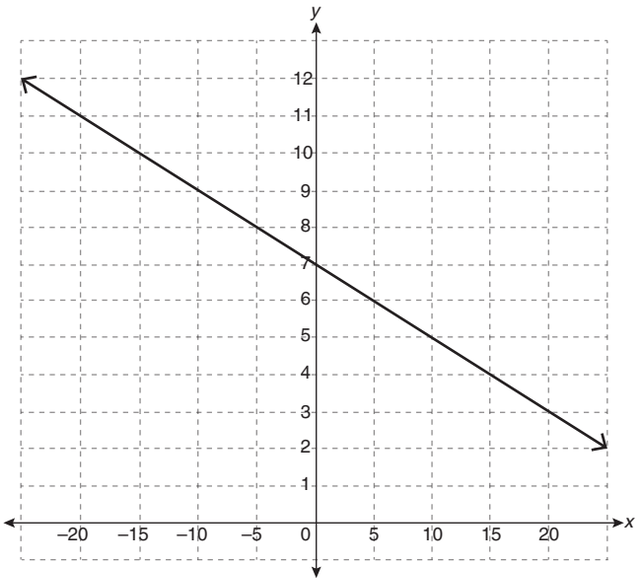
Appendix

Lesson 7.1: Slope-Intercept Form of a Linear Equation

Practice – I

1. State the slope and y-intercept of the following graph. Explain how you determined each.



The slope is $-\frac{1}{5}$ and the y-intercept is 7.

The slope can be determined using two points and the slope formula. The points (15, 4) and (0, 7) are used below.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{7 - 4}{0 - 15}$$
$$= -\frac{3}{15}$$
$$= -\frac{1}{5}$$

The y-intercept can be determined by looking at where the graph of the relation crosses the y-axis. This happens at (0, 7), so the y-intercept is 7.

2. Write each of the following equations in slope-intercept form.

   a. $y + 6 = 3x$

   $$\begin{aligned} y + 6 &= 3x \\ y + 6 - 6 &= 3x - 6 \\ y &= 3x - 6 \end{aligned}$$

   b. $x = 3y - 18$

   $$\begin{aligned} x &= 3y - 18 \\ x + 18 &= 3y - 18 + 18 \\ \frac{x + 18}{3} &= \frac{3y}{3} \\ \frac{1}{3}x + 6 &= y \end{aligned}$$

   c. $3x + 12y + 22 = 0$

   $$\begin{aligned} 3x + 12y + 22 &= 0 \\ 3x + 12y + 22 - 12y &= 0 - 12y \\ 3x + 22 &= -12y \\ \frac{3x + 22}{-12} &= \frac{-12y}{-12} \\ -\frac{3}{12}x - \frac{22}{12} &= y \\ -\frac{1}{4}x - \frac{11}{6} &= y \end{aligned}$$

3. Consider the slope-intercept form of a linear equation, $y = mx + b$.

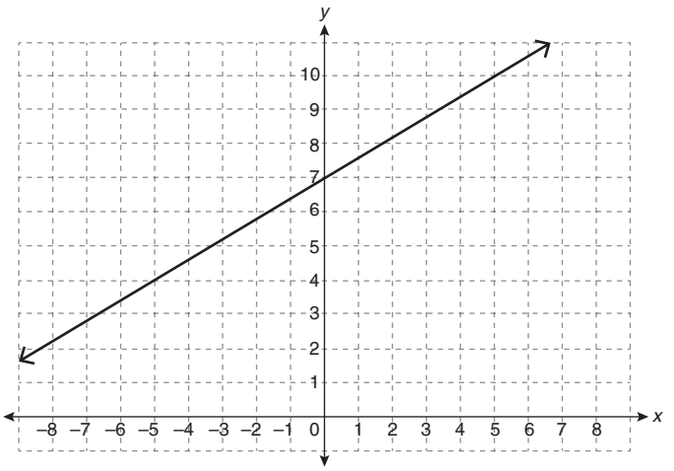
   a. Explain how this form can be used to graph a relation by hand.

   Graphing strategies will vary. Strategies include

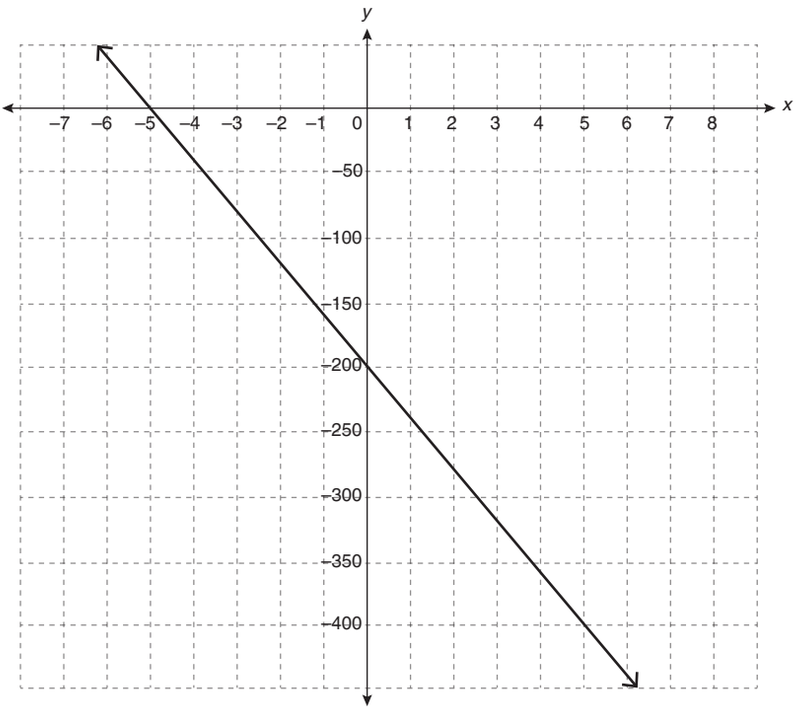
   - Make a table of x and y-values using the equation of the relation. Plot these points and draw a line through them.
   - Use the b-value to plot the y-intercept. Use the slope to determine at least one other point on the graph of the relation. Draw a line through the points.

