

Section 3.3 Solving Multi-step Equations

We can extend our undoing method to include more steps. We have to undo things in the reverse order of operations.

Example: $2x + 5 = 13$

What is being done to the variable?

1. x is multiplied by 2
2. 5 is being added

To undo it we need to do the opposite operations in reverse order

1. subtract 5
2. divide by 2

$$\begin{array}{r} 2x + 5 = 13 \\ -5 \quad -5 \quad \text{Subtract 5 from both sides} \\ \hline 2x = 8 \\ \frac{2x}{2} = \frac{8}{2} \quad \text{Divide both sides by 2} \\ x = 4 \end{array}$$

Sometimes we need to simplify one or both sides of an equation before we “undo”.

Example: $2(x + 4) - 5 = 17$

$$\begin{array}{r} 2(x + 4) - 5 = 17 \\ 2x + 8 - 5 = 17 \quad \text{Distribute} \\ 2x + 3 = 17 \quad \text{Combine like terms} \\ 2x + 3 - 3 = 17 - 3 \quad \text{Subtract 3 from both sides} \\ 2x = 14 \quad \text{Combine like terms} \\ 2x / 2 = 14 / 2 \quad \text{Divide both sides by 2} \\ x = 7 \end{array}$$