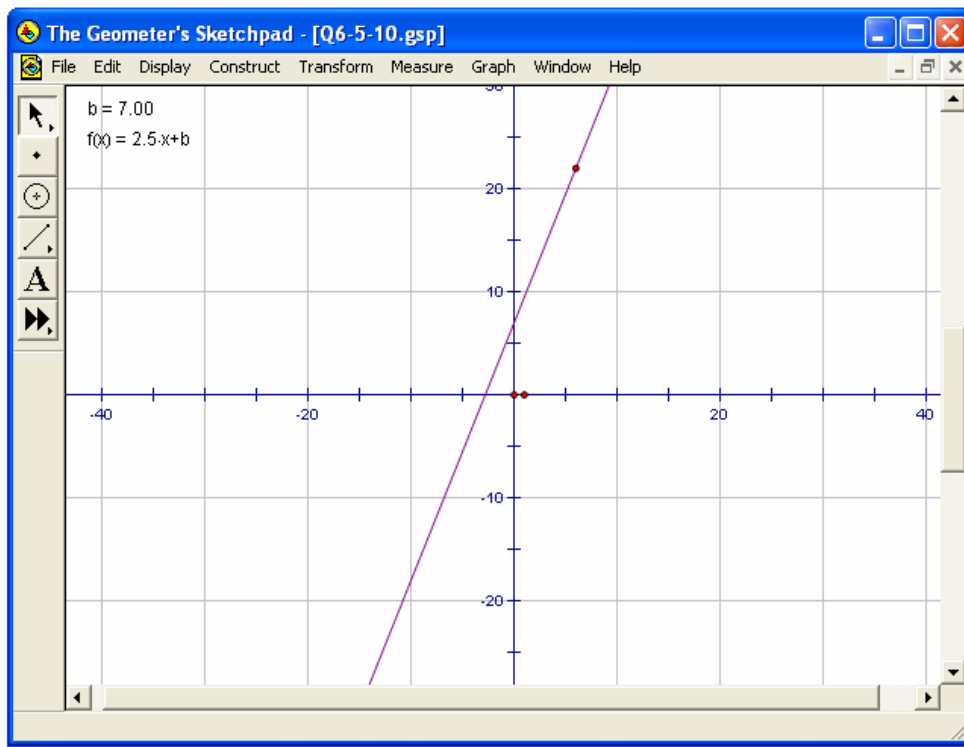
The fixed cost is $7.00.

b) $C = 2.5d + 7.00$

c)
$$C = md + b$$
$$22 = 2.5(6) + b$$
$$22 = 15 + b$$
$$22 - 15 = 15 + b - 15$$
$$7 = b$$
$$C = 2.5d + 7$$

a)
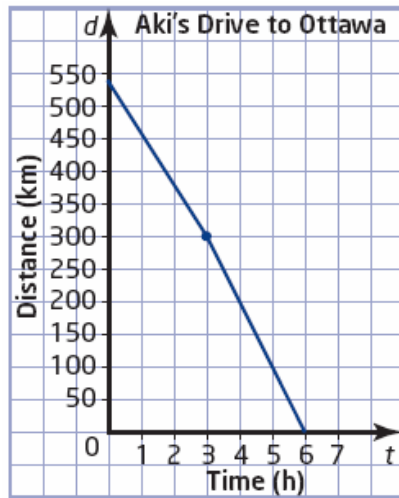
b) Answers will vary. The answer to part f) would change. Aki has 300 km left to go to Ottawa. At 100 km/h, the rest of the trip will take $\dfrac{300}{100} = 3$ h. The trip will take $3 + 3 = 6$ h. The answer to part g) will change. Aki has reached the halfway point of his trip at 3 h.

c) Explanations and methods used will vary.

Chapter 6 Section 6   Find an Equation for a Line Given Two Points

Chapter 6 Section 6   Question 1   Page 342

a)

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

$$y = mx + b$$
$$3 = 1(2) + b$$
$$3 = 2 + b$$
$$3 - 2 = 2 + b - 2$$
$$1 = b$$

The equation is $y = x + 1$.

b)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{5 - (-1)}{0 - 4}$$
$$= \frac{6}{-4}$$
$$= -\frac{3}{2}$$

$$y = mx + b$$
$$-1 = -\frac{3}{\overset{1}{\cancel{2}}}\left(\overset{2}{\cancel{4}}\right) + b$$
$$-1 = -6 + b$$
$$-1 + 6 = -6 + b + 6$$
$$5 = b$$

The equation is $y = -\frac{3}{2}x + 5$.

c)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-6-4}{-2-(-3)}$$

$$= \frac{-10}{1}$$

$$= -10$$

$$y = mx + b$$

$$4 = -10(-3) + b$$

$$4 = 30 + b$$

$$4 - 30 = 30 + b - 30$$

$$-26 = b$$

The equation is $y = -10x - 26$.

d)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-5-0}{\frac{7}{2} - \frac{1}{2}}$$

$$= \frac{-5}{\frac{6}{2}}$$

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

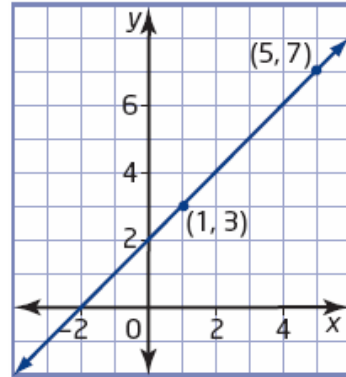$$y = mx + b$$

$$0 = -\frac{5}{3}\left(\frac{1}{2}\right) + b$$

$$0 = -\frac{5}{6} + b$$

$$0 + \frac{5}{6} = -\frac{5}{6} + b + \frac{5}{6}$$

$$\frac{5}{6} = b$$

The equation is $y = -\frac{5}{3}x + \frac{5}{6}$.

Chapter 6 Section 6   **Question 2   Page 342**

a)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{7-3}{5-1}$$

$$= \frac{4}{4}$$

$$= 1$$

$$y = mx + b$$

$$3 = 1(1) + b$$

$$3 = 1 + b$$

$$3 - 1 = 1 + b - 1$$

$$2 = b$$

The equation is $y = x + 2$.

b)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-2-4}{3-(-6)}$$

$$= \frac{-6}{9}$$

$$= -\frac{2}{3}$$

$$y = mx + b$$

$$4 = -\frac{\overset{2}{\cancel{2}}}{\underset{1}{\cancel{3}}}\left(\cancel{-6}\right) + b$$

$$4 = 4 + b$$

$$4 - 4 = 4 + b - 4$$

$$0 = b$$

The equation is $y = -\frac{2}{3}x$.

a)
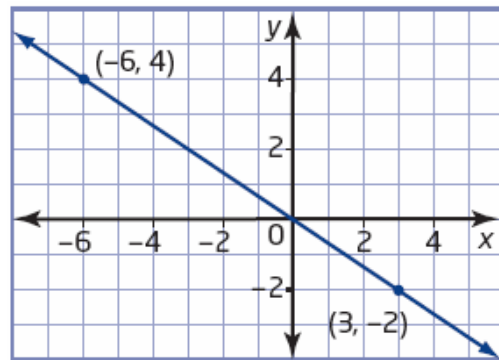
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{0 - (-2)}{4 - 0}$$

$$= \frac{2}{4}$$

$$= \frac{1}{2}$$

$$y = mx + b$$

$$-2 = \frac{1}{2}(0) + b$$

$$-2 = b$$

The equation is $y = \frac{1}{2}x - 2$.

b)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-5 - 0}{0 - (-5)}$$

$$= \frac{-5}{5}$$

$$= -1$$

$$y = mx + b$$

$$-5 = -1(0) + b$$

$$-5 = b$$

The equation is $y = -x - 5$.

a)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{3-3}{5-0}$$

$$= \frac{0}{5}$$

$$= 0$$

Since the slope is 0, the line is horizontal. The *y*-intercept is given as 3.
The equation is $y = 3$.

b)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-4-6}{-2-(-2)}$$

$$= \frac{-10}{0}$$

The slope is undefined.

The line is vertical.

The equation is $x = -2$.

a) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{28.50 - 20.50}{9 - 5}$

$= \dfrac{8.00}{4}$

$= 2.00$

The variable cost is $2.00 per game.

$C = mg + b$

$20.50 = 2.00(5) + b$

$20.50 = 10 + b$

$20.50 - 10 = 10 + b - 10$

$10.50 = b$

The equation is $C = 2.00g + 10.50$.

c)
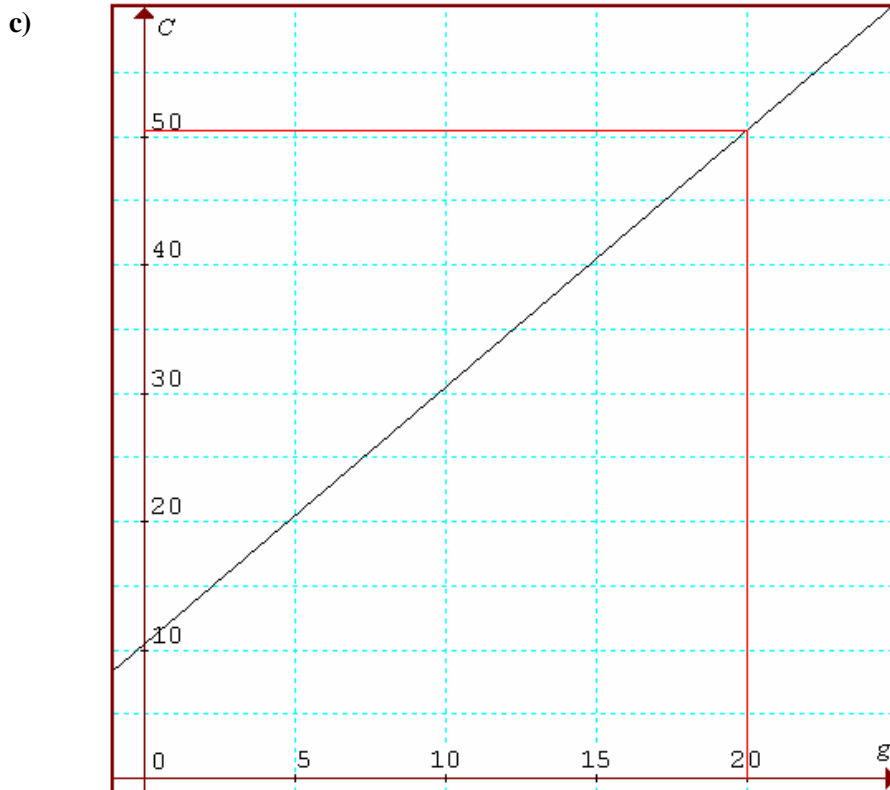
d) The C-intercept is 10.50. This represents the fixed base cost of $10.50.

e) Answers will vary slightly. From the graph, the cost of 20 games is about $50.50.

f)
$$C = 2.00(20) + 10.50$$
$$= 40.00 + 10.50$$
$$= 50.50$$

From the equation, the cost of 20 games is $50.50.

g) Answers will vary. Sample answers are shown.

The graph is easy to use, but lacks accuracy. The equation takes longer to use, but gives an exact answer.

