Tips for Solving Equations

Solving an equation is a series of steps where you can apply an operation to both sides of an equality until you have a equation that equates a variable with a value. It is the process of taking a equation such as

$$4(x+5) = 48,$$

and from this equation, determining that

$$x = 7.$$

Adding to Both Sides

Example One

$$\begin{aligned} x + 10 &= 15 \\ x + 10 + 5 &= 15 + 5 \\ x + 15 &= 20 \end{aligned}$$

Example Two

$$\begin{aligned} x - 15 &= 7 \\ x - 15 + 15 &= 7 + 15 \\ x &= 22 \end{aligned}$$

Example Three

$$\begin{aligned} 5\left(\frac{x}{2} - 12\right)^2 - 22 &= 13 \\ 5\left(\frac{x}{2} - 12\right)^2 - 22 + 22 &= 13 + 22 \\ 5\left(\frac{x}{2} - 12\right)^2 &= 35 \end{aligned}$$

Example Four

This doesn't work very well.

$$\begin{aligned} 4(x-8) &= 12 \\ 4(x-8) + 8 &= 12 + 8 \end{aligned}$$

Example Five

$$\begin{aligned} 5x + 15 &= -3x + 12 \\ 5x + 15 + 3x &= -3x + 12 + 3x \\ 8x + 15 &= 12 \end{aligned}$$

Example Six (Complex)

$$\begin{aligned}
\frac{x^2-4x-12}{x+2} &= 10 \\
\frac{x^2-4x-12}{x+2} + 4 &= 10 + 4 \\
\frac{x^2-4x-12}{x+2} + \frac{4}{1} &= 14 \\
\frac{x^2-4x-12}{x+2} + \frac{4\times(x+2)}{1\times(x+2)} &= 14 \\
\frac{x^2-4x-12}{x+2} + \frac{4(x+2)}{x+2} &= 14 \\
\frac{x^2-4x-12}{x+2} + \frac{4x+8}{x+2} &= 14 \\
\frac{x^2-4x-12+4x+8}{x+2} &= 14 \\
\frac{x^2-4}{x+2} &= 14
\end{aligned}$$

Subtracting from Both Sides

Example One

$$\begin{aligned}
3x + 17 &= 32 \\
3x + 17 - 17 &= 32 - 17 \\
3x &= 15
\end{aligned}$$