

6 steps to solving equations:

Section 3.3 Solving Multi-Step Equations

Solving a linear equation may require 2 or more transformations. Here are some guidelines:

1. distribute
2. Combine like terms
3. add/subtract constant
4. mult/divide coefficient
5. Simplify fraction (i do not want to see any mixed numbers!)
6. check you work

1. simplify one or both sides of the equation (if needed)
2. Use inverse operations to isolate the variable.

Examples

1. $10x - 5 = 10$

$$\begin{aligned} 10x - 5 &= 10 \\ +5 &+5 \\ 10x &= 15 \\ \frac{10x}{10} &= \frac{15}{10} \\ x &= \frac{3}{2} \end{aligned}$$

2. $6x + 6 = -5$

$$\begin{aligned} 6x + 6 &= -5 \\ -6 &-6 \\ 6x &= -11 \\ \frac{6x}{6} &= \frac{-11}{6} \\ x &= -\frac{11}{6} \end{aligned}$$

3. $26 = n - (-2) + 5n$

$$\begin{aligned} 26 &= n - (-2) + 5n \\ 26 &= 6n + 2 \\ -2 &-2 \\ 24 &= 6n \\ \frac{24}{6} &= \frac{6n}{6} \\ 4 &= n \end{aligned}$$

4. $4x + 12(x - 3) = 28$

$$\begin{aligned} 4x + 12(x - 3) &= 28 \\ 4x + 12x - 36 &= 28 \\ 16x - 36 &= 28 \\ +36 &+36 \\ 16x &= 64 \\ \frac{16x}{16} &= \frac{64}{16} \\ x &= 4 \end{aligned}$$

5. $2x + 5(x - 9) = 27$

$$\begin{aligned} 2x + 5(x - 9) &= 27 \\ 2x - 5x + 45 &= 27 \\ -3x + 45 &= 27 \\ -45 &-45 \\ -3x &= -18 \\ \frac{-3x}{-3} &= \frac{-18}{-3} \\ x &= 6 \end{aligned}$$

6. $12 = \frac{3}{10}(x + 2)$

$$\begin{aligned} 12 &= \frac{3}{10}(x + 2) \\ 12 &= \frac{3}{10}x + \frac{3}{5} \\ \frac{3}{5} &- \frac{3}{5} \\ 12 - \frac{3}{5} &= \frac{3}{10}x \\ \frac{57}{5} &= \frac{3}{10}x \\ \frac{57}{5} \cdot \frac{10}{3} &= \frac{3}{10}x \cdot \frac{10}{3} \\ 22.8 &= x \end{aligned}$$

8. What Celsius temperature would indicate a fever of 104°F?

$$\begin{aligned} \frac{9}{5}C + 32 &= 104 \\ -32 &-32 \\ \frac{9}{5}C &= 72 \\ \frac{9}{5}C \cdot \frac{5}{9} &= 72 \cdot \frac{5}{9} \\ C &= 40 \end{aligned}$$

9. Air temperature drops about 3°F for each 1000 ft increase in altitude. If the air temperature at sea level is 77°F, at what altitude would you expect the temperature to be 53°F?

6,000 ft

$$\begin{aligned} -3x &= -77 + 53 \\ -3x &= -24 \\ \frac{-3x}{-3} &= \frac{-24}{-3} \\ x &= 8 \end{aligned}$$