Chapter 6 Section 6   Question 6   Page 342

a) Fiona is moving away from the sensor because she is farther away from it after 4 s than she was after 2 s.

b)
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{4.5 - 1.5}{4 - 2}$$
$$= \frac{3.0}{2}$$
$$= 1.5$$

Fiona is walking at 1.5 m/s.

c)
$$d = mt + b$$
$$1.5 = 1.5(2) + b$$
$$1.5 = 3 + b$$
$$1.5 - 3 = 3 + b - 3$$
$$-1.5 = b$$

The equation is $d = 1.5t - 1.5$.

d) The d-intercept is –1.5 m. Fiona started at 1.5 m behind the motion sensor. Then, she walked towards the sensor, and passed it.

a) The point (5, 17.25) represents Colette's wage of $17.25/h with 5 years of experience and the point (1, 14.25) represents Lee's wage of $14.25/h with 1 year of experience.

b)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{17.25 - 14.25}{5 - 1}$$
$$= \frac{3.00}{4}$$
$$= 0.75$$

$$w = mn + b$$
$$14.25 = 0.75(1) + b$$
$$14.25 = 0.75 + b$$
$$14.25 - 0.75 = 0.75 + b - 0.75$$
$$13.50 = b$$

The slope is 0.75, and the w-intercept is 13.50. The slope represents the yearly hourly wage increase, and the w-intercept represents the starting hourly wage.

c) The equation is $w = 0.75n + 13.50$.

d) $w = 0.75(7) + 13.50$
$$= 5.25 + 13.50$$
$$= 18.75$$

Maria's wage is $18.75 per hour.

e) $w = 0.75(25) + 13.50$
$$= 18.75 + 13.50$$
$$= 32.25$$

A worker who has been with the lab for 25 years should earn $32.25 per hour. This may be somewhat high. The store might put a cap on the maximum salary after a number of years. Answers will vary.

a) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{40 - 240}{2.5 - 0}$

$= \dfrac{-200}{2.5}$

$= -80$

Anil's family is travelling at 80 km/h.

b) $d = mt + b$

$240 = -80(0) + b$

$240 = b$

The equation is $d = -80t + 240$.

c) $0 = -80t + 240$

$0 + 80t = -80t + 240 + 80t$

$80t = 240$

$\dfrac{80t}{80} = \dfrac{240}{80}$

$t = 3$

The entire trip takes 3 h. Anil's family will arrive home in another 0.5 h, at 7:30P.M.. They will arrive 15 minutes before the game starts, assuming that their speed remains at 80 km/h.

a)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{1-6}{10-0}$$

$$= \frac{-5}{10}$$

$$= -\frac{1}{2}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{6-2}{8-0}$$

$$= \frac{4}{8}$$

$$= \frac{1}{2}$$

$$d = mt + b$$

$$6 = -\frac{1}{2}(0) + b$$

$$6 = b$$

$$d = mt + b$$

$$2 = \frac{1}{2}(0) + b$$

$$2 = b$$

The equation for Lucas is $d = -\frac{1}{2}t + 6$.   The equation for Myrna is $d = \frac{1}{2}t + 2$.

b)
$$-\frac{1}{2}t + 6 = \frac{1}{2}t + 2$$

$$-\frac{1}{2}t + 6 + \frac{1}{2}t - 2 = \frac{1}{2}t + 2 + \frac{1}{2}t - 2$$

$$4 = t$$

Lucas and Myrna were the same distance from their sensors after 4 s.

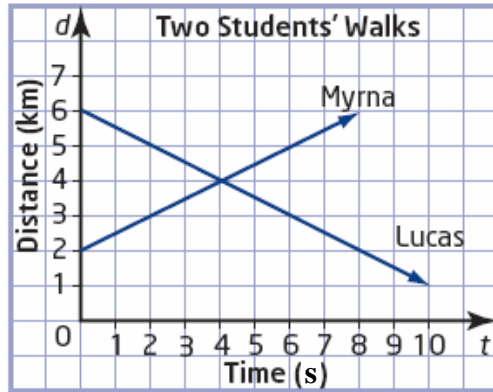**c)** $d = -\frac{1}{2}(4) + 6$

$$= -2 + 6$$

$$= 4$$

This occurred at a distance of 4 m.

d) Answers will vary. A sample answer is shown.

Lucas's distance has to equal Myrna's distance, so set the right sides of the equations equal.
Then, solve for t.

a)

b) The two lines cross at (4, 4).

c) Answers will vary. A sample answer is shown.

The point of intersection shows that Lucas and Myrna were both 4 m away from the sensor after 4 s. This means that they must have crossed paths at this time and distance from the sensor.
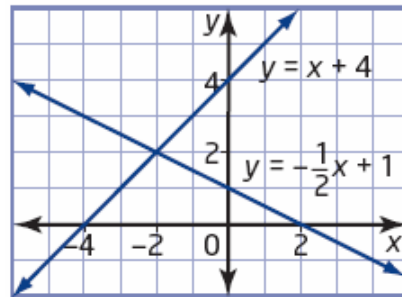
Chapter 6 Section 7   Question 1   Page 348

a) The point of intersection is (3, 1).

$$y = -\frac{1}{3}x + 2$$

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

b) The point of intersection is (–2, 2).

$$y = x + 4$$

$$y = -\frac{1}{2}x + 1$$
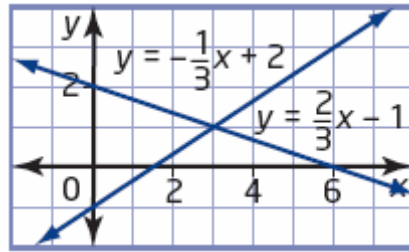
a) For the equation $y = -x$, the slope is –1 and the y-intercept is 0.

For the equation $y = x - 6$, the slope is 1 and the y-intercept is –6.

The solution is (3, –3).

L.S. = y R.S. = $-x$

$= -3$ $= -(3)$

    L.S. = R.S.

The point $(3, -3)$ satisfies the equation $y = -x$.

L.S. = y R.S. = $x - 6$

$= -3$ $= 3 - 6$

                    $= -3$

    L.S. = R.S.

The point $(3, -3)$ satisfies the equation $y = x - 6$.

b)

$$x - y = 8$$
$$x - y + y - 8 = 8 + y - 8$$
$$x - 8 = y$$

The slope is 1, and the
y-intercept is –8.

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

The slope is $-\dfrac{1}{2}$ and the
y-intercept is 1.

The solution is (6, –2).

L.S. $= x - y$ R.S. $= 8$
     $= 6 - (-2)$
  $= 8$
        L.S. $=$ R.S.

The point $(6, -2)$ satisfies the equation $x - y = 8$.

L.S. $= x + 2y$ R.S. $= 2$
   $= 6 + 2(-2)$
  $= 6 - 4$
  $= 2$
        L.S. $=$ R.S.

The point $(6, -2)$ satisfies the equation $x + 2y = 2$.

c)
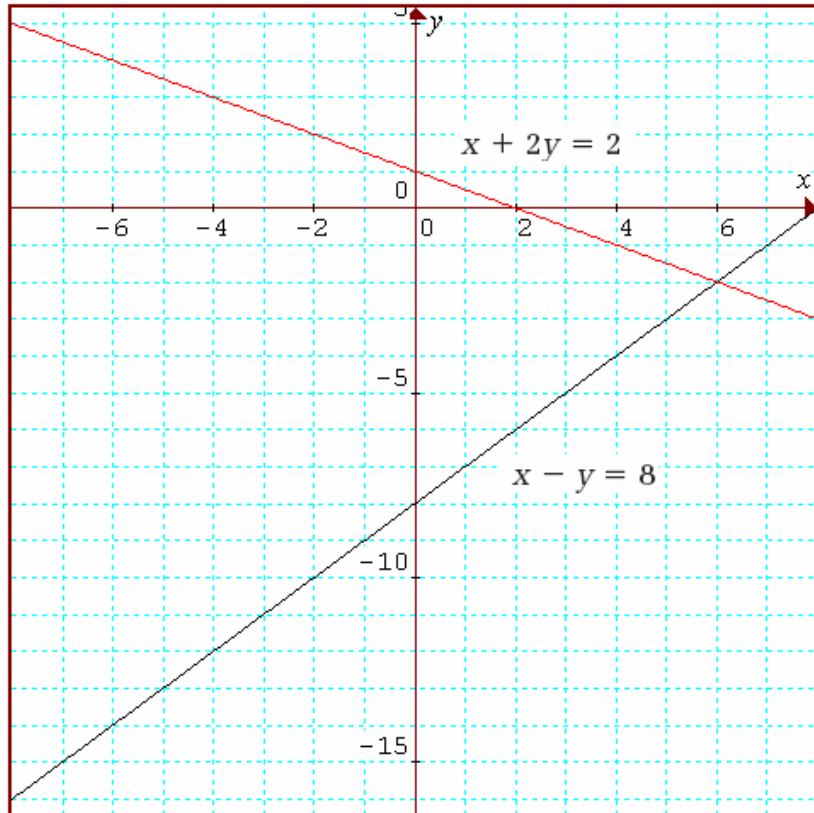
$$x + 2y = 7$$
$$x + 2y - x = 7 - x$$
$$2y = -x + 7$$
$$\frac{2y}{2} = \frac{-x + 7}{2}$$
$$y = \frac{-1x}{2} + \frac{7}{2}$$
$$y = -\frac{1}{2}x + \frac{7}{2}$$

The slope is $-\dfrac{1}{2}$, and the

y-intercept is $\dfrac{7}{2}$.

$$y = 4x - 10$$

The slope is 4 and the
y-intercept is –10.

The solution is (3, 2).
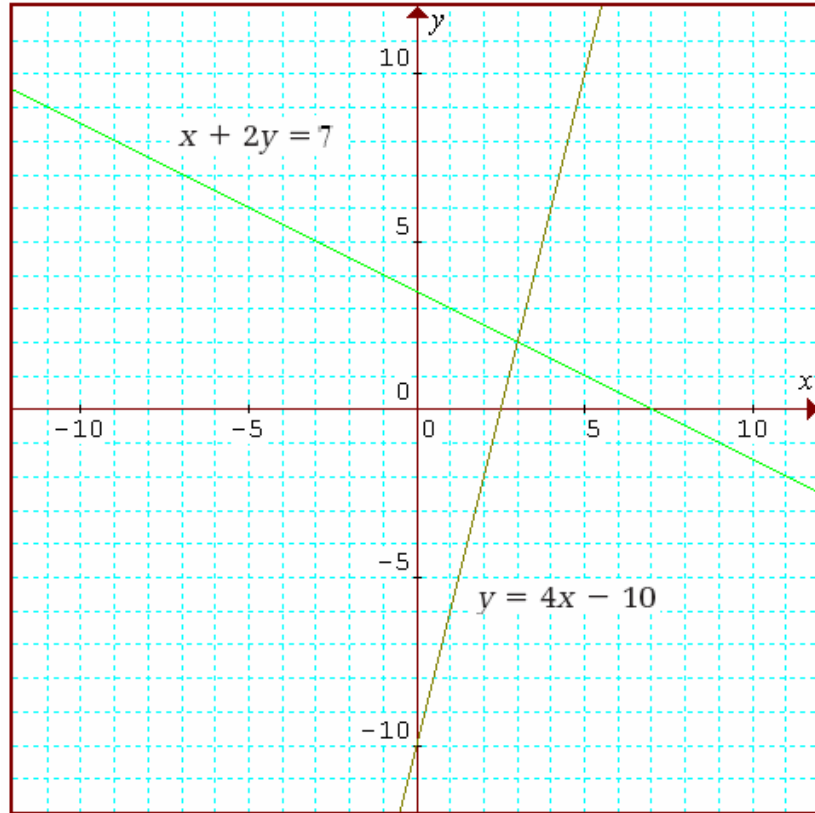
L.S. $= x + 2y$ R.S. $= 7$
    $= 3 + 2(2)$
    $= 3 + 4$
    $= 7$
        L.S. $=$ R.S.
The point $(3, 2)$ satisfies the equation $x + 2y = 7$.

