6.1 The Equation of a Line in Slope *y*-Intercept Form: $y = mx + b$

Principles of Mathematics 9, pages 296–307

A

1. Identify the slope and the *y*-intercept of each line.
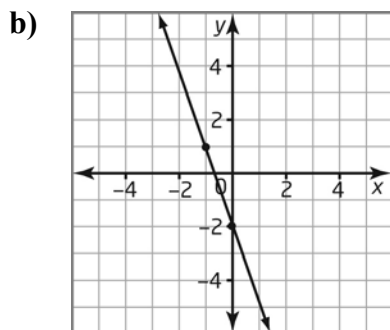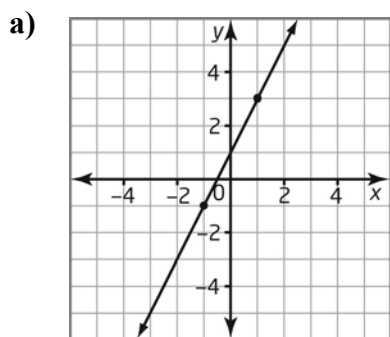
   a) $y = 3x - 2$

   b) $y = -2x + 4$

   c) $y = \dfrac{3}{4}x - 5$

   d) $y = -\dfrac{2}{5}x$
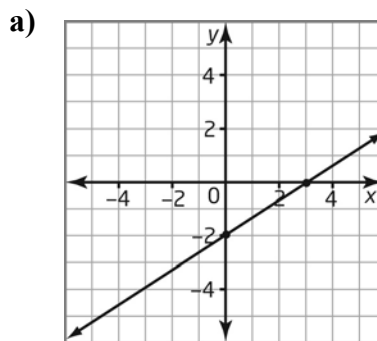
   e) $y = 2x - \dfrac{1}{3}$

   f) $y = 5$

2. Find the slope and *y*-intercept of each line.

   a)

   b)

3. Write the equation of each line in question 2.

4. Find the slope and *y*-intercept of each line.

   a)

   b)
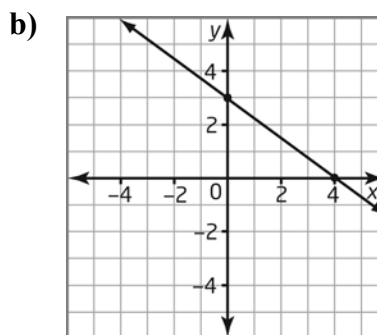
5. Write the equation of each line in question 4.

B

6. Identify the slope and *y*-intercept of each line, if they exist.

   a) $y = 2$
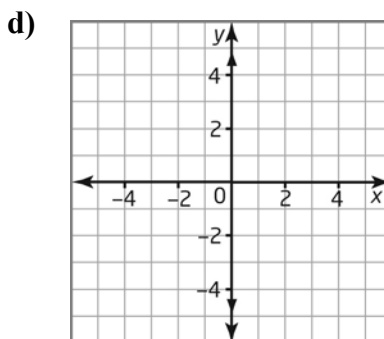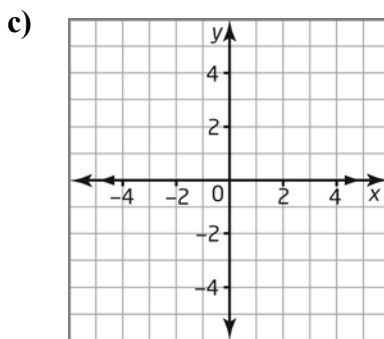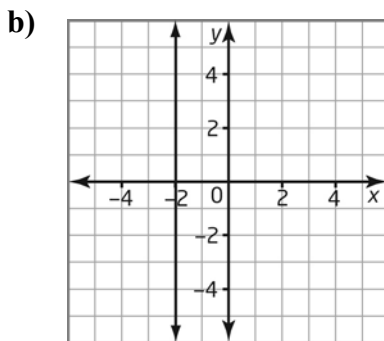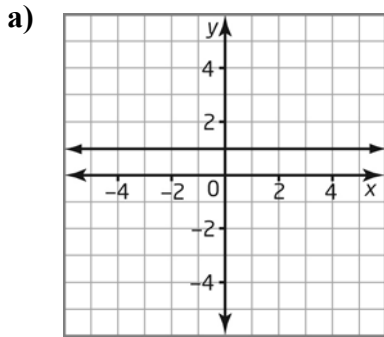
   b) $x = 3$

   c) $y = -4$

   d) $x = -1$

7. Find the slope and the *y*-intercept of each line.

a)

b)

c)

d)

8. Write the equation of each line in question 7.

9. a) The line in question 5 part c) has a special name. What is it?

   b) The line in question 5 part d) has a special name. What is it?

10. The slope and the *y*-intercept are given. Write the equation and graph each line.

   a) slope $= \dfrac{2}{5}$, *y*-intercept $= -1$

   b) slope $= -\dfrac{2}{3}$, *y*-intercept $= 2$

   c) slope $= 0$, *y*-intercept $= -2$

   d) slope $=$ undefined,

       y-intercept $=$ none, *x*-intercept $= 3$

11. This distance-time graph of a person walking in front of a motion sensor is shown.
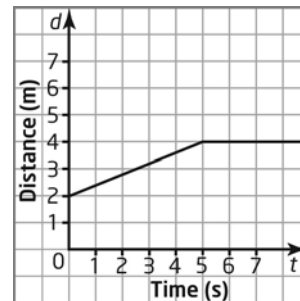
   a) How far from the sensor did the person begin walking?

   b) How fast did the person walk?

   c) Did the person walk away from or toward the sensor? Explain.

   d) How far from the sensor did the person stop walking?

