

Linear Equations in One Variable

Solve linear equations using properties of equality and by combining like terms.

Aug 26-3:59 PM

Don't Call Me After Midnight

- Distribute
- Combine Like Terms
- Move variable to one side
- Add/Subtract
- Multiply/Divide

$$5(x + 3) + 2(1 + x) = 14 + 6x$$

➤ D $5x + 15 + 2 + 2x = 14 + 6x$

➤ C $3x + 17 = 14 + 6x$

➤ M $\frac{-3x}{-3x}$

➤ A $\frac{17 = 14 + 3x}{-14 \quad -14}$

➤ M $\frac{3 = 3x}{3 \quad 3}$

$x = 1$

Aug 28-3:05 PM

Properties again.....

How do we solve the following equations?

$$\begin{array}{r} x + 13 = 8 \\ -13 \quad -13 \\ \hline x = -5 \end{array}$$

$$\begin{array}{r} m - 6 = 14 \\ +6 \quad +6 \\ \hline m = 20 \end{array}$$

What properties let us do this?

Subtraction Property of Equality:

If the same number is subtracted from both sides of an equation, the result is still equal.

Addition Property of Equality:

If the same number is added to both sides of an equation, the result is still equal.

Aug 26-4:04 PM

How do we solve these?

$$\begin{array}{r} 4r = -12 \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline r = -3 \end{array}$$

$$\begin{array}{r} \frac{5}{1} \cdot \frac{n}{5} = 13 \cdot \frac{5}{1} \\ \hline n = 65 \end{array}$$

Why can we do this?

Division Property of Equality:

If both sides of an equation are divided by the same number the resulting equation is equivalent.

Multiplication Property of Equality:

If both sides of an equation are multiplied by the same number the resulting equation is equivalent.

Aug 26-4:09 PM

We can use all of the properties of equality to solve equations that are a little more complex.

$$4x + 5 = 21$$

$$\begin{array}{r} -5 \quad -5 \\ 4x = 16 \\ \hline 4 \quad 4 \\ x = 4 \end{array}$$

$$\frac{q}{7} - 9 = 7$$

$$\begin{array}{r} +9 \quad +9 \\ \hline \frac{q}{7} = 16 \end{array}$$

$$-6 + 3n = 16$$

$$\begin{array}{r} +6 \quad +6 \\ 3n = 22 \\ \hline 3 \quad 3 \\ n = \frac{22}{3} \end{array}$$

ADD/
Subtract

$$7 \cdot \frac{q}{7} = 16 \cdot 7$$

$$q = 112$$

Multiply
Divide

Aug 26-4:13 PM

Many times equations need to be simplified before solving either by combining like terms or distributing:

$$-4y + 8 - 3y = 29$$

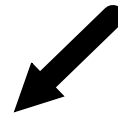
$$\begin{array}{r} -7y + 8 = 29 \\ \quad \quad -8 \quad -8 \\ \hline -7y = 21 \\ \quad \quad -7 \quad -7 \\ y = -3 \end{array}$$

$$-2n + 2 - 3n = 8n + 20 - 7n$$

$$\begin{array}{l} -5n + 2 = 8n + 20 - 7n \\ -5n + 2 = n + 20 \\ +5n \quad +5n \\ 2 = 6n + 20 \\ -20 \quad -20 \\ -18 = 6n \\ \quad \quad \quad \frac{6n}{6} = \frac{-18}{6} \\ n = -3 \end{array}$$

Don't Call Me After Midnight

- **D**istribute
- **C**ombine Like Terms
- **M**ove variable to one side
- **A**dd/Subtract
- **M**ultiply/Divide



$$-8p - 4 + 6p = 5p + 11 - 4p$$

$$\begin{array}{r} -2p - 4 = p + 11 \\ +2p \quad +2p \\ -4 = 3p + 11 \\ \quad \quad -11 \quad -11 \\ -15 = 3p \\ \quad \quad \quad \frac{-15}{3} = \frac{3p}{3} \\ \quad \quad \quad -5 = p \end{array}$$

Aug 26-4:15 PM

Use the Distributive Property to Solve:

$$3(x - 8) = 16$$

$$3x - 24 = 16$$

$$3x = 40$$

$$x = \frac{40}{3}$$

$$4(t - 2) = 6t - 10$$

$$4t - 8 = 6t - 10$$

$$4t + 2 = 6t$$

$$2 = 2t$$

$$\frac{2}{2} = \frac{2t}{2}$$

$$1 = t$$

Don't Call Me After Midnight



- Distribute
- Combine Like Terms
- Move variable to one side
- Add/Subtract
- Multiply/Divide

$$2y - 3(4 + y) = 4(y - 6)$$

$$2y - 12 - 3y = 4y - 24$$

$$-y - 12 = 4y - 24$$

$$12 = 5y$$

$$y = \frac{12}{5}$$