

1. Simplify each of the following expressions.

$$(a) \frac{-5^2 - 60 \div (-4) \cdot 3}{|-21 \div (-7)| - (-1)^6} = 10$$

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

$$(c) 5\sqrt{18a^5} - 7\sqrt{32a^5} + 4\sqrt{50a^5} = 7a^2\sqrt{2a}$$

$$(d) \frac{x^3(-2x^3y^{-2})^4 2yx^{-1}(-12xy^{-3}x^{-2})^{-1}}{x^{-3}yx^3y^0(-3x^{-5}y)^{-2}y^{-3}} = -24x^5$$

$$(e) \frac{x^2 - 4x - 21}{x^2 - 49} \div \frac{8x + x^2 + 15}{2x + x^2 - 35} = \frac{x - 5}{x + 5}$$

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

$$(g) \frac{x - 5}{x + 2} - \frac{3}{2 - x} - \frac{14 - x}{x^2 - 4} = \frac{x - 1}{x + 2}$$

$$(h) (2i - 3)^2 (2i + 3)^2 = 169$$

$$(i) (3x - 1)(3x + 9x^2 + 1) = 27x^3 - 1$$

$$(j) \text{Rationalize the denominator in } \frac{2}{\sqrt{17} + 4} = 2\sqrt{17} - 8$$

$$(k) \text{Rationalize the denominator in } \frac{2}{\sqrt{x} + 4} = \frac{2\sqrt{x} - 8}{x - 16}$$

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

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

$$(b) \sqrt{5x - 4} - 3 = 8 \quad 25$$

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

$$(d) \sqrt{2x - 1} + 4 = 1 \quad \text{no solution}$$

$$(e) 4 - (2x - 5)(x + 1) = 18 - 2x^2 \quad 3$$

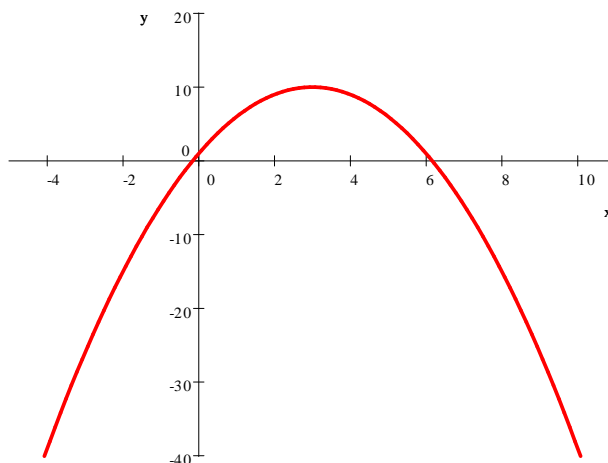
3. Solve the following inequalities. Graph the solution set on a number line.

$$(a) |2x - 5| - 17 > -2 \quad (-\infty, -5) \cup (10, \infty)$$

$$(b) 6x + x^2 \leq 91 \quad [-13, 7]$$

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

$$y\text{-intercept: } (0, 1) \quad \text{vertex: } (3, 10) \quad x\text{-intercepts: } (3 - \sqrt{10}, 0) \text{ and } (3 + \sqrt{10}, 0)$$



5. Find the domain of the function $f(x) = \frac{1}{x^2 - 5x - 24}$ $x \neq 3, 8$
6. One side of a rectangle is 8 in longer than three times the other side. The area of the rectangle is 315 in². Find the sides. **9 in by 35 in**
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. **24 ft, 70 ft, 74 ft**
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 cm². **11 cm by 48 cm**
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%? **6 gallons of the 9% solution with 15 gallons of the 30% solution.**
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. **$3 \frac{\text{mi}}{\text{h}}$ and $17 \frac{\text{mi}}{\text{h}}$**