L.S. $= y$ R.S. $= 4x - 10$
  $= 2$ $= 4(3) - 10$
                $= 12 - 10$
                $= 2$
        L.S. $=$ R.S.
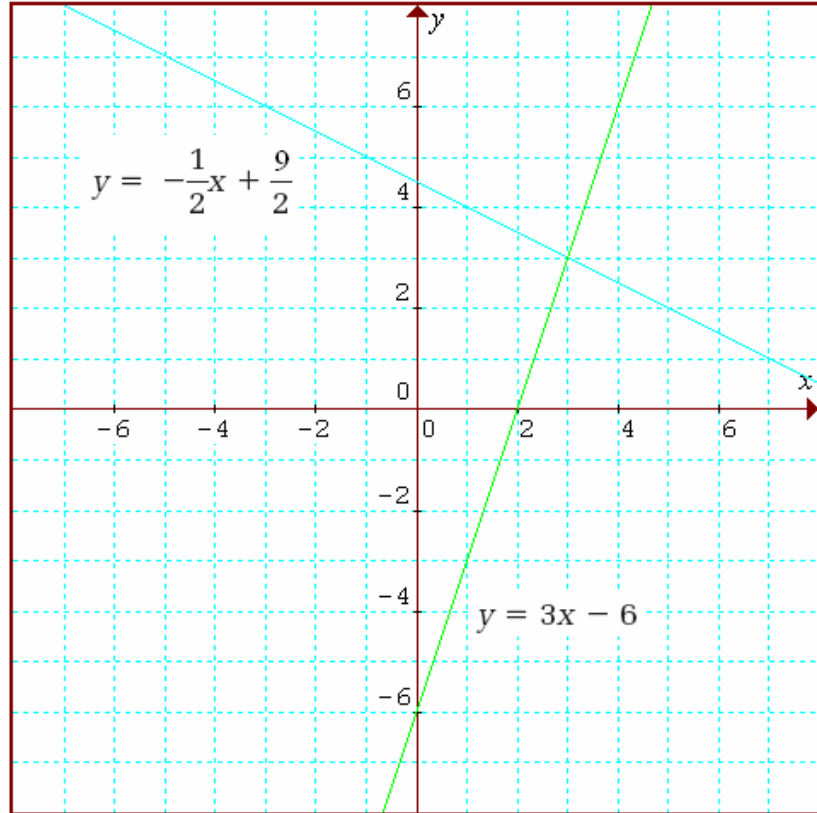The point $(3, 2)$ satisfies the equation $y = 4x - 10$.

d)

$$y = -\frac{1}{2}x + \frac{9}{2}$$

The slope is $-\frac{1}{2}$, and the

y-intercept is $\frac{9}{2}$.

$$y = 3x - 6$$

The slope is 3 and the y-intercept is –6.

The solution is (3, 3).

$y = -\frac{1}{2}x + \frac{9}{2}$

$y = 3x - 6$

L.S. = y 　　　R.S. = $-\frac{1}{2}x + \frac{9}{2}$

　 = 3 　　　　　 = $-\frac{1}{2}(3) + \frac{9}{2}$

　　　　　　　　 = $-\frac{3}{2} + \frac{9}{2}$

　　　　　　　　 = $\frac{6}{2}$

　　　　　　　　 = 3

　　　L.S. = R.S.

The point $(3, 3)$ satisfies the equation $y = -\frac{1}{2}x + \frac{9}{2}$.

L.S. = y 　　　　　R.S. = $3x - 6$

　 = 3 　　　　　　　 = $3(3) - 6$

　　　　　　　　　　 = $9 - 6$

　　　　　　　　　　 = 3

　　　L.S. = R.S.

The point $(3, 3)$ satisfies the equation $y = 3x - 6$.

Chapter 6 Section 7 **Question 3** **Page 349**

a) $C = 50d$

$= 50(6)$

$= 300$

$C = 40d + 100$

$= 40(6) + 100$

$= 240 + 100$

$= 340$

Six days of skiing will cost Mike $300 under the Standard Rate option, and $340 under the Frequent Extremist option.

b) Mike should choose the Standard Rate option. It is $40 cheaper.

Chapter 6 Section 7 **Question 4** **Page 349**

a) $C = 50d$

$= 50(20)$

$= 1000$

$C = 40d + 100$

$= 40(20) + 100$

$= 800 + 100$

$= 900$

Twenty days of skiing will cost Mike $1000 under the Standard Rate option, and $900 under the Frequent Extremist option.

b) Mike should choose the Frequent Extremist option. It is $100 cheaper.

Refer to the graph. The point of intersection is (10, 500). If Mike went skiing 10 times, then the Standard Rate option would cost $500, and the Frequent Extremist option would also cost $500. In this case, it does not matter which option Mike chooses.
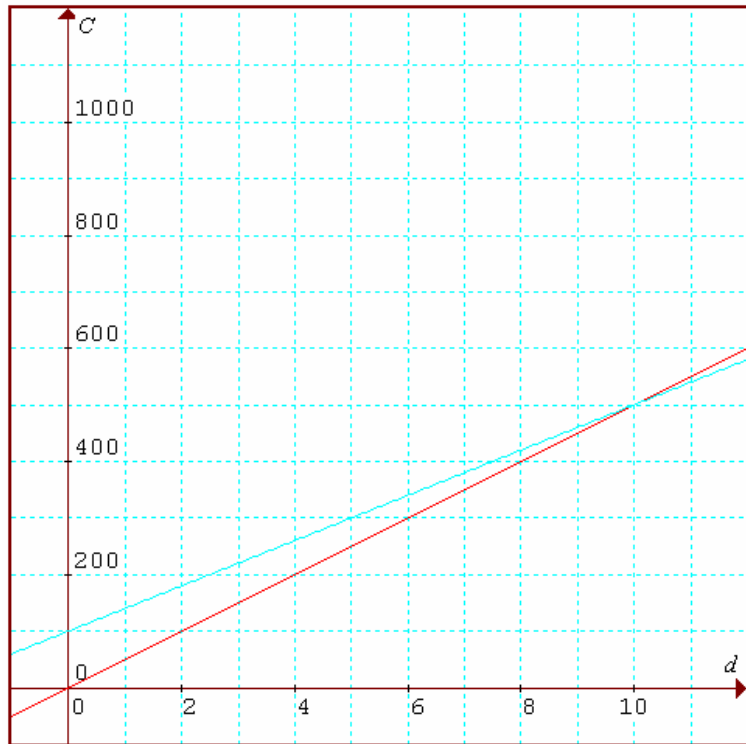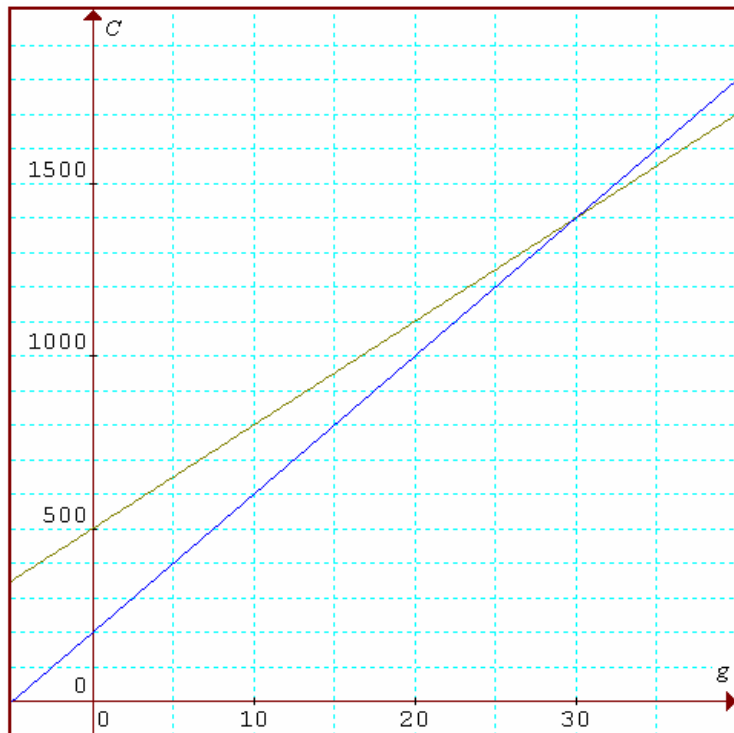
Answers will vary. A sample answer is shown.

This special may affect the couple's decision because the point of intersection is now (30, 1400). This means that the cost for 30 guests at each hotel is the same. For fewer than 30 guests, the Waverly Inn is cheaper. For more than 30 guests, the Hotel Niagara is cheaper.

Chapter 6 Section 7   **Question 7   Page 349**

Debbie's equation is $d = 25 - 10t$. Ken's equation is $d = 20t$. Use a graphing calculator to plot the equations, and to find the point of intersection.
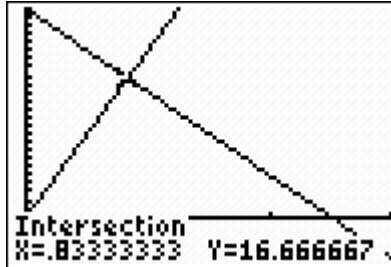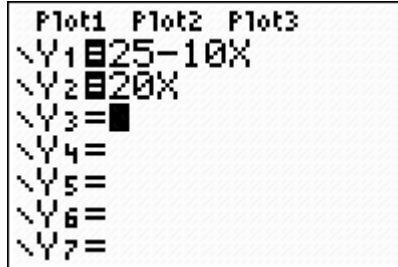
They will meet 16.7 km from Fort Erie. This will happen 0.83 h after they start, or about 2:50.

Chapter 6 Section 7   **Question 8   Page 349**

$$x - y + 2 = 0$$
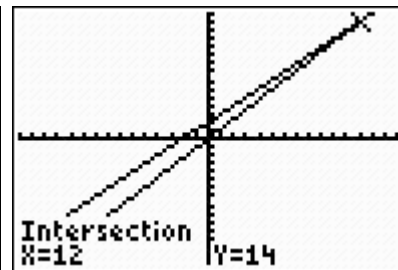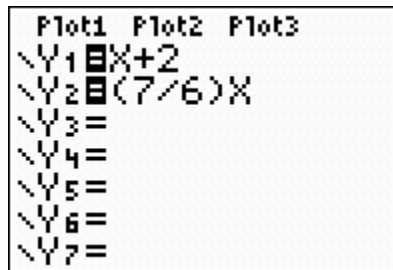$$x - y + 2 + y = 0 + y$$
$$x + 2 = y$$

$$7x - 6y = 0$$
$$7x - 6y - 7x = 0 - 7x$$
$$-6y = -7x$$
$$\frac{-6y}{-6} = \frac{-7x}{-6}$$
$$y = \frac{7}{6}x$$

Use a graphing calculator to plot the equations, and to find the point of intersection. The point of intersection is (12, 14). The letters are l and n.

Chapter 6 Section 7　　　　　**Question 9**　**Page 350**

a) Tyrion had a head start of 100 m.

b) Cersei runs at 8 m/s.

c) Tyrion runs at 6 m/s.

d) Cersei will win if the race is longer than 400 m while Tyrion will win if the race is shorter than 400 m. If the race is 400 m, then they will tie.

**e)** Answers will vary. A sample answer is shown.
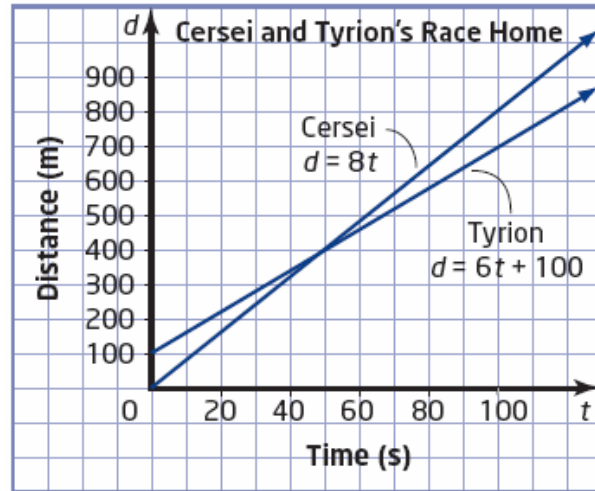
The solution of this linear system is the point (50, 400). This means that if Cersei gives Tyrion a head start of 100 m, she will catch up with him after she has run 400 m and he has run 300 m. This will occur 50 s after they both start running.

