

# Getting Ready

In this chapter, you will be working with algebraic expressions, linear and quadratic relations, and transformations. These exercises will help you warm up for the work ahead.

1. Determine the value of each expression if  $x = -4$  and  $y = 5$ .
  - (a)  $-x + 4y$
  - (b)  $4x^2 - 3x + 2$
  - (c)  $6x^2 - 2y^2$
  - (d)  $(2x + 3y)(5x - 2y)$
  - (e)  $-3x^2y^3 + 2x^3y^2$
  - (f)  $\frac{xy + y^2}{y}$
  - (g)  $\frac{x^2 - x + 10}{y^2 - 4y}$
  - (h)  $\frac{(x - 3)^2}{(-2 - y)^2}$
2. Create a table for each relation and then graph the relation.
  - (a)  $y = 3x + 2$
  - (b)  $4x - 2y = 8$
  - (c)  $y = x^2 + 2$
  - (d)  $y = x^2 + 6x + 2$
  - (e)  $y = 2(x - 3)^2 + 1$
  - (f)  $y = -(x + 3)(x - 5)$
3. Solve each linear equation.
  - (a)  $2x - 5 = 7$
  - (b)  $3x - 4 - 5x = -3x - 2$
  - (c)  $5(3 + 2d) = -5$
  - (d)  $-4(2c + 3) = 8$
  - (e)  $3(2m - 5) + 4(3m + 2) = 11$
  - (f)  $7(4 - 3g) = -8(2g - 1)$
  - (g)  $\frac{3x}{4} = -6$
  - (h)  $\frac{3c}{4} - \frac{2c}{3} = 6$
  - (i)  $\frac{y + 2}{3} = \frac{2y + 3}{5}$
4. Replace ■ with either  $<$  or  $>$  to make each statement true.
  - (a)  $-13 - (-2)^2$  ■  $-12 - (-2)(-3)$
  - (b)  $-2 - (-2)(3)$  ■  $-4 - (-3)$
  - (c)  $8 \div (-2) + 6$  ■  $-15 \div 3$
  - (d)  $(-1)^2 - (-2)^2$  ■  $(-4)^2 - (-5)^2$
5. CARZ rents cars at a fixed daily rate and charges \$0.25/km. The cost of renting a car for one day and driving it for 240 km is \$105.
  - (a) Is distance or cost the dependent variable?
  - (b) What is the rate of change in this situation?
  - (c) Write an equation for the rental cost in terms of the distance driven.
  - (d) Graph the relation.
  - (e) Determine the cost to rent a car for one day if it is driven 440 km.
  - (f) Determine the distance driven if the total rental cost is \$125.
6. Express each of the following in the form  $y = mx + b$ .
  - (a)  $2y = 4x + 10$
  - (b)  $3x + 2y = 12$
  - (c)  $4x + 6y - 10 = 0$
  - (d)  $\frac{1}{2}x + \frac{3}{4}y = 1$
  - (e)  $\frac{3}{5}x - 2 = 6y$
  - (f)  $\frac{x}{3} + \frac{y}{5} = -1$

7. A football is punted into the air. Its height,  $h$ , in metres, after  $t$  seconds is  $h = -4.9(t - 2.4)^2 + 29$ .

- What was the height of the ball when it was kicked?
- What was the maximum height of the ball?
- How high was the ball after 2 s?
- Was the ball still in the air after 5 s? Justify your answer.

8. Express each equation in vertex form by completing the square.

- $y = x^2 + 6x$
- $y = 2x^2 + 4x$
- $y = 2x^2 - 4x + 5$
- $y = -3x^2 + 6x - 7$
- $y = 2x^2 + 20x + 43$
- $y = -5x^2 + 10x - 11$

9. For each of the following quadratic relations, state

- the coordinates of the vertex
- the equation of the axis of symmetry
- the direction of opening

- $y = (x - 2)^2 + 4$
- $y = -2(x + 3)^2 - 5$
- $y = 4x^2 + 8x - 5$
- $y = -2x^2 + 10x - 3$

10. What transformations must you apply to  $y = x^2$  to create each new graph? List the transformations in the order you would apply them.

- $y = -x^2 + 4$
- $y = (x - 5)^2$
- $y = (x + 3)^2 - 1$
- $y = -2(x - 4)^2 - 5$

11. Sketch by hand the graph of the relation. Start with the graph of  $y = x^2$  and use the appropriate transformations.

- $y = x^2 + 2$
- $y = (x + 3)^2$
- $y = -2x^2$
- $y = \frac{1}{2}x^2$
- $y = (x + 1)^2 + 3$
- $y = -3(x - 2)^2 + 12$

12. What transformations must be applied to the graph of  $y = x^2$  to produce the graph of  $y = 2x^2 - 12x + 7$ ?

13. For each set of data,

- determine if the relationship is linear or quadratic by examining the first differences and the second differences
- create a scatter plot and draw the curve of best fit

(a)

| Age of Car (years) | 0      | 1      | 2      | 3         | 4         |
|--------------------|--------|--------|--------|-----------|-----------|
| Resale Value (\$)  | 25 000 | 22 000 | 19 360 | 17 036.80 | 14 992.38 |

(b)

| Time (s)           | 0   | 1     | 2     | 3     | 4    |
|--------------------|-----|-------|-------|-------|------|
| Height of Ball (m) | 1.0 | 16.10 | 21.40 | 16.90 | 2.60 |

14. Solve for  $x$ . Determine all possible solutions.

- $x^2 = 36$
- $x^2 + 4x = 21$
- $2x^2 - 1 = 97$
- $-3x^2 + 18x = 27$