C

12. Sketch a distance-time graph for each walker for the first 4 s.

   a) Kurtis started at a distance of 2 m and walked away from the sensor at a constant speed of 0.5 m/s.

   b) Nicole began walking toward the sensor at a constant speed of 0.5 m/s from an initial distance of 4 m.

   **c)** Julianne stood at a distance of 3.5 m from the sensor and did not move.

   d) Benjamin started at 4 m from the sensor and walked towards it at a constant speed of 1m/s for 2 s. Then, he turned around and walked, at the same speed, away from the sensor for 2 s.

13. Identify the slope and the vertical intercept of each linear relation and explain what they represent. Write an equation to describe the relationship.

   a)

   b)

14. The *y*-intercept is the *y*-coordinate of the point where a graph crosses the *y*-axis. The value of the *x*-coordinate for any *y*-intercept is 0. The *x*-intercept is the *x*-coordinate of the point where a graph crosses the *x*-axis. The value of the *y*-coordinate for any intercept is 0. Find the *x*-intercept and the *y*-intercept of each line.

   a) $y = 2x - 6$

   b) $y = \dfrac{2}{5}x + 4$
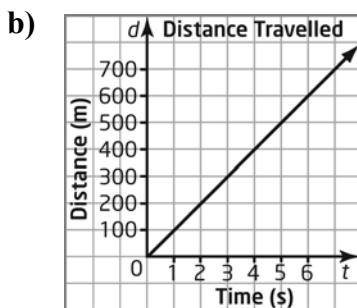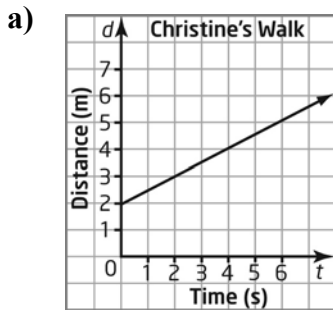
6.2 The Equation of a Line in Standard Form: $Ax + By + C = 0$

Principles of Mathematics 9, pages 308–314

A

1. Express each equation in the form $y = mx + b$.

   a) $x + y - 4 = 0$

   b) $x - y + 2 = 0$

   c) $x + 4y + 3 = 0$

   d) $x - 3y - 8 = 0$

   e) $2x + 5y + 10 = 0$

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

2. For each linear relation in question 1,

   • identify the slope and the y-intercept

   • use this information to graph the line

3. The Gala Restaurant uses the equation $30n - C + 200 = 0$ to determine the cost for a room rental, where C represents the cost, in dollars, which depends on n, the number of people attending.

   a) Express the equation in slope y-intercept form: $C = mn + b$.

   b) Identify the fixed and variable costs.

   c) Illustrate the relation graphically using pencil and paper or a graphing calculator.

   d) What is the rental cost if 100 people attend a hockey banquet?

B

4. The Everything for Events Rental Company charges according to the equation $25n - C + 100 = 0$ to rent tables for events, where C represents the cost, in dollars, which depends on n, the number of tables that are rented.

   a) Express the equation in slope y-intercept form: $C = mn + b$.

   b) Identify the fixed and variable costs.

   c) Illustrate the relation graphically using pencil and paper or a graphing calculator.

   d) What is the rental cost if 200 tables are rented for a charity event?

5. The Home Medical Supplies Rental Company charges according to the equation $60m - C + 75 = 0$ to rent hospital beds, where C represents the cost, in dollars, which depends on m, the number of months that the bed is rented for.

   a) Express the equation in slope y-intercept form: $C = mn + b$.

   b) Identify the fixed and variable costs.

   c) Illustrate the relation graphically using pencil and paper or a graphing calculator.

   d) What is the rental cost if a hospital bed is rented for 5 months?

6. The Tent-All Company charges according to the equation $10d - C + 50 = 0$ to rent tents for camping, where C represents the cost, in dollars, which depends on d, the days that the tent is rented for.

   a) Express the equation in slope y-intercept form: $C = mn + b$.

   b) Identify the fixed and variable costs.

   c) Illustrate the relation graphically.

   d) What is the rental cost if a tent is rented for 7 days.

