

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

$$(a) \frac{3}{x+1} - \frac{2}{x-1} + \frac{x+3}{x^2-1} =$$

$$(b) \sqrt{45} - \sqrt{20} + \sqrt{500} =$$

$$(c) \frac{a^2 - 8a + 16}{a} \cdot \frac{a^3}{4-a} =$$

$$(d) \frac{\sqrt{75}}{\sqrt{12}} =$$

$$(e) \frac{2x^2 - 98}{x^2 - 6x - 7} \div \frac{21 + 3x}{6x^2 - 6} =$$

$$(f) (\sqrt{7} - 2)^2 =$$

$$(g) \frac{x^2 - 3x}{x^2 + 4x - 21} \cdot \frac{6x + x^2 - 7}{x^2 - x} =$$

$$(h) (2\sqrt{5} - 1)(2\sqrt{5} + 1) =$$

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

$$(j) \frac{1}{x-y} - \frac{1}{x+y} =$$

2. Completely factor each of the following expressions.

$$(a) 24a^3 - 315a^2 + 3a^4 =$$

$$(b) 3a^6b - 243a^2b =$$

$$(c) 2x^4y^3 - 32y^3 =$$

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

$$(a) x^3 = 12x^2 + 3213x$$

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

$$(c) x^3 - 2x^2 - 35x = 0$$

$$(d) 2x^2 - 32x = 0$$

$$(e) 2(x-3) - 5(4x+3) = 2x-1$$

$$(f) \frac{3x-4}{5} - \frac{x-4}{2} = \frac{2x+4}{10}$$

$$(g) 2(x-3)^2 - 3(x-1)^2 = 3 - (x+2)^2$$

4. Solve each of the following inequalities. Graph the solution set.

$$(a) 2(x-3) - 5(2x-2) \geq 10 - 2x$$

$$(b) \frac{5x+1}{28} + \frac{12x-6}{56} > \frac{x-1}{14}$$

$$(c) 3(x-25) \leq 5x-17$$

5. Consider the straight line $2x - 3y = -6$.
- Find the coordinates of the y -intercept of the line.
 - Find the coordinates of the x -intercept of the line.
 - Graph the line.

6. Solve each of the following systems of linear equations.

(a)

$$\begin{aligned}5x - y &= 11 \\3x + 2y &= 4\end{aligned}$$

(b)

$$\begin{aligned}3x + y &= 2 \\y &= -3x - 5\end{aligned}$$

7. Solve each of the following formulas.

- $PV = nRT$ for T
- $A = \frac{1}{2}h(B + b)$ for h
- $2x + 3y = 12$ for y

8. Graph the straight lines determined by the equations $3x + 2y = 6$ and $x + y = 4$.

- Use your graph to find the coordinates of the point where the lines intersect.
- Use algebraic methods to check your answer.

9. We threw an object upward from the top of a 880 ft tall building. t seconds after we dropped it, the distance of the object from the ground is

$$h(t) = -16t^2 + 96t + 880$$

- Find $h(t)$ if $t = 0$ s. (Also denoted by $h(0$ s)).
- Find $h(t)$ if $t = 1$ s. (Also denoted by $h(1$ s)).
- Find $h(t)$ if $t = 3$ s. (Also denoted by $h(3$ s)).
- Find $h(t)$ if $t = 4$ s. (Also denoted by $h(4$ s)).
- Find $h(t)$ if $t = 7$ s. (Also denoted by $h(7$ s)).
- How long until the object hits the ground?

10. There is a farm where chickens and cows live. There are 79 heads and 262 legs. How many chickens, how many cows?
11. The sum of two numbers is 27. Their difference is 11. Find these numbers.
12. Consider the right triangle with sides 20 m, 21 m, and 29 m long.
- Compute the perimeter of the triangle. Include units in your computation and answer.
 - Compute the area of the triangle. Include units in your computation and answer.