

1. Simplify each of the following expressions.

$$(a) \frac{-5^2 - 60 \div (-4) \cdot 3}{|-21 \div (-7)| - (-1)^6} =$$

$$(b) \frac{\frac{1}{5} + \left(-\frac{1}{2}\right)^2 \cdot \left(3\frac{2}{5}\right)}{\frac{1}{5} + \frac{1}{2}} - 2^{-1} =$$

$$(c) 5\sqrt{18a^5} - 7\sqrt{32a^5} + 4\sqrt{50a^5} =$$

$$(d) \frac{x^3 (-2x^3y^{-2})^4 2yx^{-1} (-12xy^{-3}x^{-2})^{-1}}{x^{-3}yx^3y^0 (-3x^{-5}y)^{-2}y^{-3}} =$$

$$(e) \frac{x^2 - 4x - 21}{x^2 - 49} \div \frac{8x + x^2 + 15}{2x + x^2 - 35} =$$

$$(f) \frac{2a - \frac{1}{8a}}{4 + \frac{1}{a}} =$$

$$(g) \frac{x-5}{x+2} - \frac{3}{2-x} - \frac{14-x}{x^2-4} =$$

$$(h) (2i-3)^2 (2i+3)^2 =$$

$$(i) (3x-1)(3x+9x^2+1) =$$

$$(j) \text{Rationalize the denominator in } \frac{2}{\sqrt{17}+4} =$$

$$(k) \text{Rationalize the denominator in } \frac{2}{\sqrt{x}+4} =$$

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

$$(a) \frac{3x-1}{4} + \frac{8-4x}{3} = 2x+5$$

$$(b) \sqrt{5x-4} - 3 = 8$$

$$(c) 2x^2 + x^3 = 2x$$

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

$$(e) 4 - (2x-5)(x+1) = 18 - 2x^2$$

3. Solve the following inequalities. Graph the solution set on a number line.

$$(a) |2x-5| - 17 > -2$$

$$(b) 6x + x^2 \leq 91$$

4. Graph the parabola  $y = 6x - x^2 + 1$ . Clearly indicate the coordinates of at least five points, including vertex and intercepts.

5. Find the domain of the function  $f(x) = \frac{1}{x^2 - 5x - 24}$

6. One side of a rectangle is 8 in longer than three times the other side. The area of the rectangle is 315 in<sup>2</sup>. Find the sides.

7. The hypotenuse of a right triangle is 74 ft. The difference between the other two sides is 46 ft. Find the sides of the triangle.
8. One side of a rectangle is 7 cm shorter than five times the other side. Find the length of the sides if the area of the rectangle is  $528 \text{ cm}^2$ .
9. How many gallons of a 9% acid solution must be mixed with 15 gallons of a 30% acid solution to obtain an acid solution that is 24%?
10. Town  $A$  and town  $B$  are located 60 miles apart. A jogger starts in town  $A$  and jogs toward town  $B$ . At the same time, a bicycle starts in town  $B$  and travels toward town  $A$ . The difference between the speed of the jogger and that of the bicycle is  $14 \frac{\text{mi}}{\text{h}}$ . Find the speeds if the jogger and the bicycle meet exactly 3 hours after the start.