7. The steps show how to convert an equation in standard form to slope y-intercept form. Explain each step.

Step	*Explanation*
$2x + 3y - 6 = 0$	Start with the equation in standard form.
$3y = -2x + 6$	
$\dfrac{3y}{3} = \dfrac{-2x + 6}{3}$	
$y = -\dfrac{2}{3}x + 2$	

8. The steps show how to convert an equation in standard form to slope y-intercept form. Explain each step.

Step	*Explanation*
$3x + 2y + 5 = 0$	Start with the equation in standard form.
$2y = -3x - 5$	
$\dfrac{2y}{2} = \dfrac{-3x - 5}{2}$	
$y = -\dfrac{3}{2}x - \dfrac{5}{2}$	

C

9. The steps show how to convert an equation in slope y-intercept form to standard form. Explain each step.

Step	*Explanation*
$y = -\dfrac{3}{4}x + 2$	Start with the equation in slope y-intercept form.
$4 \times y = 4 \times \left(-\dfrac{3}{4}x + 2\right)$	
$4y = -3x + 8$	
$3x + 4y - 8 = 0$	

10. Express each equation in standard form using pencil and paper or a CAS.

   a) $y = x - 5$

   b) $y = -x + 3$

   c) $y = 2x + 5$

   d) $y = -3x + 4$

   e) $y = \dfrac{2}{5}x + 4$

   f) $y = -\dfrac{2}{3}x - \dfrac{3}{4}$
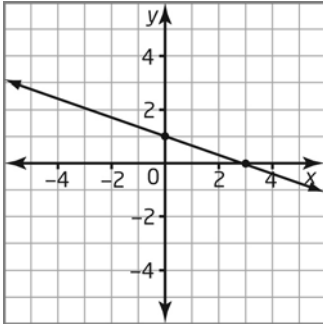
6.3 Graph a Line Using Intercepts
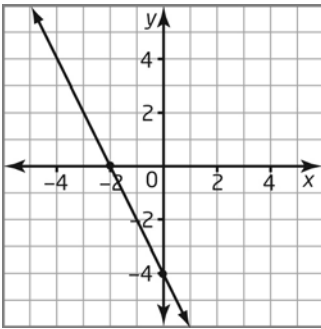*Principles of Mathematics 9*, pages 315–322

A
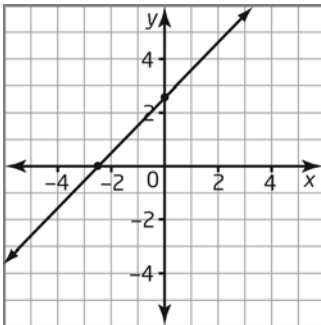
1. Identify the *x*- and *y*-intercepts of each graph.

a)
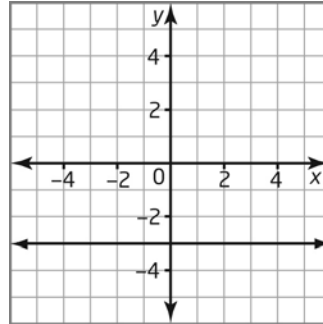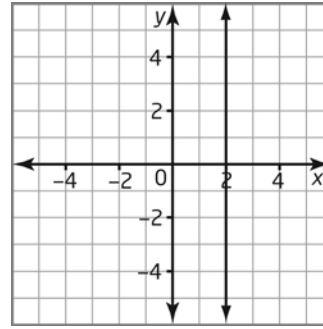

b)

c)

2. Identify the *x*- and *y*-intercepts of each graph, if they exist.

a)

b)

c)
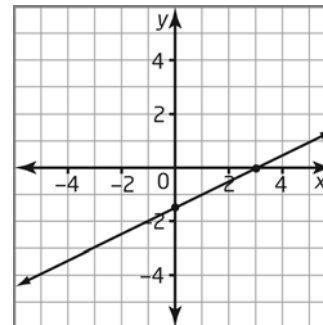
B

3. For each part, plot the intercepts and graph the line.

	x-intercept	y-intercept
a)	2	3
b)	−4	1
c)	2.5	−3.5
d)	none	4
e)	−3	none

4. Determine the *x*- and *y*-intercepts and use them to graph each line.

a) $3x + 4y = 12$

b) $2x + y = 8$

c) $x - 3y = 6$

d) $-2x + 3y = 6$

e) $3x = 9$

f) $4y = 8$

5. Draw a graph and determine the slope of each line using the rise and run from the graph.

	x-intercept	y-intercept
a)	−3	3
b)	−2	−4
c)	0.5	2.5
d)	none	2
e)	−1	none
f)	−4	−3
g)	−1.5	1.5
h)	2	1
i)	none	−3
j)	3	none

6. Find the slope of each line given the *x*- and *y*-intercepts, using the slope formula.

	x-intercept	y-intercept
a)	5	4
b)	2	−5
c)	−3	6
d)	none	7
e)	−2	none

7. An ice sculpture in the form of a tower is melting at a constant rate of 4 cm/h. The ice sculpture is 40 cm high when it first starts to melt.

a) Set up a graph of height, *h*, in centimetres, versus time, *t*, in hours, and plot the *h*-intercept.

b) Should the slope of this linear relation be positive or negative? Explain.

c) Graph the line.

d) What is the height of the ice sculpture after

    •   4 hours

    •   5.5 hours?

e) Identify the *t*-intercept and explain what it means.

f) Explain why this graph has no meaning below the *t*-axis.

8. When you buy a car, its value depreciates (becomes less) over time. The graph illustrates the value of a car from the time it was bought.
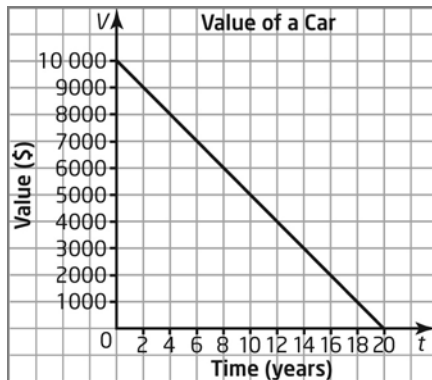
a) How much did the car originally cost?

b) After what period of time does the car no longer have any value?

c) What is the slope of this graph and what does it mean?

