

Part 1

1. Simplify $5 - 2(4b - 5(b - 3))$.

(a) $2b + 35$

(b) $35 - 18b$

(c) $2b - 25$

(d) $35 - 2b$

2. Simplify the expression $(\sqrt{x} - \sqrt{2})^2$

(a) $x - 2\sqrt{2x} + 2$

(b) $x - 2$

(c) $x - 2\sqrt{x} + 2\sqrt{2} - \sqrt{x}\sqrt{2}$

(d) $x - 4\sqrt{x} + 4$

3. The solution set of the inequality $|3x - 7| \leq 2$ is

(a) $[-3, 3]$

(b) $\left[-3, -\frac{5}{3}\right]$

(c) $\left[\frac{5}{3}, 3\right]$

(d) $(-\infty, 5) \cup \left(\frac{19}{3}, \infty\right)$

4. Perform the indicated operations and simplify. $\frac{x^2 - 9}{x^2 + 7x + 12} \div \frac{x - 3}{x + 5} =$

(a) $\frac{x + 5}{x + 4}$

(b) $\frac{x^2 - 6x + 9}{9x + x^2 + 20}$

(c) $\frac{x - 3}{9x + x^2 + 20}$

(d) $\frac{x + 5}{x - 4}$

5. Solve the equation $x^2 = 4x + 1$.

(a) $-\frac{1}{2}, \sqrt{5} + 1$

(b) $2 - \sqrt{5}, 2 + \sqrt{5}$

(c) $2 - \sqrt{10}, 2 + \sqrt{10}$

(d) $2 + \sqrt{20}, 2 - \sqrt{20}$

6. Simplify the expression $\frac{1 - x^{-2}}{1 + x^{-1}}$.

(a) $\frac{x - 1}{x}$

(b) $\frac{1 - x}{x^2 + 1}$

(c) 1

(d) $-\frac{1}{x - 1}$

7. Perform the indicated operations and simplify. $\frac{1}{x - y} - \frac{1}{x + y}$

(a) 0

(b) $-\frac{2}{x + y}$

(c) $\frac{-2y}{y^2 - x^2}$

(d) $\frac{2x}{y^2 - x^2}$

8. Simplify $\frac{2^{1/2}4^{-1/2}}{64^{-2/3}}$.

(a) $\sqrt{2}$

(b) $\frac{1}{8}\sqrt{2}$

(c) $-32\sqrt{2}$

(d) $8\sqrt{2}$

9. Find the equation of the perpendicular bisector of the line segment determined by the points $A(-1, -5)$ and $B(5, 7)$.
- (a) $y = 2x - 3$
 (b) $y = \frac{1}{2}x - \frac{9}{2}$
 (c) $4x - y = 13$
 (d) $y = -\frac{1}{2}x + 2$
10. Find the area of a rectangle if its diagonal is 39 cm long and one of its sides is 15 cm long.
- (a) 292.5 cm²
 (b) 540 cm²
 (c) 585 cm²
 (d) 102 cm²

Part 2

1. Simplify each of the following expressions. Show all work.

- (a) $2^{-2} - 2^{-3} =$
 (b) $\frac{(x^{-2})^{-2} y^3 x^0 (-2yxy^{-2}x^{-2})^{-3}}{yx^5 (y^{-2}x)^{-3} (2x^{-1}yx^3)^{-1}} =$
 (c) $\sqrt{48x^5y^3} =$
 (d) $\sqrt{80a^{11}} - 2\sqrt{180a^{11}} + 3\sqrt{245a^{11}} =$
 (e) $\sqrt[3]{56} + 4\sqrt[3]{189} - \sqrt[3]{875} =$
 (f) $(2 - \sqrt{x})(3 + 2\sqrt{x}) =$
 (g) $\frac{\sqrt{5} - 1}{\sqrt{5} - 2} =$
 (h) $\frac{px^2 - 16q - 16p + qx^2}{x^2 + 5x + 6} \cdot \frac{x^2 + 6x + 9}{4px^2 + px^3 + 4qx^2 + qx^3} =$
 (i) $i^{210} =$
 (j) $(3 - 2i)^2 =$
 (k) $\frac{7 - 4i}{2 + i} =$
 (l) $\frac{(3 - i)^3 - (2 + i)^2}{1 - 2i} =$

2. Completely factor each of the following.

(a) $357ab^2 - 30ab^2x - 3ab^2x^2 =$

(b) $4a^2px^5 - 2a^2qx - 4a^2px + 2a^2qx^5 =$

3. Factor via completing the square:

(a) $100x - x^2 - 2419 =$

(b) $x^2 - x - 462 =$

(c) $11x + 6x^2 - 10 =$

(d) $x^2 - 8x + 13 =$

(e) $x^2 - 4x + 7 =$

4. Graphing.

(a) Graph the parabola $y = -2x^2 + 3x + 1$. Clearly label the coordinates of at least 5 points, including vertex and intercepts.

(b) Graph the parabola $y = 5x - 2x^2 + 3$ and the line $y = 5x - 5$ in the same coordinate system. Use your graph to find the coordinates of the points where they intersect..

5. Solve each of the following.

(a) $7 - (3 + 4t) + 2t = -5(1 - t) + 3 - t$

(b) $\frac{2x - 1}{3} - \frac{-3 - x}{4} = x - 1$

(c) $|4x - 1| > 13$

(d) $3x^3 - x^2 = x$

(e) $\sqrt{x + 1} - \sqrt{2x + 1} = -2$

6. Word Problems.

(a) One side of a rectangle is 16 cm longer than the other side. The area of the rectangle is 80 cm^2 . Find the dimensions of the rectangle. Include units in your answer

(b) The sides of a right triangle have lengths (in centimeters) that are consecutive even integers. What are the lengths of the sides?

(c) Two investments produce an annual interest income of 708. The total amount of money invested is \$8000, and the two interest rates paid are 7% and 11%. How much money is invested at each rate?

(d) A bank teller has 47 more five-dollar bills than ten-dollar bills. The total value of the money is \$1000. How much of each denomination of bill does he have?

(e) Two cars are 400 miles apart. Both start at the same time and travel toward one another. They meet 4 hours later. If the speed of one car is $20 \frac{\text{mi}}{\text{hr}}$ faster than the other, what is the speed of each car?