Chapter 6 Section 7　　　　　**Question 10**　**Page 350**

Answers will vary. Sample answers are shown.

a) If Tyrion's head start is doubled, then his distance-time equation will be $d = 6t + 200$ and the new intersection point will be (100, 800). This means that if the race is less than 800 m, Tyrion will win, and if the race is more than 800 m, Cersei will win. If the race is 800 m exactly, they will tie.

b) If Tyrion's head start is halved, then his distance-time equation will be $d = 6t + 50$ and the new intersection point will be (25, 200). This means that if the race is less than 200 m, Tyrion will win, and if the race is more than 200 m, Cersei will win. If the race is 200 m exactly, they will tie.
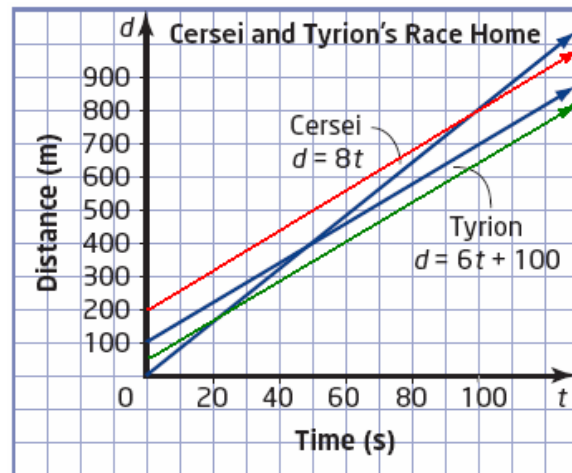
Chapter 6 Section 7　　　　　**Question 11**　**Page 350**

Solutions for the Achievement Checks are shown in the Teacher's Resource.

a)

Year	Numberton's Population	Decimalville's Population
0	25 000	15 000
1	26 000	16 500
2	27 000	18 150
3	28 000	19 965
4	29 000	21 962
5	30 000	24 158
6	31 000	26 573
7	32 000	29 231
8	33 000	32 154
9	34 000	35 369
10	35 000	38 906
11	36 000	42 797
12	37 000	47 076
13	38 000	51 784
14	39 000	56 962
15	40 000	62 659

b)
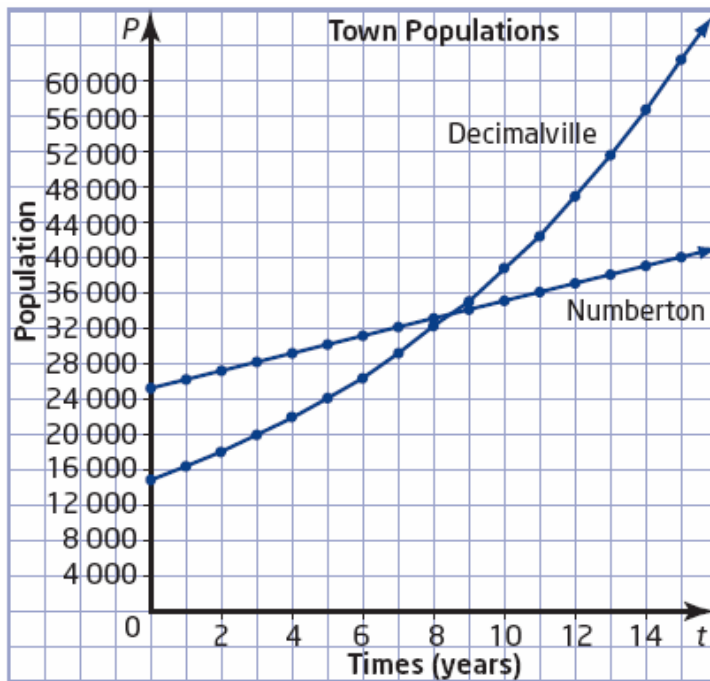
c)   Numberton's population growth is linear. Decimalville's population growth is non-linear.

d) The solution to this system occurs some time in the eighth year when both populations number between 33 000 and 34 000. Up to this time, Numberton's population was greater, but after this time, Decimalville's population will be greater.
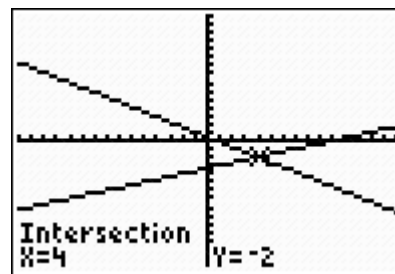
Chapter 6 Section 7   **Question 13   Page 351**

$$3x + 5y = 2$$
$$3x + 5y - 3x = 2 - 3x$$
$$5y = -3x + 2$$
$$\frac{5y}{5} = \frac{-3x + 2}{5}$$
$$y = \frac{-3x}{5} + \frac{2}{5}$$
$$y = -\frac{3}{5}x + \frac{2}{5}$$

$$x - 3y = 10$$
$$x - 3y - x = 10 - x$$
$$-3y = -x + 10$$
$$\frac{-3y}{-3} = \frac{-x + 10}{-3}$$
$$y = \frac{-1x}{-3} + \frac{10}{-3}$$
$$y = \frac{1}{3}x - \frac{10}{3}$$

```
Plot1 Plot2 Plot3
\Y1▤(-3/5)X+(2/5
)
\Y2▤(1/3)X-(10/3
)
\Y3=
\Y4=
\Y5=
```

```
Intersection
X=4            Y=-2
```

The point of intersection is (4, –2). Answer B.

$$-2x + 4y = 14$$
$$-2x + 4y + 2x = 14 + 2x$$
$$4y = 2x + 14$$
$$\frac{4y}{4} = \frac{2x + 14}{4}$$
$$y = \frac{2x}{4} + \frac{14}{4}$$
$$y = \frac{1}{2}x + \frac{7}{2}$$

$$5x - 3y = -14$$
$$5x - 3y - 5x = -14 - 5x$$
$$-3y = -5x - 14$$
$$\frac{-3y}{-3} = \frac{-5x - 14}{-3}$$
$$y = \frac{-5x}{-3} + \frac{-14}{-3}$$
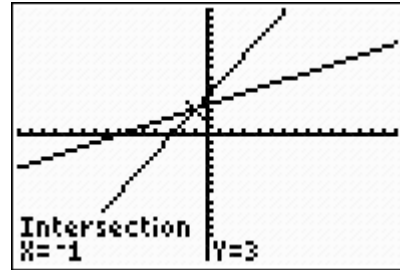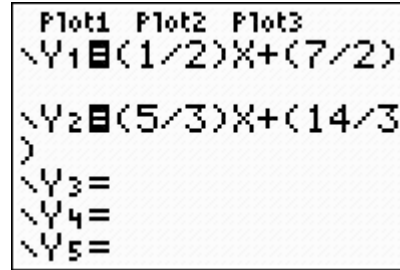$$y = \frac{5}{3}x + \frac{14}{3}$$

$$4x - 6y + 12 = 0$$
$$4x - 6y + 12 - 4x - 12 = 0 - 4x - 12$$
$$-6y = -4x - 12$$
$$\frac{-6y}{-6} = \frac{-4x - 12}{-6}$$
$$y = \frac{-4x}{-6} + \frac{-12}{-6}$$
$$y = \frac{2}{3}x + 2$$

The point of intersection is (–1, 3). The desired slope is $-\dfrac{3}{2}$.

$$y = mx + b$$

$$3 = -\frac{3}{2}(-1) + b$$

$$3 = \frac{3}{2} + b$$

$$3 - \frac{3}{2} = \frac{3}{2} + b - \frac{3}{2}$$

$$\frac{6}{2} - \frac{3}{2} = b$$

$$\frac{3}{2} = b$$

The equation is $y = -\frac{3}{2}x + \frac{3}{2}$.

Chapter 6 Section 7   **Question 15   Page 351**

a)

$$3x + 5y = 7$$

$$3x + 5y - 3x = 7 - 3x$$

$$5y = -3x + 7$$

$$\frac{5y}{5} = \frac{-3x + 7}{5}$$

$$y = \frac{-3x}{5} + \frac{7}{5}$$

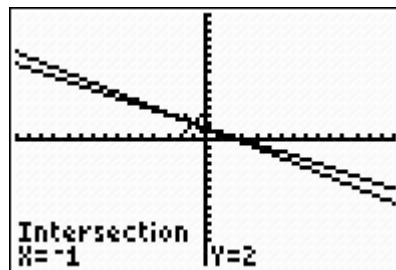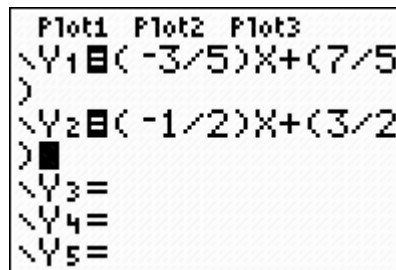$$y = -\frac{3}{5}x + \frac{7}{5}$$

$$2x + 4y = 6$$

$$2x + 4y - 2x = 6 - 2x$$

$$4y = -2x + 6$$

$$\frac{4y}{4} = \frac{-2x + 6}{4}$$

$$y = \frac{-2x}{4} + \frac{6}{4}$$

$$y = -\frac{1}{2}x + \frac{3}{2}$$

The point of intersection is (–1, 2).

b)

$$x + 5y = 9$$
$$x + 5y - x = 9 - x$$
$$5y = -x + 9$$
$$\frac{5y}{5} = \frac{-x+9}{5}$$
$$y = \frac{-1x}{5} + \frac{9}{5}$$
$$y = -\frac{1}{5}x + \frac{9}{5}$$
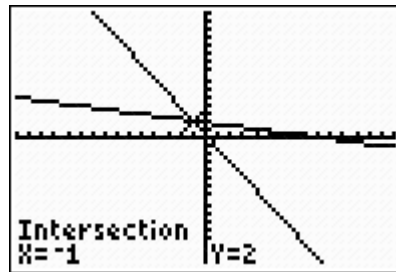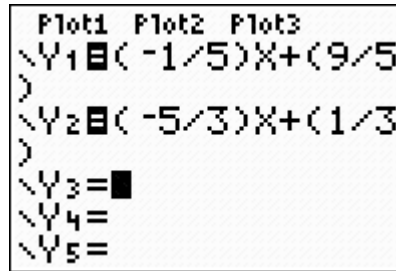
$$5x + 3y = 1$$
$$5x + 3y - 5x = 1 - 5x$$
$$3y = -5x + 1$$
$$\frac{3y}{3} = \frac{-5x+1}{3}$$
$$y = \frac{-5x}{3} + \frac{1}{3}$$
$$y = -\frac{5}{3}x + \frac{1}{3}$$
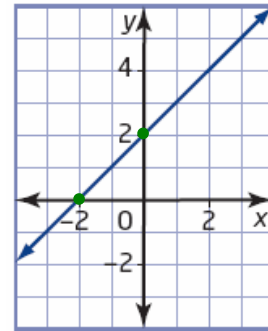
The point of intersection is (–1, 2).

c) Answers will vary. A sample answer is shown. The point of intersection of several lines whose constants, in standard form, are arithmetic sequences is always (–1, 2).

Chapter 6 Review

Chapter 6 Review **Question 1** **Page 352**

a) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{2 - 0}{0 - (-2)}$

$= \dfrac{2}{2}$

$= 1$

The slope is 1. The *y*-intercept is 2.

b) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-2 - 2}{1 - (-1)}$

$= \dfrac{-4}{2}$

$= -2$
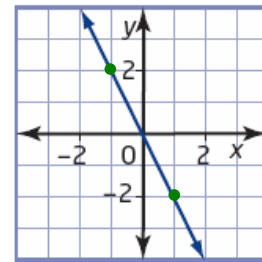
The slope is –2. The *y*-intercept is 0.