C

9. Refer to question 8. Suppose that each year, the car's value becomes 75% of its previous year's value.

a) Construct a table of values of the computer's value versus time for the first 5 years after the date of purchase.

b) Graph this relation. Is it linear or non-linear? Explain.

c) After how many years will the car be worth
   - Less that 30% of its original value?
   - 0

d) Does the t-intercept exist? If yes, what is it? If no, why not?

e) Compare this graph with the one in question 7. Under which system does the car's value depreciate faster? Explain.

10. a) Is the relationship in the graph linear or non-linear. Explain.
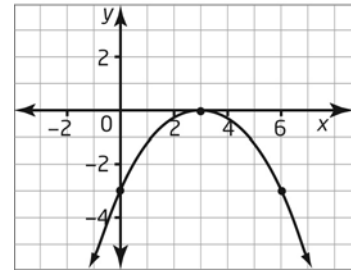
b) How many x-intercepts does the graph have? What are they?

c) How many y-intercepts does the graph have? What are they?

d) Sketch the graph of a relation that has the same shape as the given relation with one x-intercept and one y-intercept.

e) Sketch the graph of a relation that has the same shape as the given relation with no x-intercept and one y-intercept.

6.4 Parallel and Perpendicular Lines
Principles of Mathematics 9, pages 326–329

A

1. Graph each pair of lines on the same coordinate grid using pencil and paper or technology. Find their slopes and conclude whether the lines are parallel, perpendicular, or neither.

   a) $y = 2x + 3$ $\qquad$ $y = 2x - 1$

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

   c) $y = 3x + 1$ $\qquad$ $y = \dfrac{1}{3}x + 1$

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

   e) $y = x + 1$ $\qquad$ $y = -x + 1$

   f) $y = 3x - 2$ $\qquad$ $y = 2x - 3$

2. Graph each pair of lines on the same coordinate grid using pencil and paper or technology. Find their slopes and conclude whether the lines are parallel, perpendicular, or neither.

   a) $y = 3$ $\qquad$ $y = -2$

   b) $y = 1$ $\qquad$ $x = -1$

   c) $y = 2$ $\qquad$ $y = x$

   d) $x = 3$ $\qquad$ $x = 0$

   e) $y = x + 2$ $\qquad$ $y = -x$

   f) $x = 4$ $\qquad$ $y = -x + 4$

3. Graph each pair of lines on the same coordinate grid using pencil and paper or technology. Find their slopes and conclude whether the lines are parallel, perpendicular, or neither.

   a) $x + y = 3$ $\qquad$ $x + y = 2$

   b) $3x + 2y - 6 = 0$ $\qquad$ $2x - 3y + 6 = 0$

   c) $2x + y - 1 = 0$ $\qquad$ $\dfrac{1}{2}x + y - 2 = 0$

   d) $x + y - 2 = 0$ $\qquad$ $x - y - 2 = 0$

4. The slopes of two lines are given. Conclude whether the lies are parallel, perpendicular, or neither, Justify your answers.

   a) $m = \dfrac{3}{4}$, $m = \dfrac{6}{8}$

   b) $m = 3$, $m = -\dfrac{1}{3}$

   c) $m = 5$, $m = -5$

   d) $m = 0.4$, $m = \dfrac{2}{5}$

   e) $m = 2\dfrac{1}{2}$, $m = -\dfrac{2}{5}$

   f) $m = -\dfrac{1}{2}$, $m = \dfrac{1}{2}$

   g) $m = 0$, $m = $ undefined

5. What is the slope of a line that is parallel to each line?

   a) $y = 3x + 5$

   b) $y = -2x + 3$

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

   d) $y = -\dfrac{2}{5}x - 7$

   e) $2x + 3y = 12$

   f) $5x - 3y - 15 = 0$

   g) $x = 3$

   h) $y = -4$

6. For each line in question 5, give the slope of a perpendicular line.

7. Copy and complete the following table.

Slope of a Line	Slope of a Parallel Line	Slope of a Perpendicular Line
4		
−3		
$\dfrac{2}{3}$		
0		
undefined		

8. a) Write the line $3x + 2y - 7 = 0$ in the form $y = mx + b$.

   b) State the slope of the line $3x + 2y - 7 = 0$.

   c) State the slope of a line parallel to the line $3x + 2y - 7 = 0$.

   d) Write the equations of two lines that are parallel to the line $3x + 2y - 7 = 0$.

C

9. a) Write the line $5x - 2y + 4 = 0$ in the form $y = mx + b$.

   b) State the slope of the line $5x - 2y + 4 = 0$.

   c) State the slope of a line that is perpendicular to the line $5x - 2y + 4 = 0$.

   d) Write the equations of two lines that are perpendicular to the line $5x - 2y + 4 = 0$.

10. The lines in the following table are parallel to the line $2x + 3y = 18$.

    a) Determine the x- and y-intercepts of the line $2x + 3y = 18$.

    b) Complete the following table.

Line Equation	x-intercept	y-intercept
$2x + 3y = 12$		
$2x + 3y = 6$		
$2x + 3y = -6$		
$2x + 3y = -12$		
$2x + 3y = -18$		

    c) Describe how you can use intercepts to find a line that is parallel to a given line.

