



# Solutions to Linear Equations in One Variable

The \_\_\_\_\_ of an equation is the value(s) of the variable(s) that make the equation a **true statement**.

- Equations in **one variable** can have \_\_\_\_\_ solution, \_\_\_\_\_ solutions or \_\_\_\_\_ solution.

	<b>One Solution</b>	<b>Infinite Solutions</b>	<b>No Solution</b>
<b>Reasoning:</b> <i>What the type of solution means.</i>	Only _____ value will make the equation <b>true</b> .  ★ _____	_____ value will make the equation <b>true</b> .  ★ _____	_____ values will make the equation <b>true</b> .  ★ _____
<b>True Solution?</b> <i>Always, Sometimes, Never</i>	_____ A <i>conditional equation</i> is true for <b>some</b> values of $x$ . _____ _____	_____ An <i>identity</i> is <b>always</b> true, for any value of $x$ . _____ _____	_____ A <i>contradiction</i> is <b>never</b> true for any value of $x$ . _____ _____
<b>Example:</b>	$4x + 6 = 18$  _____ _____  ★ _____ is the only number that makes the equation <b>true</b> .	$5x + 15 = 5x + 15$  _____ _____  ★ _____ for $x$ will make the equation <b>true</b> .	$4x + 8 = 4x + 3$  _____ _____  ★ _____ for $x$ will make the equation true.
<b>Hints:</b> <i>Look at both sides of the equation.</i>	End result still has a _____ and a _____.	Variables cancel each other out and <b>both sides</b> of the equation _____.	Variables cancel each other out and <b>both sides</b> of the equation _____.

# Determining the Type of Solution

	One Solution	Infinite Many Solutions	No Solution
<b>Simplified Equation</b>	$3x - 5 = 7x + 3$	$2 + 4x = 4x + 2$	$8x + 9 = 8x - 5$
<b>Look at the Variable Terms.</b>	The variable terms are _____.	Variable terms are the _____. Both sides _____.	Variable terms are the _____. Both sides _____.

## Example One:

$$2(4x + 5) = 5(2x + 4)$$

\_\_\_\_\_

\_\_\_\_\_ both sides of the equation.

← **Variable terms** are \_\_\_\_\_.

★ Equation can be \_\_\_\_\_.

The equation has \_\_\_\_\_. The solution means \_\_\_\_\_.

\_\_\_\_\_

## Example Two:

$$2(5x + 4) - 11 = 4x + 3(2x - 1)$$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ both sides of the equation.

← **Variable terms** are \_\_\_\_\_.

and both sides are \_\_\_\_\_.

The equation has \_\_\_\_\_. The solution means \_\_\_\_\_.

\_\_\_\_\_

## Example Three:

$$-4x + 3(5x + 6) = 7(2x + 1) - 3x$$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ both sides of the equation.

← **Variable terms** are \_\_\_\_\_.

and both sides are \_\_\_\_\_.

The equation has \_\_\_\_\_. The solution means \_\_\_\_\_.

\_\_\_\_\_

# Solutions to Linear Equations in One Variable

The solution of an equation is the value(s) of the variable(s) that make the equation a **true statement**.

- Equations in **one variable** can have one solution, infinite solutions or no solution.

	One Solution	Infinite Solutions	No Solution
<b>Reasoning:</b> <i>What the type of solution means.</i>	Only <u>one</u> value will make the equation <b>true</b> . ★ <u>One Number</u>	<u>Any</u> value will make the equation <b>true</b> . ★ <u>Any Number</u>	<u>No</u> values will make the equation <b>true</b> . ★ <u>No Number</u>
<b>True Solution?</b> <i>Always, Sometimes, Never</i>	<u>Sometimes</u> A conditional equation is true for <b>some</b> values of $x$ . <u>Only true one time.</u>	<u>Always</u> An identity is <b>always</b> true, for any value of $x$ . <u>True every time</u>	<u>Never</u> A contradiction is <b>never</b> true for any value of $x$ . <u>Not ever true.</u>
<b>Example:</b>	$4x + 6 = 18 - 6$ $\frac{4x}{4} = \frac{12}{4}$ $\boxed{x = 3}$ ★ <u>3</u> is the only number that makes the equation <b>true</b> .	$5x + 15 = 5x + 15$ $15 = 15$ $\text{true}$ ★ <u>Any Number</u> for $x$ will make the equation <b>true</b> .	$4x + 8 = 4x + 3$ $8 \neq 3$ $\text{False}$ ★ <u>No Number</u> for $x$ will make the equation true.
<b>Hints:</b> <i>Look at both sides of the equation.</i>	End result still has a <u>variable</u> and a <u>solution</u> .	Variables cancel each other out and <b>both sides</b> of the equation <u>look equal</u> .	Variables cancel each other out and <b>both sides</b> of the equation <u>do not look equal</u> .

# Determining the Type of Solution

	One Solution	Infinite Many Solutions	No Solution
Simplified Equation	$3x - 5 = 7x + 3$	$2 + 4x = 4x + 2$	$8x + 9 = 8x - 5$
Look at the Variable Terms.	The Variable terms are <u>different</u> .	Variable terms are the <u>same</u> . Both sides <u>are equal</u> .	Variable terms are the <u>same</u> . Both sides <u>are not equal</u> .

## Example One:

$$2(4x + 5) = 5(2x + 4)$$

$$\cancel{8x} + \cancel{10} = \cancel{10x} + 20$$

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

$$x = -5$$

Simplify both sides of the equation.

← Variable terms are different.

★ Equation can be solved. ★

The equation has one solution. The solution means that -5 is the only value for x that will make the equation true.

## Example Two:

$$2(5x + 4) - 11 = 4x + 3(2x - 1)$$

$$\cancel{10x} + \cancel{8} - 11 = 4x + \cancel{6x} - 3$$

$$\cancel{10x} - 3 = \cancel{10x} - 3$$

True

Simplify both sides of the equation.

← Variable terms are the same.

and both sides are equal.

The equation has infinite many solutions. The solution means that any value for x will make the equation true.

## Example Three:

$$-4x + 3(5x + 6) = 7(2x + 1) - 3x$$

$$\cancel{-4x} + \cancel{15x} + 18 = \cancel{14x} + 7 - \cancel{3x}$$

$$\cancel{11x} + 18 \neq \cancel{11x} + 7$$

False

Simplify both sides of the equation.

← Variable terms are the same.

and both sides are not equal.

The equation has no solution. The solution means that no value for x will make the equation true.



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