Chapter 6 Review **Question 2** **Page 352**

a) The slope is –3. The *y*-intercept is 2.

b) The slope is $\dfrac{3}{5}$. The *y*-intercept is –1.

a) $y = -2x + 3$
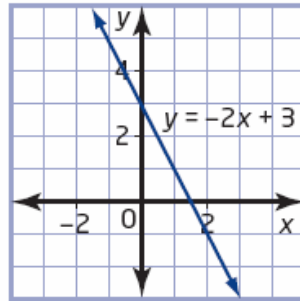
b) $y = \dfrac{2}{3}x - 4$
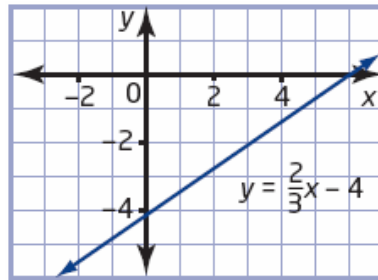
c) $y = 2$
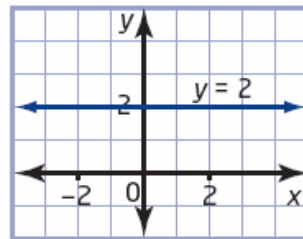
Chapter 6 Review   **Question 4   Page 352**

a)   The slope is 1. The d-intercept is 2. The slope shows that the person is moving away from the motion sensor at a speed of 1 m/s. The d-intercept shows that the person started 2 m away from the sensor.

b) $d = t + 2$
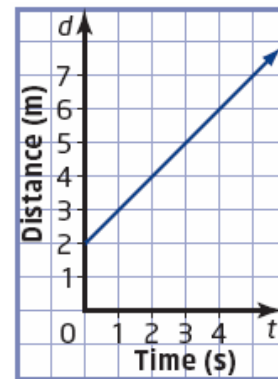
a)

$$2x + y - 6 = 0$$
$$2x + y - 6 - 2x + 6 = 0 - 2x + 6$$
$$y = -2x + 6$$

b)

$$3x + 5y + 15 = 0$$
$$3x + 5y + 15 - 3x - 15 = 0 - 3x - 15$$
$$5y = -3x - 15$$
$$\frac{5y}{5} = \frac{-3x - 15}{5}$$
$$y = \frac{-3x}{5} - \frac{15}{5}$$
$$y = -\frac{3}{5}x - 3$$

a) $60n - C + 90 = 0$

$60n - C + 90 + C = 0 + C$

$60n + 90 = C$

$C = 60n + 90$

b) The slope is 60 and the C-intercept is 90. The slope represents the dollar amount per hour that the plumber charges. The C-intercept shows that the plumber also charges a base cost of $90.

c)
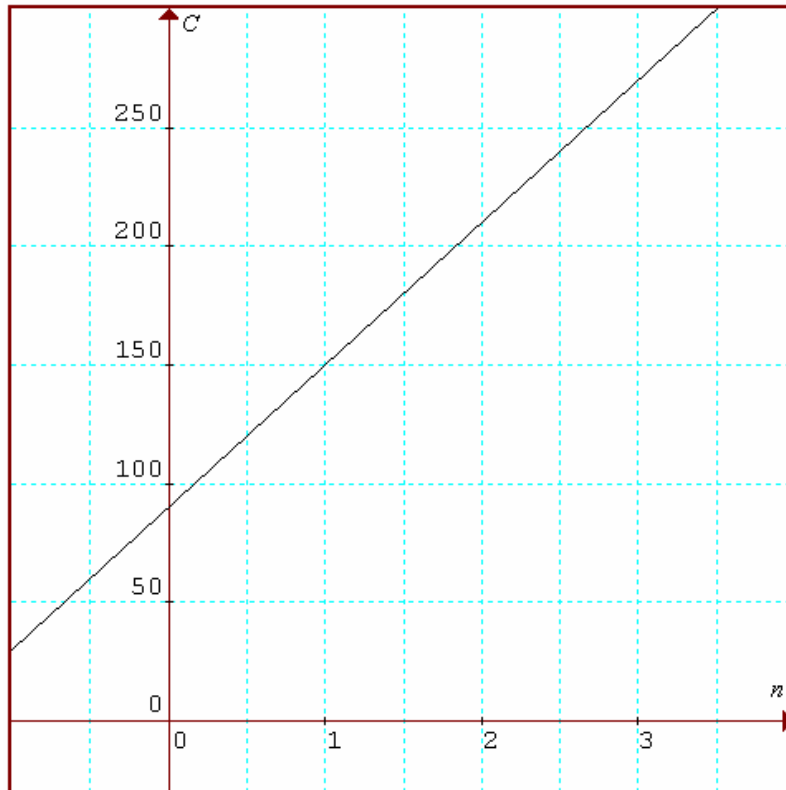
d) $C = 60(3) + 90$

$= 180 + 90$

$= 270$

A 3-h house call costs $270.

a)

$$3x - 4y = 12$$
$$3x - 4(0) = 12$$
$$3x = 12$$
$$\frac{3x}{3} = \frac{12}{3}$$
$$x = 4$$

$$3(0) - 4y = 12$$
$$-4y = 12$$
$$\frac{-4y}{-4} = \frac{12}{-4}$$
$$y = -3$$

The x-intercept is 4, and the y-intercept is –3.

b)

$$6x - y = 9$$
$$6x - (0) = 9$$
$$6x = 9$$
$$\frac{6x}{6} = \frac{9}{6}$$
$$x = \frac{3}{2}$$

$$6(0) - y = 9$$
$$-y = 9$$
$$\frac{-y}{-1} = \frac{9}{-1}$$
$$y = -9$$

The x-intercept is $\frac{3}{2}$, and the y-intercept is –9.

$6x - y = 9$

$3x - 4y = 12$
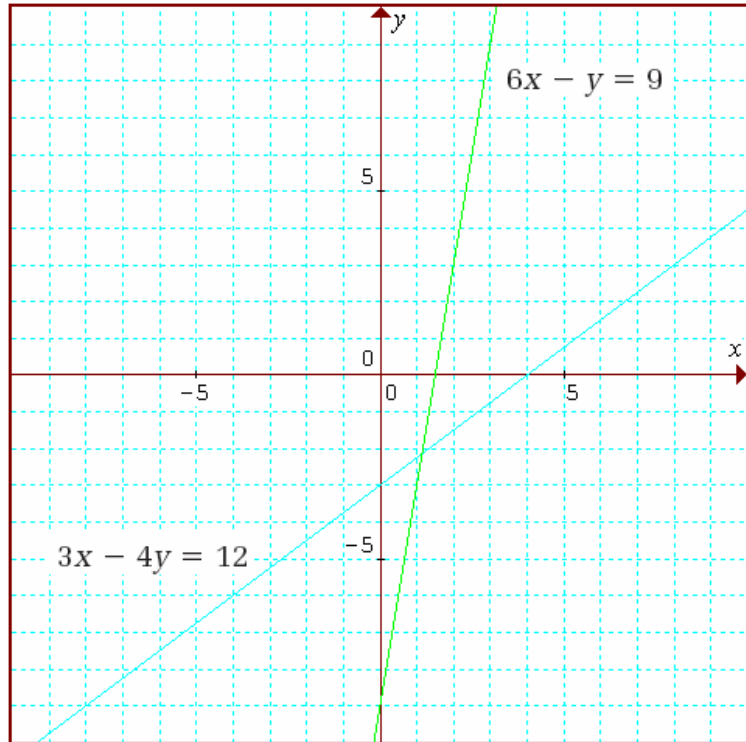
Chapter 6 Review **Question 8** **Page 352**

a) Cindy can buy $\dfrac{18}{3}$, or 6 hamburgers.

b) Cindy can buy $\dfrac{18}{2}$, or 9 pops.

c) Cindy can buy 2 hamburgers and 6 pops; or 4 hamburgers and 3 pops.
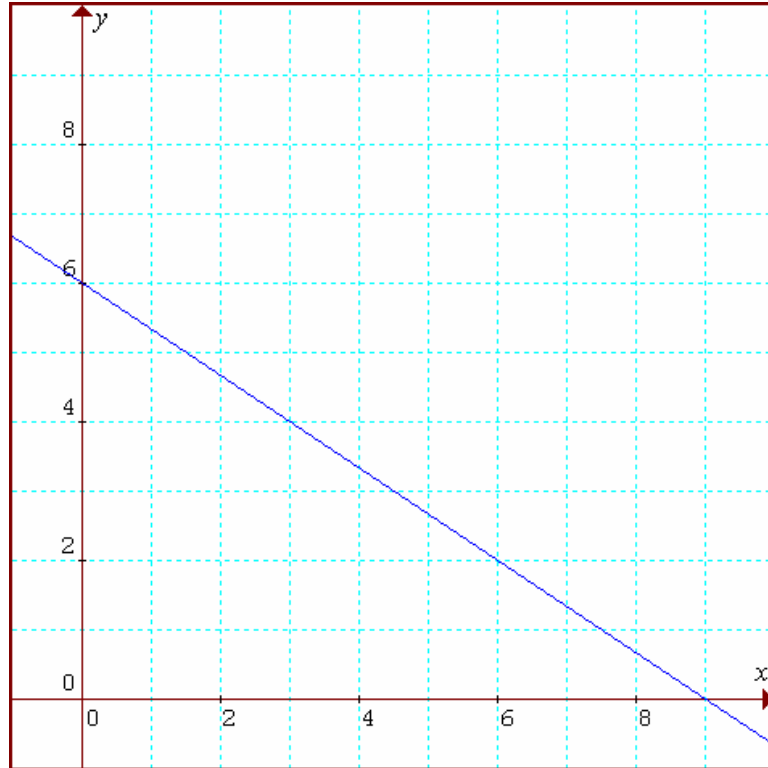
Chapter 6 Review **Question 9** **Page 353**

The slopes of parallel lines are identical. For example, $y = 3x + 1$ and $y = 3x - 5$ are parallel lines with a slope 3.

Chapter 6 Review **Question 10** **Page 353**

The slopes of perpendicular lines are negative reciprocals. For example, $y = 3x + 1$ and $y = -\dfrac{1}{3}x$ are perpendicular lines.

$$y = mx + b$$

$$-4 = \frac{2}{3}(1) + b$$

$$-4 = \frac{2}{3} + b$$

$$-4 - \frac{2}{3} = \frac{2}{3} + b - \frac{2}{3}$$

$$-\frac{12}{3} - \frac{2}{3} = b$$

$$-\frac{14}{3} = b$$

$$y = \frac{2}{3}x - \frac{14}{3}$$

Chapter 6 Review   **Question 12   Page 353**

$$3x - 4y = 12$$

$$3x - 4y - 3x = 12 - 3x$$

$$-4y = -3x + 12$$

$$\frac{-4y}{-4} = \frac{-3x + 12}{-4}$$

$$y = \frac{-3x}{-4} + \frac{12}{-4}$$

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

The desired slope is $\frac{3}{4}$.

$$y = mx + b$$

$$0 = \frac{3}{\cancel{4}_{2}}(\cancel{6}^{3}) + b$$

$$0 = \frac{9}{2} + b$$

$$0 - \frac{9}{2} = \frac{9}{2} + b - \frac{9}{2}$$

$$-\frac{9}{2} = b$$

$$y = \frac{3}{4}x - \frac{9}{2}$$

Chapter 6 Review   **Question 13**   **Page 353**

The desired slope is $-\dfrac{1}{2}$. The y-intercept is 0.