11. Determine whether or not the following sets of points form right triangles. Justify your answers with mathematical reasoning.

    a) A(1, 3), B(5, 1), C(6, 3)

    b) D(−2, 5), E(2, 3), F(3, −2)

    c) M(−4, 2), N(−1, 4), O(1, 1)

12. ΔLMN has vertices L(−1, 2) and M(−4, −1).

    a) Find the coordinates of N such that ΔLMN is a right triangle.

    b) Is there more than one solution? Explain.

6.5 Find an Equation for a Line Given the Slope and a Point

Principles of Mathematics 9, pages 330–337

A

1. Find the equation of a line with the given slope and passing through the given point.

   a) $m = 2$, P(4, 5)

   b) $m = -4$, P(−3, −2)

   c) $m = \dfrac{3}{5}$, P(5, −1)

   d) $m = -\dfrac{1}{4}$, P(2, 6)

2. Find the equation of a line with the given slope and passing through the given point.

   a) $m = 0$, P(5, −4)

   b) $m = 3$, $P\left(\dfrac{2}{3}, \dfrac{1}{4}\right)$

   c) $m = \dfrac{2}{3}$, P(0, 0)

   d) $m = \dfrac{1}{2}$, P(−3, −4)

3. Find the equation of a line

   a) with a slope of 5, passing through (2, 3)

   b) with a slope of −4, passing through (−3, 5)

   c) parallel to $y = 2x + 5$, passing through (3, 2)

   d) perpendicular to $y = 3x - 4$, passing through (5, −3)

   e) parallel to $y = 4$, passing through (2, 3)

   f) perpendicular to $y = -2$, passing through (−3, 1)

4. Find the equation of a line.

   a) parallel to $y = \dfrac{1}{2}x + 3$, passing through the origin

   b) perpendicular to $y = -\dfrac{5}{2}x + 3$, passing through (−2, −3)

   c) parallel to $y = -2x + 3$, passing through (0, 0)

   d) perpendicular to $y = 3x + 4$, passing through (0, 0)

B

5. Find an equation for the line parallel to $3x + 5y - 4 = 0$, with the same x-intercept as $2x - 3y - 6 = 0$.

6. Find an equation for the line perpendicular to $2x + 5y - 3 = 0$, with the same y-intercept as $2x + 3y + 6 = 0$.

7. In Ottawa, you can ride on a tour bus for a fixed price plus a variable amount that depends on the length of the trip. The variable cost is $2/km and a 20-km trip costs $55.

   a) Determine the equation relating cost, C, in dollars, and distance, d, in kilometres.

   b) Use your equation to find the cost of a 15-km tour.

   c) Graph the relation.

   d) Use the graph to find the cost of a 15-km tour.

8. Refer to question 7.

a) Copy and complete the table to solve the problem using a third method. Explain this method.

Distance (km)	Cost ($)	First Differences
2	19	
3	21	2
4		
5		
6		

b) Use all three methods (equation, graph, and table) to determine how far you could travel on the tour bus for $105.

c) Use each method to determine the cost of a 10.5 km tour.

d) Describe at least one advantage and one disadvantage to each method of solution.

9. **Use Technology** A city taxi charges $3/km and a fixed cost. A 5-km taxi ride costs $21. Use *The Geometer's Sketchpad*® to find

a) the fixed cost

b) the equation relating cost, C, in dollars, and distance, d, in kilometres

c) the equation using another method to check your results.

C

10. Ahmed has been running at an average speed of 15 km/h towards the finish line of a 45 km race for 2 h, when he sees a checkpoint sign shown.

Finish Line 15 km

a) What does the ordered pair (2, 15) mean?

b) The slope is $m = -15$. What does this value represent? Why is it negative?

c) Determine the value of b.

d) Write an equation relating distance and time.

e) Graph the relation. What is the meaning of the d-intercept?

f) How long will the race take, in total?

g) Has Ahmed reached the halfway point of his race yet? Explain.

11. Emeline has been driving at an average speed of 100 km/h towards Hamilton for 2 h, when she sees the sign shown.

Hamilton 300 km

a) What does the ordered pair (2, 300) mean?

b) The slope is $m = -100$. What does this value represent? Why is it negative?

c) Determine the value of b.

d) Write an equation relating distance and time.

e) Graph the relation. What is the meaning of the d-intercept?

f) How long will the car drive take, in total?

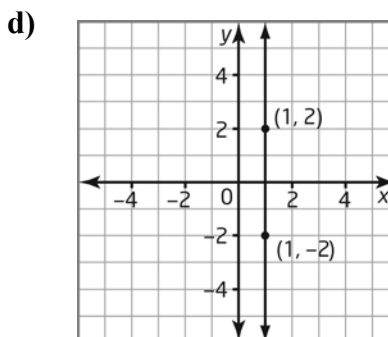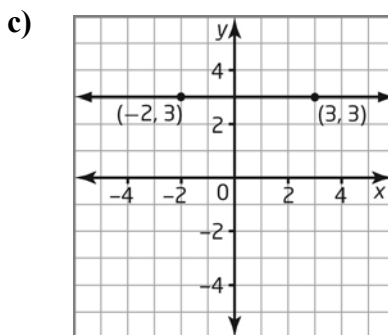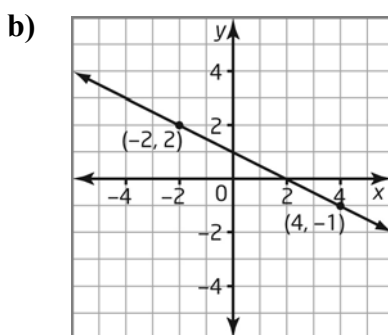**g)** Has Emeline reached the halfway point of her trip yet? Explain.

