Exercises

4. In which form is each equation written?
   a) $8x - 3y = 52$ **b)** $9x + 4y + 21 = 0$
   c) $y = 4x + 7$ **d)** $y - 3 = 5(x + 7)$

5. Determine the x-intercept and the y-intercept for the graph of each equation.
   a) $8x - 3y = 24$ **b)** $7x + 8y = 56$
   c) $4x - 11y = 88$ **d)** $2x - 9y = 27$

6. Write each equation in general form.
   a) $4x + 3y = 36$ **b)** $2x - y = 7$
   c) $y = -2x + 6$ **d)** $y = 5x - 1$

7. Graph each line.
   a) The x-intercept is 2 and the y-intercept is -3.
   b) The x-intercept is -6 and the y-intercept is 2.

8. a) Explain how you can tell that each equation is not written in general form.
   i) $-2x + 3y + 42 = 0$
   ii) $4y - 5x = 100$
   iii) $\frac{1}{2}x - \frac{1}{2}y + 1 = 0$
   iv) $5y + 9x - 20 = 0$
   b) Write each equation in part a in general form.

9. For each equation below:
   i) Determine the x- and y-intercepts of the graph of the equation.
   ii) Graph the equation.
   iii) Verify that the graph is correct.
   a) $3x - 4y = 24$ **b)** $6x - 5y = -60$
   c) $3x - 2y = 24$ **d)** $5x - y = 10$

10. Two numbers, f and s, have a sum of 12.
   a) Generate some data for this relation.
   b) Graph the data. Should you join the points? Explain.
   c) Write an equation in general form to relate f and s.
   d) Use the graph to list 6 pairs of integers that have a sum of 12.

11. Rebecca makes and sells Nanaimo bars. She uses pans that hold 12 bars or 36 bars. Rebecca uses these pans to fill an order for 504 Nanaimo bars.
   a) Generate some data for this relation, then graph the data.
   b) Choose letters to represent the variables, then write an equation for the relation.

12. Write each equation in slope-intercept form.
   a) $4x + 3y - 24 = 0$ **b)** $3x - 8y + 12 = 0$
   c) $2x - 5y - 15 = 0$ **d)** $7x + 3y + 10 = 0$

13. Determine the slope of the line with each equation. Which strategy did you use each time?
   a) $4x + y - 10 = 0$ **b)** $3x - y + 33 = 0$
   c) $5x - y + 45 = 0$ **d)** $10x + 2y - 16 = 0$

14. Graph each equation on grid paper. Which strategy did you use each time?
   a) $x - 2y + 10 = 0$ **b)** $2x + 3y - 15 = 0$
   c) $7x + 4y + 4 = 0$ **d)** $6x - 10y + 15 = 0$

15. A pipe for a central vacuum is to be 96 ft. long. It will have s pipes each 6 ft. long and e pipes each 8 ft. long. This equation describes the relation:
   $6s + 8e = 96$
   a) Suppose 4 pieces of 6-ft. pipe are used. How many pieces of 8-ft. pipe are needed?
   b) Suppose 3 pieces of 8-ft. pipe are used. How many pieces of 6-ft. pipe are needed?
   c) Could 3 pieces of 6-ft. pipe be used? Justify your answer.
   d) Could 4 pieces of 8-ft. pipe be used? Justify your answer.

16. Pascal saves loonies and toonies. The value of his coins is $24.
   a) Generate some data for this relation.
   b) Graph the data. Should you join the points? Explain.
   c) Write an equation to relate the variables. Justify your choice for the form of the equation.
   d) i) Could Pascal have 6 toonies and 8 loonies?
      ii) Could Pascal have 6 loonies and 8 toonies?
   Use the graph and the equation to justify your answers.

17. Use a graphing calculator or a computer with graphing software. Graph each equation. Sketch or print the graph.

    a) $x - 22y - 15 = 0$ **b)** $15x + 13y - 29 = 0$

    c) $33x + 2y + 18 = 0$ **d)** $34x - y + 40 = 0$

18. Write each equation in general form.

    a) $y = \frac{1}{3}x - 4$ **b)** $y - 2 = \frac{1}{3}(x + 5)$

    c) $y + 3 = -\frac{1}{4}(x - 1)$ **d)** $y = -\frac{3}{2}x + \frac{4}{3}$

19. Choose one equation from question 18. Write it in 2 different forms. Graph the equation in each of its 3 forms. Compare the graphs.

20. Describe the graph of $Ax + By + C = 0$, when $C = 0$. Include a sketch in your answer.

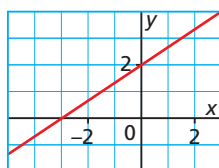**21. a)** How are the x- and y-intercepts of this line related to the slope of the line? Justify your answer.
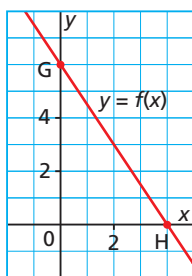
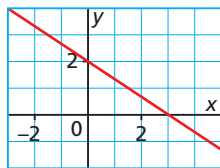   **b)** Is the relationship in part a true for all lines? Explain how you know.

22. Match each equation with its graph. Justify your answer.

    a) $2x + 3y - 6 = 0$ **b)** $2x - 3y + 6 = 0$

Graph A   **Graph B**

23. a) Why can't you use intercepts to graph the equation $4x - y = 0$?

    b) Use a different strategy to graph the equation. Explain your steps.

24. Which equations below are equivalent? How did you find out?

    a) $y = 3x + 6$ **b)** $2x - 3y - 3 = 0$

    c) $y - 2 = \frac{2}{3}(x - 2)$ **d)** $3x - y - 6 = 0$

    e) $y = \frac{2}{3}x - 1$ **f)** $y - 3 = 3(x - 3)$

    g) $y - 1 = \frac{2}{3}(x - 3)$ **h)** $y + 3 = 3(x - 1)$

25. a) Write the equation of a linear function in general form that would be difficult to graph by determining its intercepts. Why is it difficult?

    b) Use a different strategy to graph your equation. How did your strategy help you graph the equation?

26. If an equation of a line cannot be written in general form, the equation does not represent a linear function. Write each equation in general form, if possible. Indicate whether each equation represents a linear function.

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

    b) $y = \frac{10}{x}$

    c) $y = 2x(x + 4)$

    d) $y = \frac{x + y}{4} + 2$

27. Suppose you know the x- and y-intercepts of a line. How can you write an equation to describe the line without determining the slope of the line? Use the line with x-intercept 5 and y-intercept -3 to describe your strategy.

28. The general form for the equation of a line is: $Ax + By + C = 0$

    a) Write an expression for the slope of the line in terms of A, B, and C.

    b) Write an expression for the y-intercept in terms of A, B, and C.

Reflect

Describe a situation that can be most appropriately modelled with the equation of a linear relation in general form. Show that different forms of this equation represent the same graph.