

1. Simplify each of the following expressions.

(a)  $(5a - 1)^2 = 25a^2 - 10a + 1$

(b)  $(3x^5 + 4y)(3x^5 - 4y) = 9x^{10} - 16y^2$

(c)  $\frac{3a - 8}{8 - 3a} = -1$

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

(e)  $(x - y)(x^5 + x^4y + x^3y^2 + x^2y^3 + xy^4 + y^5) = x^6 - y^6$

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

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

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

(i)  $\sqrt{125} - 3\sqrt{80} + \sqrt{45} = -4\sqrt{5}$

(j)  $(\sqrt{7} - 2)^2 = 11 - 4\sqrt{7}$

(k)  $(\sqrt{3} - 1)^3 = -10 + 6\sqrt{3}$

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

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

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

(c)  $\frac{2}{\sqrt{7} + 1} = \frac{\sqrt{7} - 1}{3}$

3. Find the exact value of  $x^2 - 4x + 6$  if  $x = 2 - \sqrt{3}$ . 5

4. Factor  $13x + 2x^2 - 24$  by completing the square.  $2(x + 8)\left(x - \frac{3}{2}\right) = (x + 8)(2x - 3)$

5. Factor completely each of the following:

(a)  $4a^2mn - 15abm^2 - 6abmn + 10a^2m^2 = am(2n + 5m)(2a - 3b)$

(b)  $a^2x^3 - b^2x - a^2x + b^2x^3 = x(a^2 + b^2)(x + 1)(x - 1)$

(c)  $162a + 162b - 2ax^4 - 2bx^4 = 2(9 + x^2)(3 + x)(3 - x)(a + b)$

(d)  $x^2 - 6x + 8 = (x - 2)(x - 4)$

(e)  $3a^2 - 5a - 2 = (a - 2)(3a + 1)$

$$(f) 4b^2 - b - 5 = (4b - 5)(b + 1)$$

6. Solve each of the following equations. Make sure to check your solution(s).

$$(a) 2x^3 = 20x^2 + 1750x \quad 35, 0, \text{ and } -25$$

$$(b) \frac{3x + 17}{2} = x - 1 + \frac{x + 19}{2} \quad \text{identity, all real numbers are solution.}$$

$$(c) |3 - 2x| + 2 = 5 \quad 0, 3$$

$$(d) \frac{2}{3}(x - 7) = \frac{4}{5}(x + 1) \quad -41$$

$$(e) 7x^2 + (x + 3)(2x - 1) = (3x + 1)^2 \quad -4$$

$$(f) 8a + 2a^2 = 42 \quad -7, 3$$

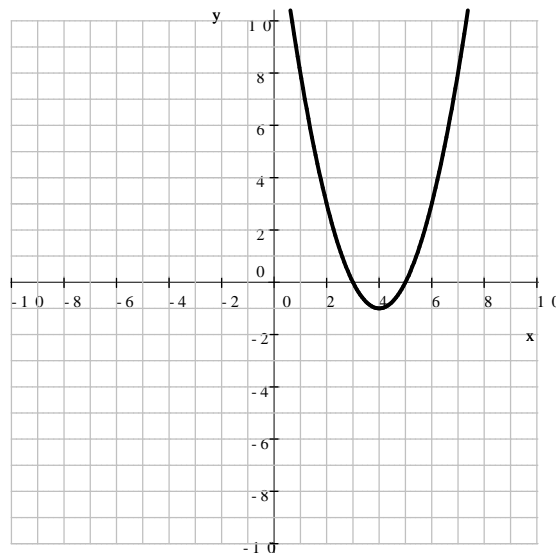
$$(g) 8x^3 = 50x^2 \quad \frac{25}{4}, 0$$

$$(h) 8p^3 = 50p - \frac{5}{2}, 0, \frac{5}{2}$$

$$(i) 2 - (3 - x)(2x + 5) = (x - 1)(2x - 1) \quad 7$$

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.  $(-2, 1)$

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.  $9 \text{ ft and } 23 \text{ ft}$

10. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the area is  $84 \text{ ft}^2$ . **6 ft and 14 ft**
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  $319 \text{ in}^2$ . **11 in by 29 in**
12. The population of a town has decreased from 80 000 to 68 000. What percent of a decrease does this represent? **15% decrease**
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. **32 cm and 60 cm**
14. Find the distance between  $(3, 8)$  and  $(8, -4)$ . **13 units**