

1. Simplify each of the following expressions.

$$(a) \frac{1}{2 - \frac{1}{x-4}} = \quad (6.6 \text{ Example 4})$$

$$(b) \frac{x^2 - 3x}{x^2 + 4x - 21} \cdot \frac{6x + x^2 - 7}{x^2 - x} = \quad (6.4 \text{ Example 4})$$

$$(c) \frac{27p^3 + 8}{3p^2 - 13p - 10} \div \frac{9p^2 - 6p + 4}{p^2 - 25} = \quad (7.5 \text{ Example 6})$$

$$(d) \frac{2ax - 3b - 3a + 2bx}{a^2 - b^2} \div \frac{2x^2 - x - 3}{3b - 3a + ax - bx} =$$

$$(e) (7 - 3\sqrt{2})^2 = \quad (9.5 \text{ Example 1, 2, 3})$$

$$(f) (6 - 5\sqrt{2})(6 + 5\sqrt{2}) = \quad (9.5 \text{ Example 1, 2, 3})$$

$$(g) \frac{2}{\sqrt{29} + 5} = \quad (9.5 \text{ Example 3, 4})$$

$$(h) 3\sqrt{8} + 2\sqrt{18} - \sqrt{50} = \quad (9.4 \text{ Example 4})$$

2. Multiply each of the following expressions.

$$(a) (2a - 3b)(5a + 2b) =$$

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

$$(c) (2\sqrt{2} - 3)(5\sqrt{2} + 2) =$$

$$(d) (2\sqrt{5} - 3)(5\sqrt{5} + 2) =$$

3. Find the value of $a^2 - 6a - 2$ if $a = 3 - \sqrt{2}$

4. Factor each of the following by completing the square or state if it does not factor.

$$(a) x^2 - 6x + 5 =$$

$$(b) x^2 - 6x + 9 =$$

$$(c) x^2 - 6x + 13 =$$

$$(d) x^2 - 6x + 7 =$$

$$(e) 1560x^2 - 26598x + 78x^3 =$$

$$(f) 3x^2 - 14x - 5 =$$

5. Completely factor each of the following expressions.

$$(a) ab^2 - 6a^3 + a^2b = \quad (5.4 \text{ Example 6})$$

$$(b) 10xy - 4a^2 + 25x^2 + y^2 = \quad (5.4 \text{ Example 10})$$

$$(c) 3a^6b - 243a^2b = \quad (5.2 \text{ Example 4})$$

(d) $12ax - 4ay + 24bx - 8by =$ (5.1 Example 12)

(e) $34x - 6x^2 + 12 =$ (5.3 Example 6, 5.4 Example 8)

6. Solve the following equations. Make sure to check your solutions.

(a) $\frac{5x + 1}{28} + \frac{12x - 6}{56} = \frac{x - 1}{14}$ (6.7 Exercise 33)

(b) $x^3 = 12x^2 + 3213x$ (5.7 Example 7)

(c) $3|x + 3| - 5 = 10$ (7.2 Example 4)

(d) $2(x - 3) - \frac{x}{2} = \frac{3}{2}(x - 4)$ (2.3 Exercise 81)

(e) $x^3 - 2x^2 - 35x = 0$ (5.7 Example 6)

(f) $2x^2 - 32x = 0$ (5.7 Example 1)

(g) $x^2 + 11 = 8x$

7. Solve each of the following formulas.

(a) $PV = nRT$ for T (2.6 Example 1,6)

(b) $A = \frac{1}{2}h(B + b)$ for h (2.6 Example 4)

(c) $2x + 3y = 12$ for y (2.6 Example 5)

8. Consider the equation $x^2 + 2x - 6 = 0$.

(a) If the solutions of this equation are x_1 and x_2 , find the sum $x_1 + x_2$.

(b) If the solutions of this equation are x_1 and x_2 , find the product x_1x_2 .

9. Graph the straight lines determined by the equations $3x + 2y = 6$ and $x + y = 4$. (3.2 Example 4)

(a) Use your graph to find the coordinates of the point where the lines intersect.

(b) Use algebraic methods to check your answer.

10. Graph the straight lines determined by the equations $y = 2x - 6$ and $y = -2x + 6$ in the same coordinate system.

(a) What symmetry do you notice? Can you explain it?

(b) Graph $y = |2x - 6|$.

11. Graph the straight lines determined by the equations $y = \frac{2}{3}x - 4$ and $y = x - 2$ in the same coordinate system.
- Use your graph to find the coordinates of the point where the lines intersect.
 - Explain how the graph relates to the equation $\frac{2}{3}x - 4 = x - 2$.
12. Graph the straight lines determined by the equations $y = \frac{2}{3}x - 4$ and $y = \frac{2}{3}x + 3$ in the same coordinate system.
- Use your graph to find the coordinates of the point where the lines intersect.
 - Explain how the graph relates to the equation $\frac{2}{3}x - 4 = \frac{2}{3}x + 3$.
13. Find the equation of the straight line if
- The line passes through the points $(2, 7)$ and $(4, 1)$.
 - The line passes through $(-6, 2)$ and is perpendicular to the line $2x + 3y = 5$.
14. There is a farm where chickens and cows live. There are 79 heads and 262 legs. How many chickens, how many cows?
15. We invested \$ 5000 in two bank accounts. One account earns 5% interest per year, the other earns 8% interest per year. How much did we invest into each account if the combined interest of the two accounts was \$ 337 after one year? .
16. The sum of two numbers is 27. Their difference is 11. Find these numbers.
17. The product of two numbers is 78. Their difference is 7. Find these numbers.
18. One side of a rectangle is 3 ft shorter than twice the other side. Find the sides if the perimeter is 36 ft.
19. One side of a rectangle is 3 ft shorter than twice the other side. Find the sides if the area is 104 ft^2 .
20. Graph the parabola $y = 8x - x^2 - 7$. Clearly label the coordinates of at least five points, including vertex and intercepts.
21. One leg of a right triangle is 12 cm long. The difference between the other two sides is 2 cm. Find the sides of the triangle.
22. The hypotenuse of a right triangle is 58 cm long. The difference between the other two sides is 2 cm. Find the sides of the triangle.
23. Find the distance between the points $(-3, -5)$ and $(2, 7)$. (9.2 Example 2)