

Solving Equations Student Notes

Think back to the activities where you solved equations using concrete models by isolating the model for the variable. You had to keep both sides of the equation balanced: if you did something to one side of the equation, then you had to do the same thing to the other side of the equation. Now we will solve equations without concrete models.

Isolate the variable:

1. Add or subtract so the variable is isolated.
2. Multiply or divide to get "x" as the variable.



$$2x + 7 = 19$$

(Subtract 7 to isolate the variable.)

$$2x + 7 - 7 = 19 - 7$$

(Subtract 7 from the other side of the = sign to keep the equation balanced.)

$$2x = 12$$

$$\frac{2x}{2} = \frac{12}{2}$$

$$x = 6$$

Since we are multiplying the variable by 2, then we divide by 2 to get "x" as the variable. Do the inverse operation to get x and remember to balance the equation by doing the same thing to both sides of the = sign.

Check your solution to see if it meets the conditions of the equation.

$$2x + 7 = 19$$

$$2(\underline{6}) + 7 = 19$$

$$12 + 7 = 19$$

$$19 = 19$$

- ✓ The conditions of the equation are met because the equation remains balanced so the solution is reasonable.



Example 1
 $2x - 3 = -7$

Example 2
 $4 = 3x - 8$

Example 3
 $-4.2 = 2x + 1$

Try these examples on your own. Remember to check your solution.

Check:

Check:

Check:

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Remember!
"=" is a symbol of an equality relationship between the left and right side of an equation.

Solving an equation is performing the same operation to both sides of an equation to keep the equation in balance.

Isolate the variable:
1. Add or subtract so the variable is isolated.
2. Multiply or divide to get "x" as the variable.



$$\begin{aligned} \frac{x}{3} - 2 &= 10 && \text{(Add 2 to isolate the variable.)} \\ \frac{x}{3} - 2 + 2 &= 10 + 2 && \text{(Add 2 to the other side of the "=" to keep the equation balanced.)} \\ \frac{x}{3} &= 12 \\ 3\left(\frac{x}{3}\right) &= 3(12) \\ x &= 36 \end{aligned}$$

Since we are dividing the variable by 3, then we multiply by 3 to get "x" as the variable. Do the inverse operation to get x and remember to balance the equation by doing the same thing to both sides of the = sign.

Check your solution to see if it meets the conditions of the equation.

$$\begin{aligned} \frac{x}{3} - 2 &= 10 \\ \frac{36}{3} - 2 &= 10 \\ 12 - 2 &= 10 \\ 10 &= 10 \end{aligned}$$

✓ The conditions of the equation are met because the equation remains balanced so the solution is reasonable.



Try these examples on your own. Remember to check your solution.

Example 1

$$\frac{x}{2} - 3 = -1$$

Check:

Example 2

$$4 = \frac{x}{3} - 8$$

Check:

Example 3

$$-4.2 = \frac{x}{4} + 1$$

Check: