

Steps to Solve an Equation with One Variable

1. Write original problem.
2. Simplify each side by doing distributive property and/or combining like terms. Each side is simplified when there is at most one variable term and one constant term.
3. If there is a constant term on the left side, insert the opposite of term on each side.
4. Simplify each side.
5. If there is a variable term on the right side, insert the opposite of term on each side.
6. Simplify each side.
7. Divide each side by coefficient and its sign.
8. Simplify each side.

Example with comments: *Solve* $4x + 2x - 4 = 2x + 9 - 1$

#	General Steps	Specific Steps for this Problem	Results of our Steps
1	Write original problem.	$4x + 2x - 4 = 2x + 9 - 1$
2	Simplify each side by doing distributive property and/or combining like terms. Each side is simplified when there is at most one variable term and one constant term.	On left side we can combine the $4x + 2x$. On the right side we combine the $9 - 1$.	$6x - 4 = 2x + 8$
3	If there is a constant term on the left side, insert the opposite of term on each side.	We notice there is a $- 4$ on left side; we will insert its opposite, a $+ 4$ on each side.	$6x - 4 + 4 = 2x + 8 + 4$
4	Simplify each side.	On left side, $- 4 + 4$ will cancel. On right side, $8 + 4$, will add up to 12.	$6x = 2x + 12$
5	If there is a variable term on the right side, insert the opposite of term on each side.	We notice there is a right side; we will insert its opposite, a $- 2x$, on each side.	$6x - 2x = 2x - 2x + 12$
6	Simplify each side.	On left side, $6x - 2x$, will simplify to $4x$. On right side, the $2x - 2x$ will cancel.	$4x = 12$
7	Divide each side by coefficient and its sign.	The coefficient is the number in front of variable and it is 4 in this problem.	$\frac{4x}{4} = \frac{12}{4}$
8	Simplify each side.	On left side, the $\frac{4x}{4}$ will be $1x$ or just x . On right side, $\frac{12}{4}$ means $12 \div 4$ which is 3.	$x = 3$

On the next page is the example without all of the comments.

Solve $4x + 2x - 4 = 2x + 9 - 1$

$$4x + 2x - 4 = 2x + 9 - 1$$

$$6x - 4 = 2x + 8$$

$$6x - 4 + 4 = 2x + 8 + 4$$

$$6x = 2x + 12$$

$$6x - 2x = 2x - 2x + 12$$

$$4x = 12$$

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

$$x = 3$$

Steps to Check an Equation for the Correct Solution

1. Write the following:

Check for =

Put your original equation here.

Put the name of your variable here.

Put the value of your variable here.

2. Substitute all locations of the variable with a () and the number we are checking. Change the = to a $\stackrel{?}{=}$.
3. Simplify each side using order of operations.
4. Once there is just one number on each side, and they are equal, replace the ? over the equal sign with a check mark.
5. Write, **Solution:** { }. Note: in the { } put the value of the variable.

Example with comments:

#	Steps	Example	Comments
1	Write the following	Check $4x + 2x - 4 = 2x + 9 - 1$ for $x = 3$...
2	Substitute all locations of x , with () and the number we are checking. Change = to $\stackrel{?}{=}$.	$4(3) + 2(3) - 4 \stackrel{?}{=} 2(3) + 9 - 1$	We put in (3) for each x .
3	Simplify each side using order of operations.	$12 + 6 - 4 \stackrel{?}{=} 6 + 9 - 1$	Order of operations requires that we first do each multiplication. On left side multiply the $4(3)$ and $2(3)$. On right side multiply $2(3)$.
3..	... we continue to simplify each side ...	$18 - 4 \stackrel{?}{=} 15 - 1$	On left side combine the $12 + 6$ and on right side combine the $6 + 9$.
4.	Once there is just one number on each side, and they are equal, replace the ? over the equal sign with a check mark.	$14 \checkmark = 14$	On left side combine the $18 - 4$ and on right side combine the $15 - 1$. Both sides have the same number
5.	Write, Solution: { }.	Solution: {3}	The value we were checking was, 3, and it is now in a { }.

Example without all of the comments.

Check $4x + 2x - 4 = 2x + 9 - 1$ **for** $x = 3$

$$4(3) + 2(3) - 4 \stackrel{?}{=} 2(3) + 9 - 1$$

$$12 + 6 - 4 \stackrel{?}{=} 6 + 9 - 1$$

$$18 - 4 \stackrel{?}{=} 15 - 1$$

$$14 \stackrel{\checkmark}{=} 14$$

Solution: {3}