The equation is $y = -\dfrac{1}{2}x.$

Chapter 6 Review   **Question 14**   **Page 353**

a)
$$f = mt + b$$
$$88 = 32(2) + b$$
$$88 = 64 + b$$
$$88 - 64 = 64 + b - 64$$
$$24 = b$$

Set must carry a minimum of 24 L of fuel in his plane at all times.

b) $f = 32t + 24$

c)
$$160 = 32t + 24$$
$$160 - 24 = 32t + 24 - 24$$
$$136 = 32t$$
$$\dfrac{136}{32} = \dfrac{32t}{32}$$
$$4.25 = t$$

Seth has enough fuel to fly 4 h and 15 min before having to refuel.

d)
$$f = 24t + 24$$
$$160 = 24t + 24$$
$$160 - 24 = 24t + 24 - 24$$
$$136 = 24t$$
$$\dfrac{136}{24} = \dfrac{24t}{24}$$
$$5\dfrac{2}{3} = t$$

Seth has enough fuel to fly 5 h and 40 min at the new fuel burn rate.

Chapter 6 Review   **Question 15   Page 353**

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

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

$$= \frac{-10}{5}$$

$$= -2$$

$$y = mx + b$$

$$5 = -2(-2) + b$$

$$5 = 4 + b$$

$$5 - 4 = 4 + b - 4$$

$$1 = b$$

$$y = -2x + 1$$

Chapter 6 Review   **Question 16   Page** 353

a)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{4.0 - 2.5}{3 - 1}$$

$$= \frac{1.5}{2}$$

$$= 0.75$$

$$d = mt + b$$

$$2.5 = 0.75(1) + b$$

$$2.5 = 0.75 + b$$

$$2.5 - 0.75 = 0.75 + b - 0.75$$
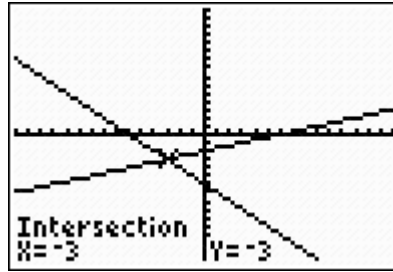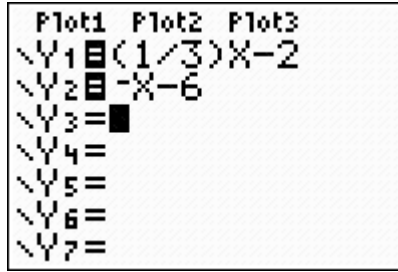
$$1.75 = b$$

$$d = 0.75t + 1.75$$

b) The slope, 0.75, shows that Claudia is walking at a speed of 0.75 m/s away from the motion sensor. The *d*-intercept, 1.75, shows that she started 1.75 m away from the sensor.

c) $d = 0.75(5) + 1.75$

$$= 3.75 + 1.75$$

$$= 5.5$$

Claudia will be 5.5 m from the sensor 5 s after she begins walking.

The solution is (–3, –3).

$$\text{L.S.} = -3 \qquad \text{R.S.} = \frac{1}{3}(-3)$$
$$= -1$$
$$\text{L.S.} = \text{R.S.}$$

The solution satisfies the equation $y = \frac{1}{3}x - 2$.

$$\text{L.S.} = -3 \qquad \text{R.S.} = -(-3) - 6$$
$$= 3 - 6$$
$$= -3$$
$$\text{L.S.} = \text{R.S.}$$

The solution satisfies the equation $y = -x - 6$.

Chapter 6 Review   **Question 18   Page 353**

a)
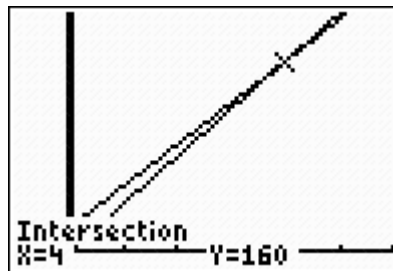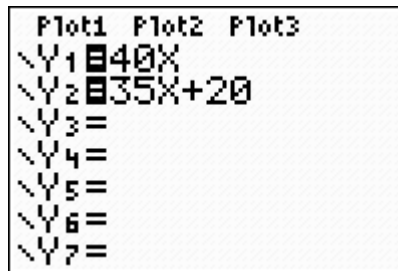
The solution is (4, 160). This means that both tutors charge $160 for 4 h of tutoring.

b) If a student wants to spend as little money as possible, then for less than 4 h the student should hire Mr. Wellington. The student should hire Ms. Tenshu for more than 4 h of tutoring. The assumption is that both tutors are equally helpful.

Chapter 6 Chapter Test

Chapter 6 Chapter Test   Question 1   Page 354

The slope is –3 and the *y*-intercept is –1. Answer C.

Chapter 6 Chapter Test   Question 2   Page 354

The *x*-intercept is –4.

The *y*-intercept is –2.

Answer D.
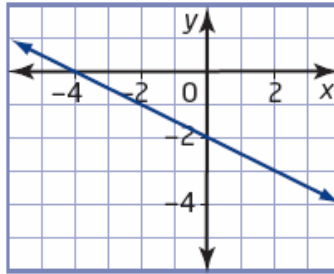
Chapter 6 Chapter Test   Question 3   Page 354

A line parallel to the given line must have a slope of $\frac{1}{5}$. Answer B.

Chapter 6 Chapter Test   Question 4   Page 354

A line perpendicular to the given line must have a slope of $-\frac{2}{3}$. Answer B.

Chapter 6 Chapter Test   Question 5   Page 354

From the graph, the point of intersection is (–1, 3).

Answer A.

Chapter 6 Chapter Test   **Question 6**   **Page 354**

a) The person was 5 m from the motion sensor when she began walking.

b) The distance is decreasing. She was walking towards, the sensor.
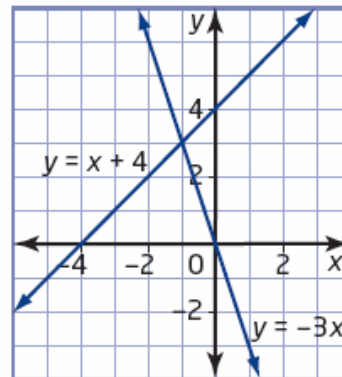
c) $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$ = \dfrac{0 - 5}{5 - 0}$

$ = \dfrac{-5}{5}$

$ = -1$
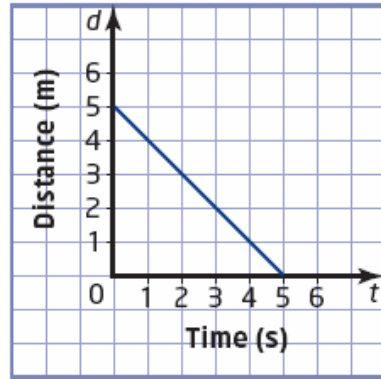
She was walking at 1 m/s.

d) The d-intercept is 5.

$d = -t + 5$

Chapter 6 Chapter Test   **Question 7**   **Page 354**

$3x - y = 6$

$3(0) - y = 6$

$-y = 6$

$y = -6$

$3x - (0) = 6$

$3x = 6$

$\dfrac{3x}{3} = \dfrac{6}{3}$

$x = 2$

The x-intercept is 2, and the y-intercept is –6.
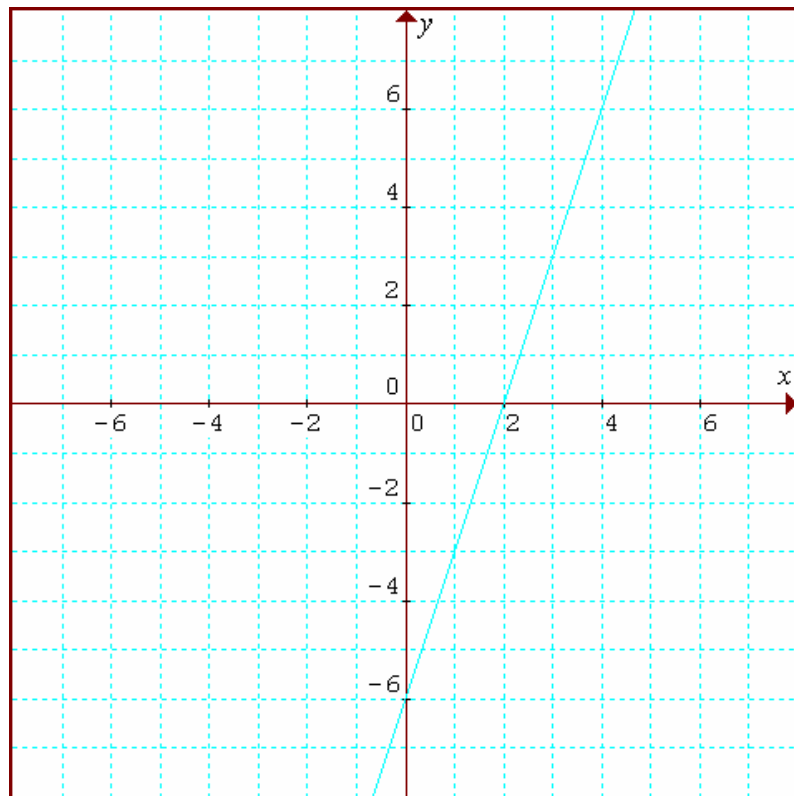
a) $75n - C + 60 = 0$

$75n - C + 60 + C = 0 + C$

$75n + 60 = C$

$C = 75n + 60$

b) The slope is 75 and the C-intercept is 60. The slope represents the dollar amount per hour that the electrician charges. The C-intercept shows that the electrician also charges a base cost of $60.

c)

d) $C = 75(2) + 60$

$= 150 + 60$

$= 210$

The cost of a 2-h house call is $210.

Chapter 6 Chapter Test   **Question 9**   **Page 355**

$$y = mx + b$$

$$-1 = \frac{2}{3}(4) + b$$

$$-1 = \frac{8}{3} + b$$

$$-1 - \frac{8}{3} = \frac{8}{3} + b - \frac{8}{3}$$

$$-\frac{3}{3} - \frac{8}{3} = b$$

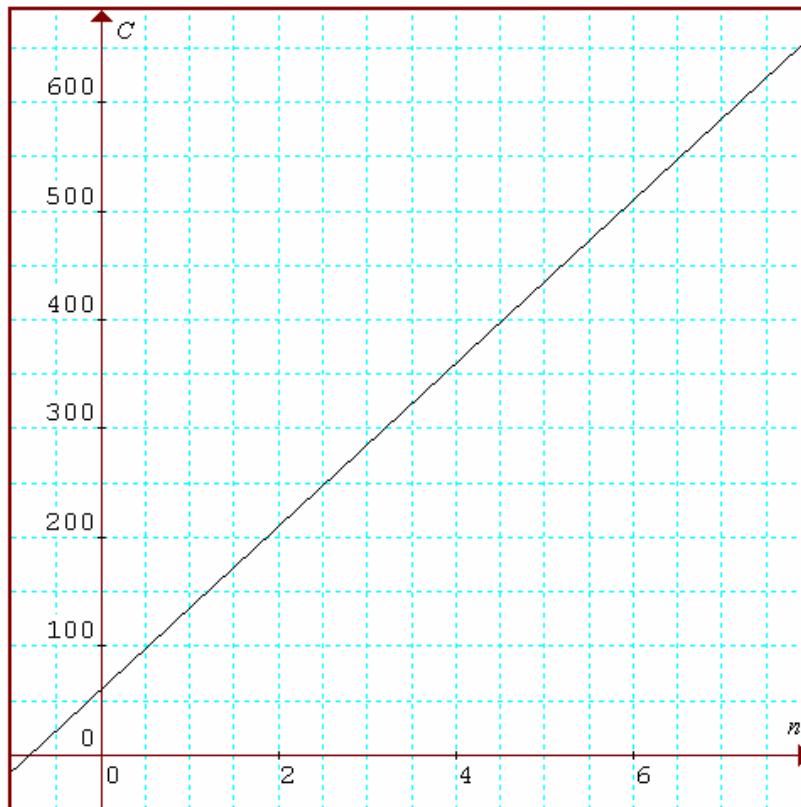$$-\frac{11}{3} = b$$

The equation is $y = \frac{2}{3}x - \frac{11}{3}$.