b. Graph each of the following.

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



ii. $y = -200 - 40x$



4. Explain how technology could be used to check your graphs from question 3.

The graphs in question 3 can be checked by graphing the same relations using a graphing calculator or graphing program and verifying that the two graphs look the same when the same scales are used.

5. The graph of a linear relation with a slope of 5.8 passes through the point (–2, –5). Determine an equation for the relation, in slope-intercept form.

$$y = mx + b$$
$$-5 = 5.8(-2) + b$$
$$-5 = -11.6 + b$$
$$-5 + 11.6 = -11.6 + b + 11.6$$
$$6.6 = b$$

The equation is $y = 5.8x + 6.6$.

6. a. Explain how you can use the equation $y = 4.592x - 8.387$ to determine points on the corresponding graph.

Explanations will vary. A sample is shown.

Select an x-value and substitute it into the equation to determine the corresponding value of y. This ordered pair represents a point on the graph. Repeat this procedure using different x-values to determine other points on the graph.

b. State three points that could be used to graph the relation $y = 4.592x - 8.387$.

Points will vary. Some possible points are listed.

x	y
–5	–31.347
–4	–26.755
–3	–22.163
–2	–17.571
–1	–12.979
0	–8.387
1	–3.795
2	0.797
3	5.389
4	9.981
5	14.573

7. A plumbing company installs tankless hot water heaters and charges for both installation time and materials used.

© *Thinkstock*

   a. The heater and supplies cost $1 800 and the shop charges $110/h for a plumber and an apprentice. Write an equation to represent the total cost to the customer. Be sure to state what each variable represents.

      Let C be the total cost and let T be the installation time in hours. The equation is $C = 110T + 1\,800$.

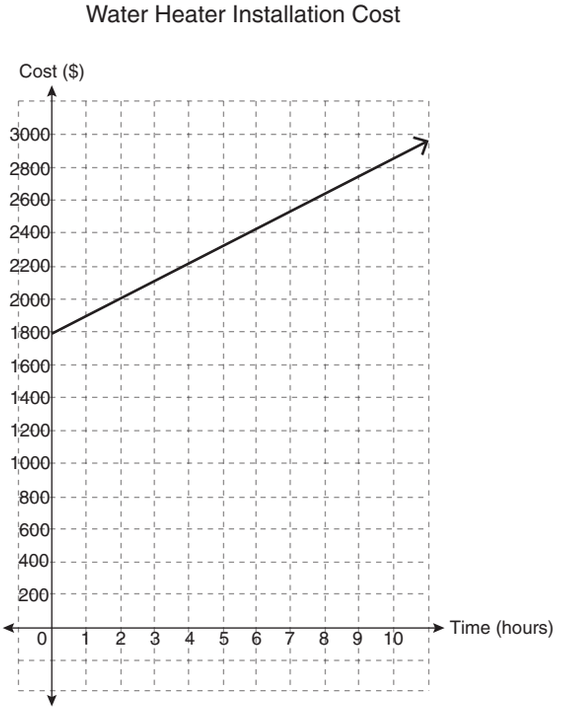
   b. i. What is the slope of the relation?

      110

      ii. What is the vertical-axis intercept of the relation?

      1 800

   c. Sketch the graph of the relation.



   d. If the installation takes 2 hours, how much will the customer be charged?

      $C = 110t + 1800$

      $C = 110(2) + 1800$

      $C = 2\,020$

      The installation will cost $2 020.

e. If a customer was charged $2 185, how long did the installation take?

$$C = 110t + 1800$$
$$2185 = 110t + 1800$$
$$2185 - 1800 = 110t + 1800 - 1800$$
$$385 = 110t$$
$$\frac{385}{110} = \frac{110t}{110}$$
$$3.5 = t$$

The installation took 3.5 hours.

Please complete *Lesson 7.1 Explore Your Understanding Assignment* located in *Workbook 7.1* before proceeding to *Lesson 7.2*.

Lesson 7.2: General Form of a Linear Equation

Practice – II

1. Rewrite each of the following equations in general form, $Ax + By + C = 0$.

a. $y = -3x - 6$

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

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

$$y = \frac{2}{3}x - 7$$
$$y - y = \frac{2}{3}x - 7 - y$$
$$0 = \frac{2}{3}x - y - 7$$
$$3(0) = 3\left(\frac{2}{3}x - y - 7\right)$$
$$0 = 2x - 3y - 21$$