


## Chapter 6 (Lesson 4) Solving 2-step Equations

$$2x - 6 = -8$$

$$\frac{x}{3} - 8 = -12$$

The solution to an equation is the value for the variable that makes the sentence true. 

To solve the equations in this section, follow these steps:

- \*Check each side of the equation to be sure it is simplified (no like terms and no parentheses)

To solve the equation  $6x - 8x + 4 = -10$ , combine like terms on the left side first  $-2x + 4 = -10$

- \*When there are two operations on one side of the equation, we always undo the addition or subtraction first.

$$-2x + 4 = -10$$

$$\begin{array}{r} -4 \quad -4 \\ -2x = -14 \end{array}$$

$$-2x = -14$$

$$\frac{-2x}{-2} = \frac{-14}{-2}$$

$$x = 7$$

- \*This results in a one step equation which we solve by dividing both sides by  $-2$

Solve:  $4x - 2 = 10$

$$\begin{array}{r} (4x) - 2 = 10 \\ +2 \quad +2 \end{array}$$

$$(4x) = 12$$

$$4x = 12$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$1x = 3$$

$$(x = 3)$$

### Bubble Method

- \*Put a "bubble" around the variable and the number connected to it
- \* Undo the addition or subtraction with the inverse operation to make zero
- \* Draw line, copy bubble term, equal sign, and do the arithmetic on other side
- \* "Pop" the bubble and solve the resulting 1-step equation

Work if you do not use "bubble" method:

$$4x - 2 = 10$$

$$\begin{array}{r} 4x - 2 = 10 \\ +2 \quad +2 \end{array}$$

$$4x = 12$$

$$\frac{4x}{4} = \frac{12}{4}$$

$$(x = 3)$$

Check for either method:

\*Write down original equation.

\*Substitute your solution for the variable.

\*Do the arithmetic to prove left side = right side

$$4x - 2 = 10$$

$$\begin{array}{r} 4 \cdot 3 - 2 \\ 12 - 2 \\ 10 \end{array}$$

OR

$$\begin{array}{r} 4x - 2 = 10 \\ 4 \cdot 3 - 2 = 10 \\ 12 - 2 = 10 \\ 10 = 10 \checkmark \end{array}$$

Example 1:

Solve:  $\frac{y}{3} + 5 = -12$

$$\begin{array}{r} (\frac{y}{3}) + 5 = -12 \\ -5 \quad -5 \end{array}$$

$$(\frac{y}{3}) = -17$$

$$(\frac{y}{3}) = -17$$

$$(3) \frac{y}{3} = -17 (3)$$

$$(y = -51)$$

Check:

$$\begin{array}{r} \frac{y}{3} + 5 = -12 \\ \frac{-51}{3} + 5 \\ -17 + 5 \\ -12 \end{array}$$

$$\begin{array}{r} 17 \\ 3 \overline{) 51} \\ \underline{3} \phantom{0} \\ 21 \\ \underline{21} \\ 0 \end{array}$$

Example 2:

Solve:  $-b + 5 = -16$

$$\begin{array}{r} \downarrow \\ (-1b) + 5 = -16 \\ -5 = -5 \\ \hline (-1b) = -21 \\ \frac{-1b}{-1} = \frac{-21}{-1} \end{array}$$

$b = 21$

Check:

$$\begin{array}{r} -b + 5 = -16 \\ \hline -(21) + 5 \\ -21 + 5 \\ -16 \end{array} \quad \begin{array}{l} \downarrow \\ -16 \checkmark \end{array}$$

Example 3:

Solve:  $41 = 5 - 6h$

$$\begin{array}{r} 41 = 5 + (-6h) \\ -5 \quad -5 \\ \hline 36 = (-6h) \\ \frac{36}{-6} = \frac{-6h}{-6} \end{array}$$

$-6 = h$

Check:

$$\begin{array}{r} 41 = 5 - 6h \\ \hline \downarrow \quad 5 - 6(-6) \\ \quad 5 + -6 \cdot -6 \\ \quad 5 + 36 \\ 41 \quad 41 \checkmark \end{array}$$

Example 4:

Solve:  $6x - 7 = -43$

$$\begin{array}{r} (6x) - 7 = -43 \\ +7 \quad +7 \\ \hline (6x) = -36 \\ \frac{6x}{6} = \frac{-36}{6} \end{array}$$

$x = -6$

Check:

$$\begin{array}{r} 6x - 7 = -43 \\ \hline 6(-6) - 7 \\ -36 - 7 \\ -36 + -7 \\ -43 \end{array} \quad \begin{array}{l} \downarrow \\ -43 \checkmark \end{array}$$

Example 5:

Solve:  $\frac{y}{4} + 6 = 3$

$$\begin{array}{r} (\frac{y}{4}) + 6 = 3 \\ (-4) \quad -4 \\ \hline (\frac{y}{4}) = -3 \\ (-4) \frac{y}{4} = -3(-4) \\ \frac{y}{1} = -3(-4) \end{array}$$

$3 - 6$   
 $3 + -6$

$y = 12$

Check:

$$\begin{array}{r} \frac{y}{4} + 6 = 3 \\ \hline \frac{12}{4} + 6 \\ -3 + 6 \\ 3 \end{array} \quad \begin{array}{l} \downarrow \\ 3 \checkmark \end{array}$$