Chapter 6 Chapter Test   **Question 10**   **Page 355**

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{8 - (-4)}{6 - (-3)}$$

$$= \frac{12}{9}$$

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

$$y = mx + b$$

$$-4 = \frac{4}{3}(-3) + b$$

$$-4 = -4 + b$$

$$-4 + 4 = -4 + b + 4$$

$$0 = b$$

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

Chapter 6 Chapter Test   **Question 11**   **Page 355**

a) $L = 3.8G$ $L = 3.8G$

   $= 3.8(0.5)$ $= 3.8(0.125)$

   $= 1.9$ L $= 0.475$ L

b) $L = 3.8G$

   $\dfrac{L}{3.8} = \dfrac{3.8G}{3.8}$

   $G = \dfrac{L}{3.8}$

c) $G = \dfrac{L}{3.8}$ $G = \dfrac{L}{3.8}$

   $= \dfrac{4}{3.8}$ $= \dfrac{0.25}{3.8}$

   $\doteq 1.053$ gallons $\doteq 0.066$ gallons

$$2x - 3y + 6 = 0$$
$$2x - 3y + 6 - 2x - 6 = 0 - 2x - 6$$
$$-3y = -2x - 6$$
$$\frac{-3y}{-3} = \frac{-2x - 6}{-3}$$
$$y = \frac{-2x}{-3} + \frac{-6}{-3}$$
$$y = \frac{2}{3}x + 2$$

The desired slope is $-\dfrac{3}{2}$.

$$3x + 7y + 9 = 0$$
$$3x + 7(0) + 9 = 0$$
$$3x + 9 = 0$$
$$3x + 9 - 9 = 0 - 9$$
$$3x = -9$$
$$\frac{3x}{3} = \frac{-9}{3}$$
$$x = -3$$

The desired line passes through $(-3, 0)$.

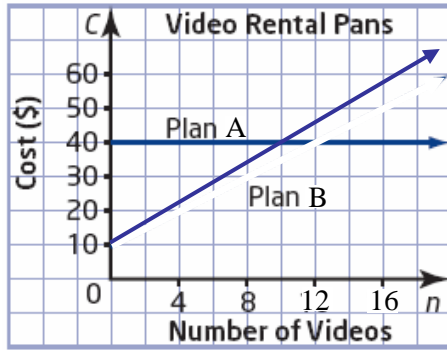$$y = mx + b$$
$$0 = -\frac{3}{2}(-3) + b$$
$$0 = \frac{9}{2} + b$$
$$0 - \frac{9}{2} = \frac{9}{2} + b - \frac{9}{2}$$
$$-\frac{9}{2} = b$$

The equation is $y = -\dfrac{3}{2}x - \dfrac{9}{2}$.

Chapter 6 Chapter Test   Question 13   Page 355

a)

b) If you rent fewer than 10 videos in a month, Plan B is cheaper. If you rent more than 10 videos, Plan A is cheaper. For 10 videos both plans cost the same, $40.

Chapter 6 Chapter Test   Question 14   Page 355

a) Use $(x_1, y_1) = (0, 0)$ and $(x_2, y_2) = (0.25, 40)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{40 - 0}{0.25 - 0}$$
$$= \frac{40}{0.25}$$
$$= 160$$

Tess's airplane is flying at 160 km/h.

b) $d = 160t$

c) $360 = 160t$
$$\frac{360}{160} = \frac{160t}{160}$$
$$2.25 = t$$

Tess will take another 2 h and 15 min to arrive at her cottage, for an arrival time of 2:30.

Chapters 4 to 6 Review

Chapters 4 to 6 Review   **Question 1   Page 356**

a) $x - 2 = -5$ The solution is $x = -3$.

$x - 2 + 2 = -5 + 2$

$x = -3$

b) $\dfrac{y}{6} = -7$ The solution is $y = -42$.

$6 \times \dfrac{y}{6} = 6(-7)$

$y = -42$

c) $9 + w = 13$ The solution is $w = 4$.

$9 + w - 9 = 13 - 9$

$w = 4$

d) $8s = 32$ The solution is $s = 4$.

$\dfrac{8s}{8} = \dfrac{32}{8}$

$s = 4$

e) $4n + 9 = 25$ The solution is $n = 4$.

$4n + 9 - 9 = 25 - 9$

$4n = 16$

$\dfrac{4n}{4} = \dfrac{16}{4}$

$n = 4$

f) $16 - 5r = -14$ The solution is $r = 6$.

$16 - 5r - 16 = -14 - 16$

$-5r = -30$

$\dfrac{-5r}{-5} = \dfrac{-30}{-5}$

$r = 6$

a)

$$5x - 8 = 2x + 7$$
$$5x - 8 + 8 - 2x = 2x + 7 + 8 - 2x$$
$$3x = 15$$
$$\frac{3x}{3} = \frac{15}{3}$$
$$x = 5$$

L.S. $= 5x - 8$ R.S. $= 2x + 7$
$= 5(5) - 8$ $= 2(5) + 7$
$= 25 - 8$ $= 10 + 7$
$= 17$ $= 17$
L.S. = R.S.

The solution is $x = 5$.

b)

$$-2y - 7 = 4y + 11$$
$$-2y - 7 + 7 - 4y = 4y + 11 + 7 - 4y$$
$$-6y = 18$$
$$\frac{-6y}{-6} = \frac{18}{-6}$$
$$y = -3$$

L.S. $= -2y - 7$ R.S. $= 4y + 11$
$= -2(-3) - 7$ $= 4(-3) + 11$
$= 6 - 7$ $= -12 + 11$
$= -1$ $= -1$
L.S. = R.S.

The solution is $y = -3$.

c)

$$4(3w + 2) = w - 14$$
$$12w + 8 = w - 14$$
$$12w + 8 - 8 - w = w - 14 - 8 - w$$
$$11w = -22$$
$$\frac{11w}{11} = \frac{-22}{11}$$
$$w = -2$$

L.S. $= 4(3w + 2)$ R.S. $= w - 14$
$= 4(3(-2) + 2)$ $= -2 - 14$
$= 4(-6 + 2)$ $= -16$
$= 4(-4)$
$= -16$
L.S. = R.S.

The solution is $w = -2$.

d)

$$3 - 2(s - 1) = 13 + 6s$$
$$3 - 2s + 2 = 13 + 6s$$
$$5 - 2s = 13 + 6s$$
$$5 - 2s - 5 - 6s = 13 + 6s - 5 - 6s$$
$$-8s = 8$$
$$\frac{-8s}{-8} = \frac{8}{-8}$$
$$s = -1$$

L.S. $= 3 - 2(s - 1)$ R.S. $= 13 + 6s$
$= 3 - 2(-1 - 1)$ $= 13 + 6(-1)$
$= 3 - 2(-2)$ $= 13 - 6$
$= 3 + 4$ $= 7$
$= 7$
L.S. = R.S.

The solution is s $= -1$.

e)

$$2(n+9) = -6(2n-5)+8$$
$$2n+18 = -12n+30+8$$
$$2n+18 = -12n+38$$
$$2n+18-18+12n = -12n+38-18+12n$$
$$14n = 20$$
$$\frac{14n}{14} = \frac{20}{14}$$
$$n = \frac{20}{14}$$
$$n = \frac{10}{7}$$

L.S. $= 2(n+9)$

$$= 2\left(\frac{10}{7}+9\right)$$
$$= 2\left(\frac{10}{7}+\frac{63}{7}\right)$$
$$= 2\left(\frac{73}{7}\right)$$
$$= \frac{146}{7}$$

R.S. $= -6(2n-5)+8$

$$= -6\left(2\left(\frac{10}{7}\right)-5\right)+8$$
$$= -6\left(\frac{20}{7}-\frac{35}{7}\right)+8$$
$$= -6\left(\frac{-15}{7}\right)+8$$
$$= \frac{90}{7}+\frac{56}{7}$$
$$= \frac{146}{7}$$

L.S. = R.S.

The solution is $n = \dfrac{10}{7}$.

f)

$$5(4k-3)-5k = 10+2(3k+1)$$
$$20k-15-5k = 10+6k+2$$
$$15k-15 = 12+6k$$
$$15k-15+15-6k = 12+6k+15-6k$$
$$9k = 27$$
$$\frac{9k}{9} = \frac{27}{9}$$
$$k = 3$$

L.S. $= 5(4k-3)-5(k)$

$$= 5(4(3)-3)-5(3)$$
$$= 5(12-3)-15$$
$$= 5(9)-15$$
$$= 45-15$$
$$= 30$$

R.S. $= 10+2(3k+1)$

$$= 10+2(3(3)+1)$$
$$= 10+2(9+1)$$
$$= 10+2(10)$$
$$= 30$$

L.S. = R.S.

The solution is $k = 3$.

Chapters 4 to 6 Review **Question 3** **Page 356**

$$2x+1+2x+1+3x = 4(4)$$
$$7x+2 = 16$$
$$7x+2-2 = 16-2$$
$$7x = 14$$
$$\frac{7x}{7} = \frac{14}{7}$$
$$x = 2$$
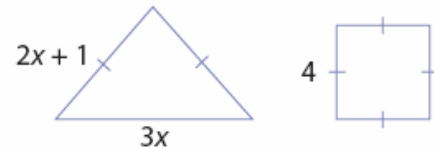
The side lengths of the triangle are $2(2)+1$, or 5 units and $3(2)$, or 6 units.

a)

b)

c)

d)

a) $A = P + I$

$A - I = P + I - I$

$P = A - I$

b) $d = 2r$

$$\frac{d}{2} = \frac{2r}{2}$$

$$r = \frac{d}{2}$$

c) $v = u + at$

$v - u = u + at - u$

$v - u = at$

$$\frac{v - u}{t} = \frac{at}{t}$$

$$a = \frac{v - u}{t}$$

d)

$$P = 2(l + w)$$

$$P = 2l + 2w$$

$$P - 2w = 2l + 2w - 2w$$

$$P - 2w = 2l$$

$$\frac{P - 2w}{2} = \frac{2l}{2}$$

$$l = \frac{P - 2w}{2}$$

$$l = \frac{P}{2} - w$$

Chapters 4 to 6 Review   Question 6   Page 356

a) Let w represent the width. The length is $2w - 2$.

$$2w - 2 + 2w - 2 + w + w = 86$$
$$6w - 4 = 86$$
$$6w - 4 + 4 = 86 + 4$$
$$6w = 90$$
$$\frac{6w}{6} = \frac{90}{6}$$
$$w = 15$$

The width is 15 m, and the length is $2(15) - 2$, or 28 m.

b) Answers will vary. A sample answer is shown.

Make a table of possible lengths and widths. Calculate the perimeter for each pair. Continue until you have a perimeter of 86 m. Click here to load the spreadsheet.

c) Answers will vary. A sample answer is shown.

The equation gives an exact answer, but requires skill to solve. The table is easy to use, but may not give an exact answer if it is not an integer.

Width	Length	Perimeter
1	0	2
2	2	8
3	4	14
4	6	20
5	8	26
6	10	32
7	12	38
8	14	44
9	16	50
10	18	56
11	20	62
12	22	68
13	24	74
14	26	80
15	28	86

Chapters 4 to 6 Review   Question 7   Page 356

a) Natalie is paid $9 for each hour that she works.

b) $P = 9t$, where t represents the time, in hours, that Natalie works and P represents the total amount she is paid for this time. The constant of variation represents the dollar amount that Natalie is paid per hour.

c) $P = 9(9)$
$$= 81$$

Natalie will earn $81 for 9 h worked.

Chapters 4 to 6 Review   Question 8   Page 356

a) The fixed cost is $50.

