

Getting Ready

In this chapter, you will be working with linear, quadratic, and other types of functions, algebraic expressions, and roots of equations. These exercises will help you warm up for the work ahead.

1. Evaluate.

(a) $-\frac{1}{4} + \frac{4}{5} - \frac{9}{10}$

(b) $\frac{5}{-6} - 3\frac{1}{3} + \frac{4}{9}$

(c) $\frac{9}{-4} \times \frac{-2}{7}$

(d) $\left(-4\frac{1}{6}\right)\left(-5\frac{1}{4}\right)$

(e) $-5 \div \left(\frac{-5}{6}\right)$

(f) $\left(-\frac{3}{7}\right) + \left(-1\frac{1}{5}\right)$

(g) $\frac{-5}{7} \times \frac{28}{5} \div \frac{-4}{3}$

(h) $\left(-\frac{1}{3}\right)^2 \div 1\frac{2}{9} \times \frac{11}{12}$

(i) $4 - \left(2\frac{1}{4} - \frac{-3}{8}\right)^2$

(j) $\frac{\frac{1}{-4} - \frac{-1}{3}}{\frac{5}{-12} - 1\frac{3}{4}}$

(k) $\frac{-3}{16} \times 3\frac{1}{5} \div \left(-1\frac{1}{3}\right)^2$

(l) $\left(\frac{4}{5} - \frac{3}{-4}\right)\left(\frac{-1}{3} - \frac{1}{4}\right)$

2. Simplify.

(a) $(4x)(3y)(-2z)$ (b) $(-5ab^2)(-6c^2)$

(c) $\frac{-27pqr}{-3qr}$ (d) $\frac{28m^3n}{14n^2}$

(e) $(-5c^2)(2bd^2)(-3a^2)$

(f) $\frac{36a^2b^2c^3d}{9a^2bd}$

3. Expand and simplify.

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

(b) $5xy(3x - 2y + xy)$

(c) $-3a(7a^3 - 4a^2 + 2a)$

(d) $5x(x + 1) + 6x(2x - 3)$

(e) $-7y(2y - 5) - 2y(5y + 1)$

(f) $-y(4y - 3) - 3y^2$

(g) $3x^2 - 2x^2(1 - x)$

(h) $x^2(x^2 + 2x + 3) - 2x(x^2 + 2x + 3)$

4. Divide.

(a) $\frac{10a^2b + 15bc^2}{-5b}$

(b) $\frac{30x^2y^3 - 20x^2z^2 + 50x^2}{10x^2}$

(c) $\frac{xy - xyz}{xy}$

(d) $\frac{16mnr - 24mnp + 40kmn}{8mn}$

5. Expand and simplify.

(a) $(x - 2)^2$

(b) $(x + 1)(x - 4)$

(c) $(2x - 3)(x + 2)$

(d) $(4x - 5)(3x + 2)$

(e) $(4a - 3)(4a + 3)$

(f) $(x + 1)^2 - (x - 1)^2$

(g) $\left(\frac{1}{2}x + \frac{1}{3}\right)\left(3x - \frac{1}{2}\right)$

(h) $(0.3x - 0.6)(0.2x + 0.5)$

6. Determine the value of y .

(a) $y = (10 - x)(25 + 3x)$, if $x = 5$

(b) $y = 75 + 30x - 3x^2$, if $x = 0.01$

(c) $y = \frac{x + 3}{1 - x}$, if

i. $x = 10\,000$ and ii. $x = -10\,000$

(d) $y = \frac{x^2 - 2x + 1}{x - 1}$, if

i. $x = 1000$ and ii. $x = -1000$

(e) $y = \frac{2x}{x^2 - 9}$, if

i. $x = 2.99$ and ii. $x = 3.01$

- 7.** Factor each expression. First remember to look for common factors.
- (a) $5xy - 2x$
 - (b) $12m^2n^3 + 18m^3n^2$
 - (c) $15p^3q^2r^2 + 21p^4q^3r$
 - (d) $x^2 - 9x + 20$
 - (e) $y^2 - 4y - 32$
 - (f) $3x^2 + 24x + 45$
 - (g) $21x^2 + 21x - 42$
 - (h) $x^2 - 49$
 - (i) $50x^2 - 72$
 - (j) $9x^2 - 6x + 1$
 - (k) $2x^2 + x - 6$
 - (l) $10a^2 + a - 3$
- 8.** Sketch the graph of each relation.
- (a) $y = \frac{3}{4}x + 1$
 - (b) $y = -3x - 2$
 - (c) $x = 7.5$
 - (d) $y = -1.2$
 - (e) $2x + 5y = 10$
 - (f) $5x - 3y - 15 = 0$
- 9.** Find the equation of the line that
- (a) is parallel to the x -axis and passes through point $(2, -1)$
 - (b) has slope $-\frac{2}{3}$ and passes through point $(4, -1)$
 - (c) has x -intercept 2 and y -intercept 5
- 10.** Sketch the graph for each relation. Do not make a table or use graphing technology. In each case, determine the coordinates of the vertex and the y -intercept.
- (a) $y = (x - 3)(x - 5)$
 - (b) $y = -(x - 2)(x + 3)$
 - (c) $y = -2(3 - x)(5 - x)$
 - (d) $y = -x^2 + 5$
 - (e) $y = \frac{1}{2}(x + 4)^2 - 5$
 - (f) $y = -3(x - 2)^2 + 12$
 - (g) $y = x^2 - 4x + 7$
- 11.** Solve each equation by factoring.
- (a) $x^2 + 4x - 21 = 0$
 - (b) $x^2 + 12 = -8x$
 - (c) $6x^2 = 5 - 13x$
- 12.** The population of a town is modelled by $P = 6t^2 + 110t + 3000$, where P is the population and t is the time in years. When $t = 0$, the year is 2000. According to this model,
- (a) what will the population be in 2015?
 - (b) when will the population be 32 000?
 - (c) can the population ever be 0? Explain your answer.
- 13.** Solve by completing the square.
- (a) $x^2 + 6x - 1 = 0$
 - (b) $x^2 - 8x + 5 = 0$
 - (c) $2x^2 - 4x - 7 = 0$
 - (d) $-4x^2 + 6x = 3$
- 14.** Solve using the quadratic formula. Round answers to two decimal places.
- (a) $2x^2 - x - 3 = 0$
 - (b) $-2x^2 + 8x - 3 = 0$
 - (c) $3m^2 + 10m - 7 = 0$
 - (d) $2x^2 - 1.3x - 4.44 = 0$
- 15.** Determine the number of real roots for each quadratic equation.
- (a) $x^2 + 9 = 0$
 - (b) $x^2 + 5x - 8 = 0$
 - (c) $3x^2 + 2x + 6 = 0$
 - (d) $-3(x + 2)^2 + 10 = 0$