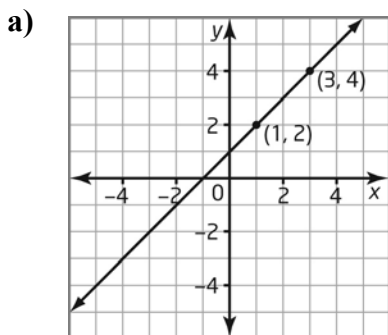## 6.6 Find an Equation for a Line Given Two Points
Principles of Mathematics 9, **pages 338–343**

A

1. Find an equation for each line.

a)

b)

c)

d)

2. Find an equation for the line passing through each pair of points.

    a) A(3, 4) and B(6, 10)

    b) D(1, 5) and E(3, −3)

    c) M(−3, 6) and N(1, −4)

    d) P(−4, 7) and Q(2, −3)

B

3. a) Find an equation for a line with an *x*-intercept of −3 and a *y*-intercept of 5.

    b) Find an equation for a line with an *x*-intercept of 4 and a *y*-intercept of −2.

4. a) Find an equation for a line with the same *x*-intercept as the line $2x + 5y - 4 = 0$ and the same *y*-intercept as the line $3x - 2y + 8 = 0$.

    b) Find an equation for a line with the same *x*-intercept as the line $3x - 4y + 6 = 0$ and the same *y*-intercept as the line $4x - 5y - 10 = 0$.

5. Dajanth is walking at a constant speed in front of a motion sensor. Dajanth starts at a distance of 2.5 m from the sensor. 2 s later, he is 7.5 m from the sensor.

a) Is Dajanth moving toward or away from the sensor? Explain how you know.

b) How fast is Dajanth walking?

c) Find the equation that describes Dajanth's motion in the form $d = mt + b$.

d) What is the d-intercept? What does it mean?

6. Helen is walking at a constant speed in front of a motion sensor. Helen starts at a distance of 8 m from the sensor. 4 s later, she is 4 m from the sensor.

a) Is Helen moving toward or away from the sensor? Explain how you know.

b) How fast is Helen walking?

c) Find the equation that describes Helen's motion in the form $d = mt + b$.

d) What is the d-intercept? What does it mean?

7. Employees of a Department Store get the same raise each year. Patti, who has been working at the store for 2 years, earns \$16.75/h. Susan, who has been working at the store for 5 years, earns \$22.75/h. The equation relating salary and number of years worked is of the form $s = mn + b$, where s is the hourly wage and n is the number of years worked.

a) (2, 16.75) and (5, 22.75) are two points on the line. Explain why.

b) Find the slope and the s-intercept of this line, and explain what they mean.

c) Write the equation of the line.

d) Carol has been working at the store for 10 years. Determine her hourly wage.

e) What wage does this linear model predict for a worker who has been with the store for 20 years? Does this seem reasonable? Explain. How might the store modify the raise policy?

C

8. Two students are walking at constant speeds in front of two motion sensors.
- Susu starts at a distance of 6 m and, after 4 s, she is 14 m away from the sensor.
- Meisrain starts at a distance of 12 m and, after 4 s, she is 8 m from the sensor.

a) Find a distance-time equation for each walker.

b) At what time were they at the same distance from their sensors?

c) At what distance did this occur?

d) Explain how you solved parts b) and c).

9. Refer to question 8.

a) Graph both linear relations on the same grid.

b) Identify the point where the two lines cross. This is called the point of intersection. What are the coordinates of this point?

c) Compare this point to your answers to question 9 parts b) and c). Explain what you notice.

10. Find an equation for the line passing through each pair of points.

a) $G\left(\dfrac{2}{3}, 3\right)$ and $H\left(3, \dfrac{1}{4}\right)$

b) $J\left(\dfrac{1}{2}, -\dfrac{3}{4}\right)$ and $K\left(-\dfrac{3}{5}, -\dfrac{1}{3}\right)$

6.7 Linear Systems
Principles of Mathematics 9, pages 344–351

A

1. Give coordinates of the point of intersection of each linear system.

   a)

   b)

   c)

