

Exercises

A

4. For each equation, identify the slope of the line it represents and the coordinates of a point on the line.

a) $y - 5 = -4(x - 1)$

b) $y + 7 = 3(x - 8)$

c) $y + 11 = (x + 15)$

d) $y = 5(x - 2)$

e) $y + 6 = \frac{4}{7}(x + 3)$

f) $y - 21 = -\frac{8}{5}(x + 16)$

5. Write an equation for the graph of a linear function that:

a) has slope -5 and passes through $P(-4, 2)$

b) has slope 7 and passes through $Q(6, -8)$

c) has slope $-\frac{3}{4}$ and passes through $R(7, -5)$

d) has slope 0 and passes through $S(3, -8)$

6. Graph each line.

a) The line passes through $T(-4, 1)$ and has slope 3 .

b) The line passes through $U(3, -4)$ and has slope -2 .

c) The line passes through $V(2, 3)$ and has slope $-\frac{1}{2}$.

d) The line has x -intercept -5 and slope $\frac{3}{4}$.

B

7. Describe the graph of the linear function with each equation, then graph the equation.

a) $y + 2 = -3(x - 4)$

b) $y + 4 = 2(x + 3)$

c) $y - 3 = (x + 5)$

d) $y = -(x - 2)$

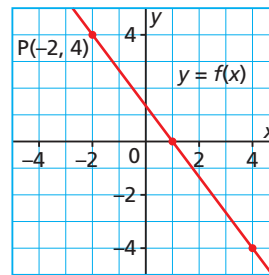
8. A line passes through $D(-3, 5)$ and has slope -4 .

a) Why is $y - 5 = -4(x + 3)$ an equation of this line?

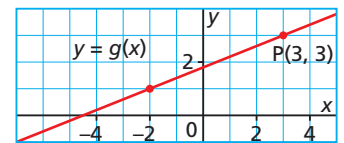
b) Why is $y = -4x - 7$ an equation of this line?

9. a) For each line, write an equation in slope-point form.

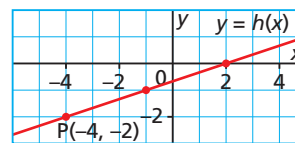
i)



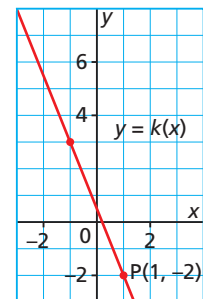
ii)



iii)



iv)



b) Write each equation in part a in slope-intercept form, then determine the x - and y -intercepts of each graph.

10. The speed of sound in air is a linear function of the air temperature. When the air temperature is 10°C , the speed of sound is 337 m/s. When the air temperature is 30°C , the speed of sound is 349 m/s.

a) Write a linear equation to represent this function.

b) Use the equation to determine the speed of sound when the air temperature is 0°C .

11. Write an equation for the line that passes through each pair of points. Write each equation in slope-point form and in slope-intercept form.

a) $B(-2, -5)$ and $C(1, 1)$

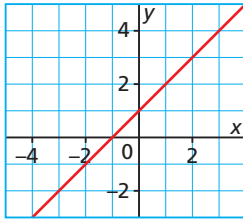
b) $Q(-4, 7)$ and $R(5, -2)$

c) $U(-3, -7)$ and $V(2, 8)$

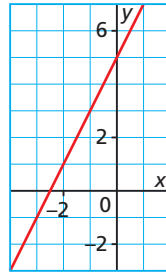
d) $H(-7, -1)$ and $J(-5, -5)$

12. Which equation matches each graph? Describe each graph in terms of its slope and y -intercept.
- a) $y + 3 = 2(x - 1)$ b) $y - 3 = (x - 2)$
 c) $y - 3 = 2(x + 1)$ d) $y + 3 = -(x + 2)$

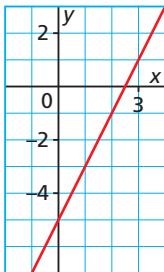
Graph A



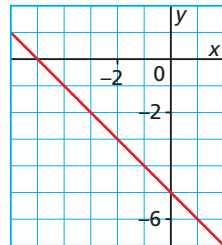
Graph B



Graph C



Graph D



13. How does the graph of $y + y_1 = m(x + x_1)$ compare with the graph of $y - y_1 = m(x - x_1)$? Include examples in your explanation.

