

To receive full credit, show all steps and present the exact value of solutions.

1. Simplify each of the following.

(a) $\sqrt{-4^2 - (-1)^4 + 2 \cdot 3^2 \div 2 \cdot 6 - 1} = 6$

(b) $\left(3\frac{4}{5}\right) \div \left(3\frac{1}{6}\right) - \frac{1}{5} = 1$

(c) $|(-3)^2 + |(-6)^2 + (-2)^3| - 2| + 1 = 36$

(d) $(5 - a)(a^2 + 5a + 25) = 125 - a^3$

2. Factor completely each of the following expressions.

(a) $2mx - 3n - m + 6nx = (2x - 1)(m + 3n)$

(b) $(3a - 1)^2 - (2a - 5)^2 = (a + 4)(5a - 6)$

(c) $15a^2mxy^2 - 5a^2nxy^2 - 15b^2mxy^2 + 5b^2nxy^2 = 5xy^2(a - b)(a + b)(3m - n)$

(d) $4ab - 24b + 8a^2b = 4b(2a - 3)(a + 2)$

3. Solve each of the following equations. Make sure to check your solutions.

(a) $3(x - 2) - 2(5x - 4) = 2 - x \quad 0$

(b) $3(x - 2) - 2(5x - 4) = 11 - 7x \quad \text{no solution}$

(c) $\frac{2x + 1}{5} - \frac{1 - 3x}{2} = 2x - 2 \quad 17$

(d) $2x^3 = x^2 + x \quad 1, 0, -\frac{1}{2}$

(e) $|2x - 1| + 3 = 4 \quad 0, 1$

4. Find the perimeter and the area of a rectangle with sides 8 ft and 17 ft. Include units in your answer. $P = 50 \text{ ft}$ $A = 136 \text{ ft}^2$

5. Word Problems.

(a) The difference between two numbers is 39, their sum is 11. Find these numbers. -14 and 25

(b) One number is 5 less than twice the other. The product of these numbers is 150. Find these numbers. $10, 15$ and $-\frac{15}{2}, -20$

(c) One side of a rectangle is 3 in shorter than 5 times the other side. Find the sides of the rectangle if its perimeter is 162 in. $14 \text{ in by } 67 \text{ in}$

(d) One side of a rectangle is 3 in shorter than 5 times the other side. Find the sides of the rectangle if its area is 224 in². $7 \text{ in by } 32 \text{ in}$