Distance, d (km)	Cost, C ($)
0	50
100	65
200	80
300	95
400	110

b) Use $(x_1, y_1) = (0, 50)$ and $(x_2, y_2) = (400, 110)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{110 - 50}{400 - 0}$$

$$= \frac{60}{400}$$

$$= 0.15$$

The variable cost is $0.15 times the number of kilometres. This is found by calculating the slope, or rate of change, from the data in the table.

c) $C = 0.15d + 50$

d) $C = 0.15(750) + 50$

$$= 112.50 + 50$$

$$= 162.50$$

The cost of renting a car for a day and driving 750 km is $162.50.
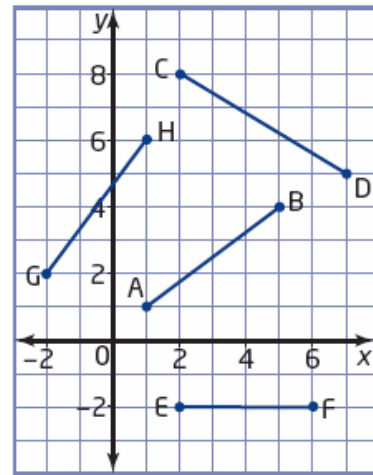
Chapters 4 to 6 Review   Question 9   Page 357

a) $m_{AB} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{4 - 1}{5 - 1}$

$= \dfrac{3}{4}$

b) $m_{CD} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{5 - 8}{7 - 2}$

$= -\dfrac{3}{5}$

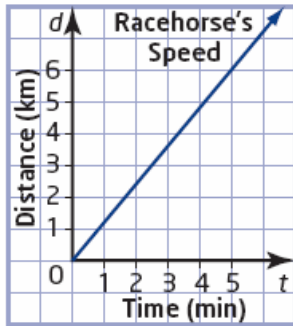**c)** $m_{EF} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{-2 - (-2)}{6 - 2}$

$= 0$

d) $m_{GH} = \dfrac{y_2 - y_1}{x_2 - x_1}$

$= \dfrac{6 - 2}{1 - (-2)}$

$= \dfrac{4}{3}$

Chapters 4 to 6 Review   **Question 10   Page 357**

a)   rate of change $= \dfrac{\text{change in distance}}{\text{change in time}}$

$= \dfrac{6}{5}$

$= 1.2$

The rate of change of the horse's distance is 1.2 km/min.

b)

c)   The rate of change of the horse's distance is the slope of the line. It shows how quickly the horse's distance changes. It represents the average speed: in this case 1.2 km/min or 72 km/h.

Chapters 4 to 6 Review   **Question 11   Page 357**

a)

x	y	First Difference
0	5	
1	7	2
2	9	2
3	11	2
4	13	2

The first differences are constant. The relation is linear.

b)

x	y	First Difference
0	−4	
2	−2	2
4	2	4
6	8	6
8	16	8

The first differences are not constant. The relation is non-linear.

a)

x	y
0	4
5	8
10	12
15	16
20	20

b) Answers will vary. A sample answer is shown.

Multiply any value of x by $\dfrac{4}{5}$ and add 4 to obtain the corresponding y-value.
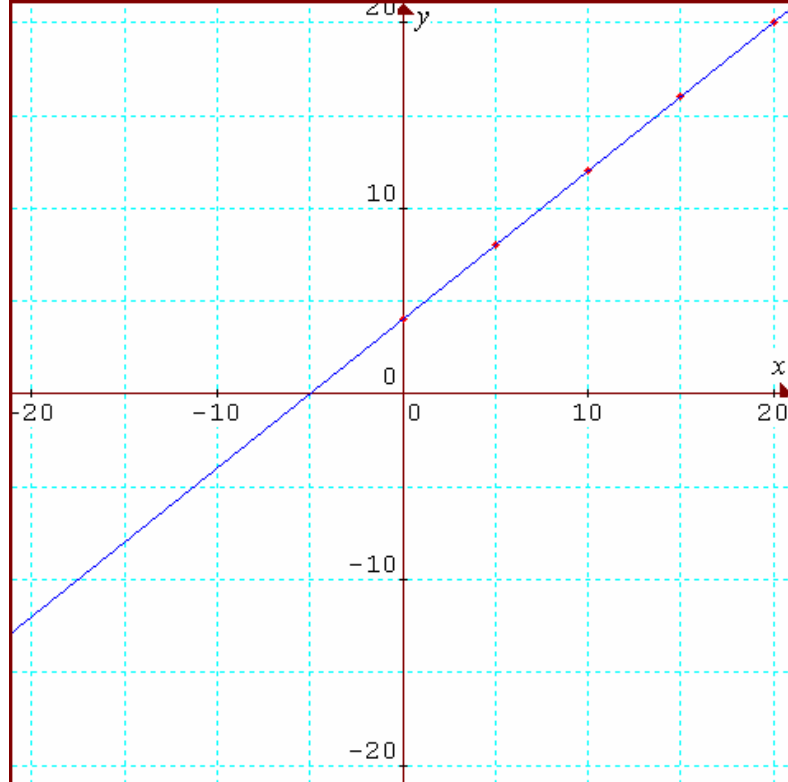
c) Use $(x_1, y_1) = (0, 4)$ and $(x_2, y_2) = (20, 20)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{20 - 4}{20 - 0}$$
$$= \frac{16}{20}$$
$$= \frac{4}{5}$$

$$y = mx + b$$
$$4 = \frac{4}{5}(0) + b$$
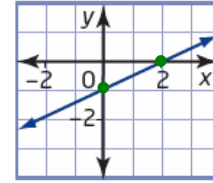$$4 = b$$

$$y = \frac{4}{5}x + 4$$

a)

$$m = \frac{\text{rise}}{\text{run}}$$

$$= \frac{1}{2}$$

The slope is $\frac{1}{2}$, and the y-intercept is -1.

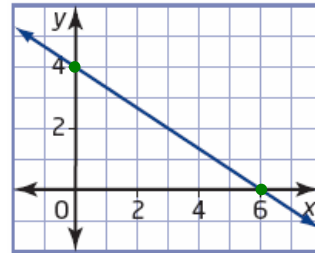The equation is $y = \frac{1}{2}x - 1$.

b)

$$m = \frac{\text{rise}}{\text{run}}$$
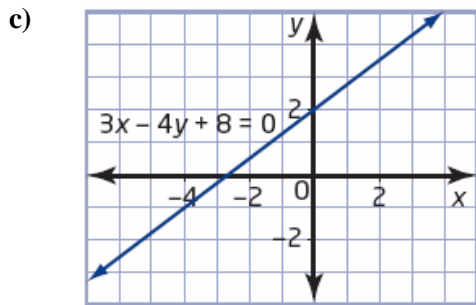
$$= \frac{-4}{6}$$

$$= -\frac{2}{3}$$

The slope is $-\frac{2}{3}$, and the y-intercept is 4.

The equation is $y = -\frac{2}{3} + 4$.

a)

$$3x - 4y + 8 = 0$$
$$3x - 4y + 8 - 3x - 8 = 0 - 3x - 8$$
$$-4y = -3x - 8$$
$$\frac{-4y}{-4} = \frac{-3x - 8}{-4}$$
$$y = \frac{-3x}{-4} + \frac{-8}{-4}$$
$$y = \frac{3}{4}x + 2$$

b) The slope is $\dfrac{3}{4}$, and the y-intercept is 2.

c)

a)

$$3x - y = 6$$
$$3x - 0 = 6$$
$$3x = 6$$
$$\frac{3x}{3} = \frac{6}{3}$$
$$x = 2$$

$$3(0) - y = 6$$
$$-y = 6$$
$$y = -6$$

The *x*-intercept is 2, and the *y*-intercept is –6.

b)

$$-2x + 5y = 15$$
$$-2x + 5(0) = 15$$
$$-2x = 15$$
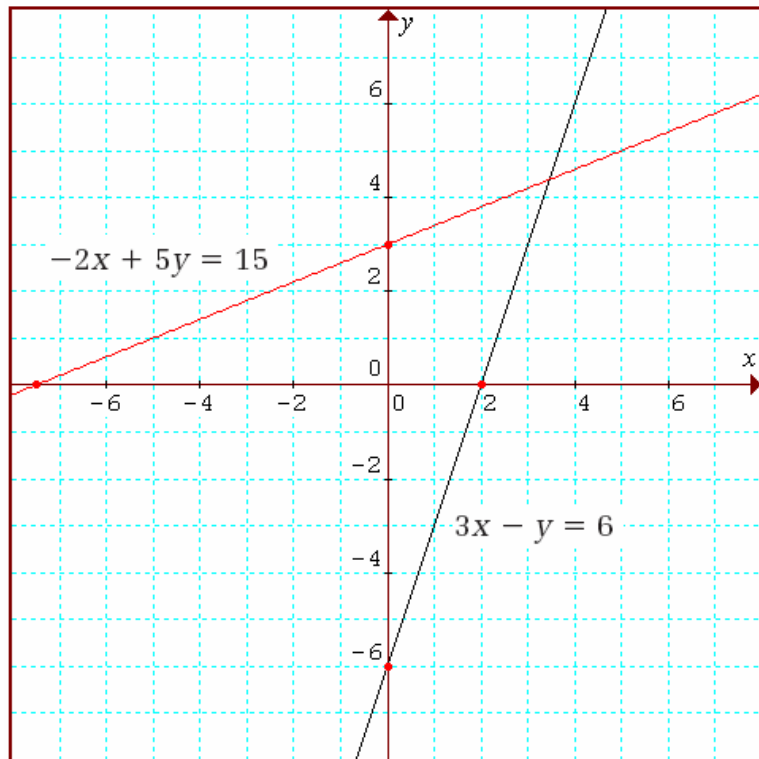$$\frac{-2x}{-2} = \frac{15}{-2}$$
$$x = -\frac{15}{2}$$

$$-2(0) + 5y = 15$$
$$5y = 15$$
$$\frac{5y}{5} = \frac{15}{5}$$
$$y = 3$$

The *x*-intercept is $-\dfrac{15}{2}$, and the *y*-intercept is 3.

Chapters 4 to 6 Review   Question 16   Page 357

a) The slopes are negative reciprocals. The lines are perpendicular.

b) The slopes are equal. The lines are parallel.

c) The slopes are neither equal nor negative reciprocals. The lines are neither.

d) The first line is horizontal, while the second is vertical. The lines are perpendicular.

Chapters 4 to 6 Review   Question 17   Page 357

a)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{3-2}{6-3}$$

$$= \frac{1}{3}$$

$$y = mx + b$$

$$2 = \frac{1}{3}(3) + b$$

$$2 = 1 + b$$

$$2 - 1 = 1 + b - 1$$

$$1 = b$$

$$y = \frac{1}{3}x + 1$$

b)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

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

$$= \frac{-6}{3}$$

$$= -2$$

$$y = mx + b$$

$$3 = -2(-2) + b$$

$$3 = 4 + b$$

$$3 - 4 = 4 + b - 4$$

$$-1 = b$$

$$y = -2x - 1$$

Chapters 4 to 6 Review   Question 18   Page 357

a)
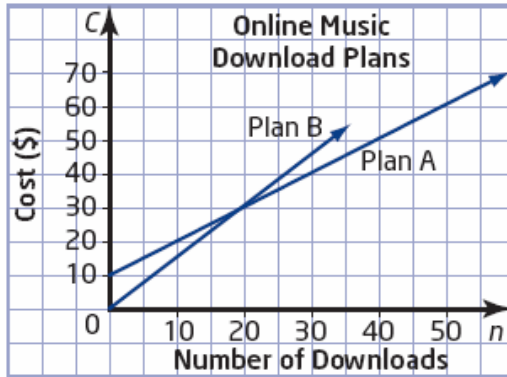
The solution is (20, 30).

b)   If you make fewer than 20 downloads per month, then Plan B is cheaper. If you make more than 20 downloads a month, then Plan A is cheaper.