

1. Simplify each of the following expressions.

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

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

(c) $\frac{px^2 - 16q - 16p + qx^2}{x^2 + 5x + 6} \cdot \frac{x^2 + 6x + 9}{4px^2 + px^3 + 4qx^2 + qx^3} =$

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

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

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

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

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) $2 - (3 - x)(2x + 5) = (x - 1)(2x - 1)$

(j) $x^2 = 4x + 1$

(k) $4x^2 + 20x + 7 = 0$

7. Graph the straight lines $3x + 5y = 5$ and $y = -x - 1$ in the same coordinate system. Use your graph to find the coordinates of the point where the lines intersect.
8. Find an equation of the straight line that is perpendicular to $2x - 3y = -6$ and passes through the point $(-12, 5)$.
9. Find an equation of the straight line that passes through the points $(2, 7)$ and $(-2, -5)$.
10. Graph the parabola $y = -8x + x^2 + 15$. Clearly label the coordinates of five points on the parabola, including vertex and intercepts.
11. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the perimeter is 64 ft.
12. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the area is 84 ft^2 .
13. 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 in^2 .
14. A bank teller has 23 more five-dollar bills than ten-dollar bills. The total value of the money is \$610. How much of each denomination of bill does he have?
15. The population of a town has decreased from 80 000 to 68 000. What percent of a decrease does this represent?
16. We invested \$10000 into two bank accounts. One account earns 14% per year, the other account earns 8% per year. How much did we invest into each account if the combined interest from the two accounts is \$1238 after the first year?
17. 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.
18. Find the distance between $(3, 8)$ and $(8, -4)$.