   d)
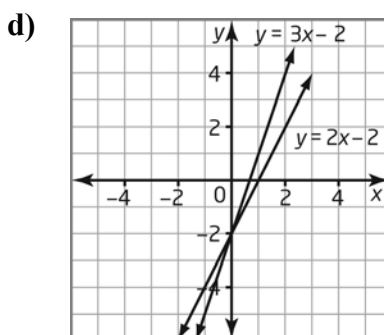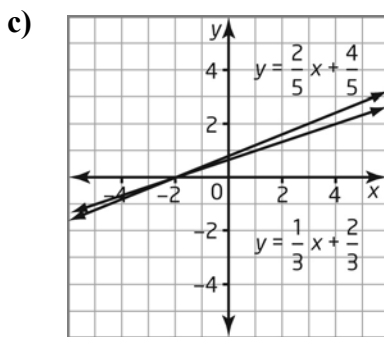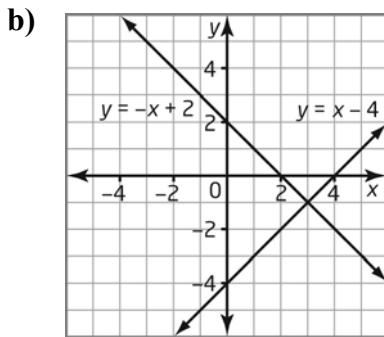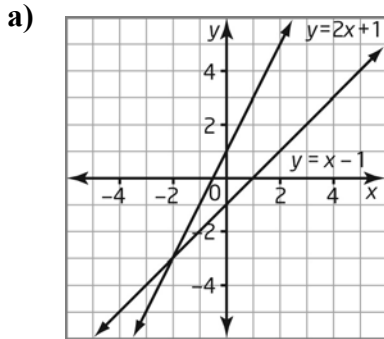
2. Which ordered pair is a solution to the given system of linear equations?

   a) $x + y = 6$ $\qquad$ $(-2, 4)$ or $(2, 4)$
   $2x - y = 0$

   b) $4x + 3y = 7$ $\qquad$ $(1, 1)$ or $(2, 1)$
   $2x - 5y = -3$

   c) $x - 4y = -6$ $\qquad$ $(-2, 2)$ or $(-2, 1)$
   $2x - 3y = -7$

   d) $-4x + y = 5$ $\qquad$ $(-3, -7)$ or $(7, -3)$
   $x - 3y = 18$

B

3. Solve each linear system using pencil and paper or technology. Verify each solution by substituting the coordinates of your solution into both equations.

   a) $y = x + 1$ and $y = 2x + 3$

   b) $x + y = 3$ and $x + 2y = 5$

   c) $x - 3y - 4 = 0$ and $2x + y + 6 = 0$

   d) $y = 3x - 5$ and $2x - 4y = 10$

   e) $3x - y = 4$ and $2x - 4y = 6$

   f) $x + 2y - 8 = 0$ and $2x - 4y + 16 = 0$

   g) $3x + 4y = 4$ and $4x - 5y = 3$

   h) $-x + 5y = 7$ and $3x - 2y = -6$

4. The cost of operating a gas-powered car is $0.90/km. The cost of operating an electric car is $0.30/km plus a fixed cost of $2400. The costs can be compared with the following equations.

Gas powered car: $C = 0.90d$

Electric car: $\quad\;\; C = 0.30d + 2400$

a) What does each variable represent?

b) Solve the system of equations.

c) What does the point of intersection represent?

d) Which type of car is more economical for driving 3000 km?

5. A printer has two presses. The cost to print a book on printer A includes a set-up cost of $225 plus $6 per page. The cost to print the same book on printer B includes a set-up cost of $375 plus $5.50 per page.

a) Write an equation to model each cost, C, in dollars, as it relates to the number of pages, p.

b) Solve the system of equations using a graphing calculator.

c) How many pages must a book contain for the total cost to be the same on both printers?

d) For what number of pages is it more economical to use printer A? printer B?

6. First Choice Taxi charges $2.50, plus 40 cents for each kilometre. G.T.A. Taxi charges $3.25 plus 25 cents for each kilometre.

a) Write an equation to model each cost, C, in dollars, as it relates to the distance, d, in kilometres.

b) Solve the system of equations using a graphing calculator.

c) For what number of kilometres is it more economical to use First Choice Taxi? G.T.A. Taxi?

7. If $(1, 3)$ and $(-1, -3)$ are both solutions to the equations $3x - y = 0$ and $6x - 2y = 0$, what can you conclude about the equations? Explain.

C

8. Find the equation of the line that passes through the point of intersection of $4x + y = -13$ and $3x - 4y = 14$ and is parallel to the line $5x + 3y - 4 = 0$.

9. The sides of a triangle lie on the following three lines.

$$5x - 3y = 19 \quad (1)$$
$$x + 6y = 17 \quad (2)$$
$$2x + y = 1 \quad\;\; (3)$$

a) Solve equations (1) and (2) to find the coordinates of one vertex.

b) Solve equations (2) and (3) to find the coordinates of another vertex.

c) Solve equations (1) and (3) to find the coordinates of the third vertex.

10. Linear equations in three variables also exist. The solution to a system of three linear equations in three variables is an ordered triple, such as P(x, y, z). Solve the following system of equations. Write your solution as an ordered triple,

(x, y, z).

$x + y + z = 3$

$y = 4x$

$z = -2x$

11. If two lines are parallel to each other, would they have a point of intersection? Graph the equations $y = 2x + 1$ and $y = 2x - 1$ to help you explain.

12. If two lines represent the same line, or are coincidental, how many points of intersection, if any, would they have? Graph the equations $y = x + 2$ and $2y = 2x + 4$ to help you explain.