14. Match each graph with its equation. Justify your choice.

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

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

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

15. Use a graphing calculator or a computer with graphing software. Graph each equation. Sketch or print the graph. Write instructions that another student could follow to get the same display.

a) $y + \frac{2}{7} = \frac{3}{8}(x - 5)$

b) $y - \frac{10}{3} = -\frac{2}{9}(x + 11)$

c) $y + 1.4 = 0.375(x + 4)$

d) $y - 2.35 = -0.5(x - 6.3)$

16. Chloé conducted a science experiment where she poured liquid into a graduated cylinder, then measured the mass of the cylinder and liquid. Here are Chloé's data.

Volume of Liquid (mL)	Mass of Cylinder and Liquid (g)
10	38.9
20	51.5

- a) When these data are graphed, what is the slope of the line and what does it represent?
 b) Choose variables to represent the volume of the liquid, and the mass of the cylinder and liquid. Write an equation that relates these variables.
 c) Use your equation to determine the mass of the cylinder and liquid when the volume of liquid is 30 mL.
 d) Chloé forgot to record the mass of the empty graduated cylinder. Determine this mass. Explain your strategy.

- 17.** In 2005, the Potash Corporation of Saskatchewan sold 8.2 million tonnes of potash. In 2007, due to increased demand, the corporation sold 9.4 million tonnes. Assume the mass of potash sold is a linear function of time.
- Write an equation that describes the relation between the mass of potash and the time in years since 2005. Explain your strategy.
 - Predict the sales of potash in 2010 and 2015. What assumptions did you make?
- 18.** In Alberta, the student population in francophone schools from January 2001 to January 2006 increased by approximately 198 students per year. In January 2003, there were approximately 3470 students enrolled in francophone schools.
- Write an equation in slope-point form to represent the number of students enrolled in francophone schools as a function of the number of years after 2001.
 - Use the equation in part a to estimate the number of students in francophone schools in January 2005. Use a different strategy to check your answer.
- 19.** A line passes through $G(-3, 11)$ and $H(4, -3)$.
- Determine the slope of line GH .
 - Write an equation for line GH using point G and the slope.
 - Write an equation for line GH using point H and the slope.
 - Verify that the two equations are equivalent. What strategy did you use? What different strategy could you have used to verify that the equations are equivalent?
- 20.**
- Write an equation for the line that passes through $D(-5, -3)$ and is:
 - parallel to the line $y = -\frac{4}{3}x + 1$
 - perpendicular to the line $y = -\frac{4}{3}x + 1$
 - Compare the equations in part a. How are they alike? How are they different?
- 21.** Write an equation for the line that passes through $C(1, -2)$ and is:
- parallel to the line $y = 2x + 3$
 - perpendicular to the line $y = 2x + 3$
- 22.** Write an equation for the line that passes through $E(2, 6)$ and is:
- parallel to the line $y - 3 = -\frac{5}{2}(x + 2)$
 - perpendicular to the line $y - 3 = -\frac{5}{2}(x + 2)$
- How do you know your equations are correct?
- 23.** Write an equation for each line.
- The line has x -intercept 4 and is parallel to the line with equation $y = \frac{3}{5}x - 7$.
 - The line passes through $F(4, -1)$ and is perpendicular to the line that has x -intercept -3 and y -intercept 6.
- 24.** Two perpendicular lines intersect on the y -axis. One line has equation $y - 3 = \frac{2}{9}(x + 5)$. What is the equation of the other line?
- 25.** Two perpendicular lines intersect at $K(-2, -5)$. One line has equation $y = -\frac{5}{3}x - \frac{25}{3}$. What is the equation of the other line?

C

- 26.** Two perpendicular lines intersect at $M(3, 5)$. What might their equations be? How many possible pairs of equations are there?
- 27.** The slope-intercept form of the equation of a line is a special case of the slope-point form of the equation, where the point is at the y -intercept. Use the slope-point form to show that a line with slope m and intersecting the y -axis at b has equation $y = mx + b$.

Reflect

How is the slope-point form of the equation of a line different from the slope-intercept form? How would you use each form to graph a linear function? Include examples in your explanation.