

1. Simplify each of the following expressions.

(a)  $(5a - 1)^2 =$

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

(c)  $\frac{3a - 8}{8 - 3a} =$

(d)  $\frac{2x + 1}{4x^2 - 1} =$

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

(f)  $\frac{ab - a - b + 1}{b^2 - 1} =$

(g)  $\frac{5x - 30}{x^2 - 36} \cdot \frac{3x + 18}{5} =$

(h)  $\frac{3x}{x - 2} - \frac{x + 4}{x - 2} =$

(i)  $\sqrt{125} - 3\sqrt{80} + \sqrt{45} =$

(j)  $(\sqrt{7} - 2)^2 =$

(k)  $(\sqrt{3} - 1)^3 =$

2. Rationalize the denominator in each of the following expressions.

(a)  $\frac{3}{\sqrt{5}} =$

(b)  $\frac{1}{\sqrt{10} - 3} =$

(c)  $\frac{2}{\sqrt{7} + 1} =$

3. Find the exact value of  $x^2 - 4x + 6$  if  $x = 2 - \sqrt{3}$ .

4. Factor  $13x + 2x^2 - 24$  by completing the square.

5. Factor completely each of the following:

(a)  $4a^2mn - 15abm^2 - 6abmn + 10a^2m^2 =$

(b)  $a^2x^3 - b^2x - a^2x + b^2x^3 =$

(c)  $162a + 162b - 2ax^4 - 2bx^4 =$

(d)  $x^2 - 6x + 8 =$

(e)  $3a^2 - 5a - 2 =$

(f)  $4b^2 - b - 5 =$

6. Solve each of the following equations. Make sure to check your solution(s).
- (a)  $2x^3 = 20x^2 + 1750x$
  - (b)  $\frac{3x + 17}{2} = x - 1 + \frac{x + 19}{2}$
  - (c)  $|3 - 2x| + 2 = 5$
  - (d)  $\frac{2}{3}(x - 7) = \frac{4}{5}(x + 1)$
  - (e)  $7x^2 + (x + 3)(2x - 1) = (3x + 1)^2$
  - (f)  $8a + 2a^2 = 42$
  - (g)  $8x^3 = 50x^2$
  - (h)  $8p^3 = 50p$
  - (i)  $2 - (3 - x)(2x + 5) = (x - 1)(2x - 1)$
7. Graph the straight lines  $3x + 5y = -1$  and  $y = -x - 1$  in the same coordinate system. Use your graph to find the coordinates of the point where the lines intersect.
8. Graph the parabola  $y = -8x + x^2 + 15$ . Clearly label the coordinates of five points on the parabola, including vertex and intercepts.
9. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the perimeter is 64 ft.
10. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the area is  $84 \text{ ft}^2$ .
11. One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its area is  $319 \text{ in}^2$ .
12. The population of a town has decreased from 80 000 to 68 000. What percent of a decrease does this represent?
13. The hypotenuse of a right triangle is 68 cm. The difference between the other two sides is 28 cm. Find the sides of the triangle.
14. Find the distance between  $(3, 8)$  and  $(8, -4)$ .