Chapter 6 Review
Principles of Mathematics 9, pages 352–353
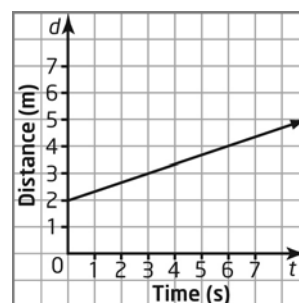
1. Identify the slope and *y*-intercept of each line.

   a)

   b)

   c)

   d)
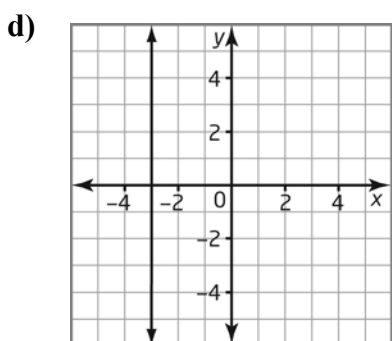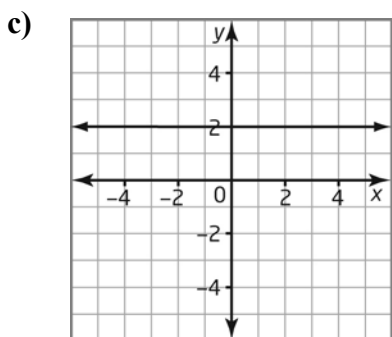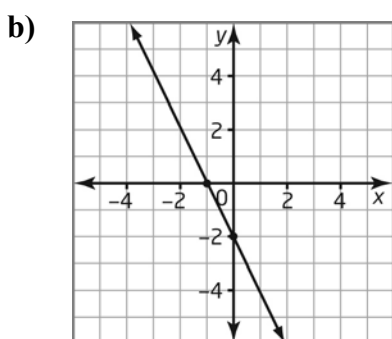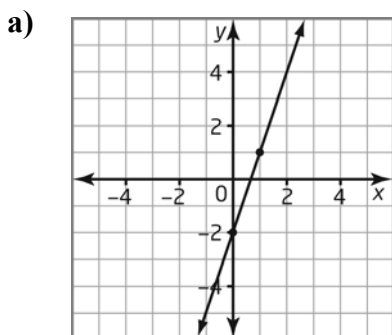
2. Identify the slope and the *y*-intercept of each line.

   a) $y = 4x + 2$ **b)** $y = -\dfrac{5}{6}x + 4$

   c) $y = 5$ **d)** $x = -2$

3. Write the equation of a line with the given slope and *y*-intercept. Then, graph the line.

   a) $m = 2, b = -3$

   b) $m = -\dfrac{2}{3}, b = 1$

   c) $m = 0, b = 3$

   d) $m =$ undefined, $b =$ none, *x*-intercept 2

4. The distance-time graph illustrates a person's movements in front of a motion sensor.

   a) Identify the slope and the *d*-intercept. Explain what they mean.

   b) Write an equation in the form $d = mt + b$ that describes the walker's motion.

5. Rewrite each equation in the form $y = mx + b$.

   a) $3x + y - 4 = 0$

   b) $2x - 3y + 4 = 0$

6. An electrician charges according the equation $35n - C + 50 = 0$, where C is the total charge, in dollars, for a house call, and n is the time, in hours, the job takes.

   a) Rearrange the equation to express it in the form $C = mn + b$.

   b) Identify the slope and the C-intercept and explain what they mean.

   c) Graph the relation.

   d) What would a 4-h house call cost?

7. Determine the x- and y-intercepts of each line. Then, graph the line.

   a) $4x + 5y = 20$ **b)** $2x - 3y = 6$

8. Christopher is at a movie with his younger sister, Cindy. He has $24 to spend on popcorn and pop. Popcorn costs $4 per bag and pop cost $2 each.

   a) If Christopher buys only popcorn, how many bags can he buy?

   b) If Christopher buys only pop, how many can he buy?

   c) The equation $4x + 2y = 24$ can be used to model this problem. Graph this line. What other combinations can Christopher buy?

9. a) Determine the x- and y-intercept of the line $5x + 2y = 10$.

   b) The lines in the table are perpendicular to the line $5x + 2y = 10$. Complete the table.

Line Equation	x-intercept	y-intercept
$2x - 5y = 20$		
$2x - 5y = 10$		
$2x - 5y = -10$		
$2x - 5y = -20$		
$2x - 5y = -30$		

   c) Describe how you can use intercepts to find a line that is perpendicular to a given line.

10. Find an equation for a line with a slope of $\frac{3}{5}$, passing through $(2, -4)$.

11. Find an equation for a line parallel to $4x + 5y + 2 = 0$, with an x-intercept of 3.

12. Find an equation for a line perpendicular to $y = 3x - 5$, with a y-intercept of -2.

13. Find an equation for a line passing through $(-3, 4)$ and $(2, -6)$.

14. Find the equation of the line that passes through the point of intersection of $x + 2y = 9$ and $4x - 2y = -4$ and the point of intersection of the lines $3x - 4y = 14$ and $3x + 7y = -8$.

15. Solve the following linear system:

$$y = -\frac{1}{2}x + 2$$
$$y = 3x - 5$$

16. Two piano teachers charge according to the following equations, relating the piano lesson charge, C, in dollars, to the time, t, in hours:

   - Mr. Sharp: $C = 30t$
   - Mr. Flat: $C = 20t + 10$

   Solve the linear system and explain what the solution means.