

1. Simplify each of the following expressions.

(a) $x^2 \cdot x^3 =$

(b) $(x^2)^3 =$

(c) $(x + y)(x^3 - x^2y + xy^2 - y^3) =$

(d) $(2x - 5)^3 =$

(e) $(2x^3 - 5x^2 + 3x - 8) - (-x^3 - 4x^2 - 3x - 8) =$

(f) $\frac{x^2 - 18x + 80}{x^2 - 6x - 16} =$

(g) $\frac{x^2 - 4}{3x + 6} \div \frac{10x + x^2 - 24}{x + 12} =$

(h) $\sqrt{12} - 2\sqrt{27} + \sqrt{75} =$

2. Factor completely each of the following:

(a) $3x^2 - 120x + 1125 =$

(b) $6a^2n^4 - 6a^2 =$

(c) $2abc - 18ab^3c =$

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

(a) $3x^3 = 48x$

(b) $(2x - 3)(x + 1)(x - 11) = 0$

(c) $x + 5 - (3 - 2x)(x + 8) = 2(x + 4)^2 + 1$

(d) $x + 5 - (3 - 2x)(x + 8) = (x + 4)^2 + 5$

(e) $-16x^2 + 64x + 1232 = 0$

4. Solve the formula $3x - 7y = -42$

(a) for x

(b) for y

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

(a) $7 - (2a - 3) < -a$

(b) $10 - (3x - 8) + 2(4 - x) \geq -6(3 - x)$

(c) $\frac{-3 + 4x}{5} - \frac{x - 4}{2} \leq \frac{2x + 6}{10}$

6. Solve the following systems of linear equations. Make sure to check your solutions.

(a)
$$\begin{cases} 2x + y = 5 \\ y = 2x - 3 \end{cases}$$

(b)
$$\begin{cases} 2x - y = -5 \\ 2y - x = 1 \end{cases}$$

7. Graph the straight lines $y = -\frac{2}{3}x - 2$ and $y = -x - 4$ in the same coordinate system.

(a) Use your graph to find the coordinates of the point where these lines intersect.

(b) Use algebraic methods to check your solution.

8. There is an animal farm where chickens and cows live. All together, there is 39 heads and 122 legs. How many chickens, how many cows?

9. We throw an object upward from the top of a 1232 ft tall building. Let t represent the time, (measured in seconds) that passed since we threw the object, and let h_t represent the distance of the object from the ground at time t . Then

$$h_t = -16t^2 + 64t + 1232$$

(a) Find h_0 .

(b) Find h_2 .

(c) Find h_7 .

(d) How long will it take for the object to hit the ground? (Hint: you need to find t so that $h_t = 0$)