Practise

1. Translate each phrase into an algebraic expression.
   a) seven less than twice a number
   b) four more than half a value
   c) a number decreased by six, times another number
   d) a value increased by the fraction two thirds

2. Translate each phrase into an algebraic expression.
   a) twice a distance
   b) twenty percent of a number
   c) double a length
   d) seven percent of a price

3. Translate each sentence into an algebraic equation.
   a) One fifth of a number, decreased by 17, is 41.
   b) Twice a number, subtracted from five, is three more than seven times the number.
   c) When tickets to a play cost $5 each, the revenue at the box office is $825.
   d) The sum of the length and width of a backyard pool is 96 m.

4. For each of the following, write a word or phrase that has the opposite meaning.
   a) increased
   b) added
   c) plus
   d) more than

5. a) All of the words and phrases in question 4 are represented by the same operation in mathematics. What operation is it?
   b) Work with a partner. Write four mathematical words or phrases for which there is an opposite. Trade your list with another pair in the class and give the opposites of the items in each other's list.

6. Explain in your own words the difference between an expression and an equation. Explain how you can tell by reading whether words can be represented by an expression or by an equation. Provide your own examples.

7. Which is the point of intersection of the lines $y = 3x + 1$ and $y = -2x + 6$?
   A $(0, 1)$ B $(1, 1)$
   C $(1, 4)$ D $(2, 5)$

8. Find the point of intersection for each pair of lines. Check your answers.
   a) $y = 2x + 3$
      $y = 4x - 1$
   b) $y = -x - 7$
      $y = 3x + 5$
   c) $y = \dfrac{1}{2}x - 2$
      $y = \dfrac{3}{4}x + 3$
   d) $y = 4x - 5$
      $y = \dfrac{2}{3}x + 5$

9. Find the point of intersection for each pair of lines. Check your answers.
   a) $x + 2y = 4$
      $3x - 2y = 4$
   b) $y + 2x = -5$
      $y - 3x = 5$
   c) $3x - 2y = 12$
      $2y - x = -8$
   d) $x - y = 1$
      $x + 2y = 4$

10. **Use Technology** Use a graphing calculator or *The Geometer's Sketchpad®* to find the point of intersection for each pair of lines. Where necessary, round answers to the nearest hundredth.
    a) $y = 7x - 23$
       $y = -4x + 10$
    b) $y = -3x - 6$
       $y = -6x - 20$
    c) $y = 6x - 4$
       $y = -5x + 12$
    d) $y = -3x + 4$
       $y = 4x + 13$
    e) $y = 5.3x + 8.5$
       $y = -2.7x - 3.4$
    f) $y = -0.2x - 4.5$
       $y = -4.8x + 1.3$

Connect and Apply

11. Fitness Club CanFit charges a $150 initial fee to join the club and a $20 monthly fee. Fitness 'R' Us charges an initial fee of $100 and $30/month.

    a) Write an equation to represent the cost of membership at CanFit.

    b) Write an equation to represent the cost of membership at Fitness 'R' Us.

    c) Graph the two equations.

    d) Find the point of intersection.

    e) What does the point of intersection represent?

    f) If you are planning to join for 1 year, which club should you join? Explain your answer.

12. LC Video rents a game machine for $10 and video games for $3 each. Big Vid rents a game machine for $7 and video games for $4 each.

    a) Write a linear equation to represent the total cost of renting a game machine and some video games from LC Video.

    b) Write a linear equation to represent the total cost of renting a game machine and some video games from Big Vid.

    c) Find the point of intersection of the two lines from parts a) and b).

    d) Explain what the point of intersection represents in this context.

13. Jeff clears driveways in the winter to make some extra money. He charges $15/h. Hesketh's Snow Removal charges $150 for the season.

    a) Write an equation for the amount Jeff charges to clear a driveway for the season.

    b) Write an equation for Hesketh's Snow Removal.

    c) What is the intersection point of the two linear equations?

    d) In the context of this question, what does the point of intersection represent?

14. **Use Technology** Brooke is planning her wedding. She compares the cost of places to hold the reception.

    Limestone Hall: $5000 plus $75/guest
    Frontenac Hall: $7500 plus $50/guest

    a) Write an equation for the cost of Limestone Hall.

    b) Write an equation for the cost of Frontenac Hall.

    c) Use a graphing calculator to find for what number of guests the hall charges are the same.

    d) In what situation is Limestone Hall less expensive than Frontenac Hall? Explain.

    e) What others factors might Brooke need to consider when choosing a banquet hall?

15. **Use Technology** Gina works for a clothing designer. She is paid $80/day plus $1.50 for each pair of jeans she makes. Dexter also works for the designer, but he makes $110/day and no extra money for finishing jeans.

    a) Write an equation to represent the amount that Gina earns in 1 day. Graph the equation.

    b) Write an equation to represent the amount that Dexter earns in 1 day. Graph this equation on the same grid as in part a).

    c) How many pairs of jeans must Gina make in order to make as much in a day as Dexter?

16. Ramona has a total of $5000 to invest. She puts part of it in an account paying 5%/year interest and the rest in a GIC paying 7.2% interest. If she has $349 in simple interest at the end of the year, how much was invested at each rate?

17. Chapter Problem The Clarke family called two car rental agencies and were given the following information.

Cool Car Company will rent them a luxury car for $525 per week plus 20¢/km driven.

Classy Car Company will rent them the same type of car for $500 per week plus 30¢/km driven.

a) Let C represent the total cost, in dollars, and d represent the distance, in kilometres, driven by the family. Write an equation to represent the cost to rent from Cool Car Company.

b) Write an equation to represent the cost to rent from Classy Car Company.

c) Draw a graph to find the distance for which the cost is the same.

d) Explain what your answer to part c) means in this context.

Extend

18. Alain has just obtained his flight instructor's rating. He is offered three possible pay packages at a flight school.

i) a flat salary of $25 000 per year

ii) $40/h of instruction for a maximum of 25 h/week for 50 weeks

iii) $300/week for 50 weeks, plus $25/h of instruction for a maximum of 25 h/week

a) For each compensation package, write an equation that models the earnings, E, in terms of the number of hours of instruction, n.

b) Graph each equation, keeping in mind the restrictions on the flying hours.

c) Use your graph to write a note of advice to Alain about which package he should take, based on how many hours of instruction he can expect to give.

19. Graph the equations $3x - y + 1 = 0$, $y = 4$, and $2x + y - 6 = 0$ on the same grid. Explain what you find.

20. a) Can you solve the linear system $y = 2x - 3$ and $4x - 2y = 6$? Explain your reasoning.

b) Can you solve the linear system $y = 2x - 3$ and $4x - 2y = 8$? Explain your reasoning.

c) Explain how you can tell, without solving, how many solutions a linear system has.

21. Solve the following system of equations by graphing. How is this system different from the ones you have worked with in this section?

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

22. Math Contest A group of 15 explorers and two children come to a crocodile-infested river. There is a small boat, which can hold either one adult or two children.

a) How many trips must the boat make across the river to get everyone to the other side?

b) Write a formula for the number of trips to get n explorers and two children across the river.

23. Math Contest A number is called *cute* if it has four different whole number factors. What percent of the first twenty-five whole numbers are cute?

24. Math Contest The average of 13 consecutive integers is 162. What is the greatest of these integers?

A 162   **B** 165   **C** 168   **D** 172   **E** 175