Name_____.

Math 9

(MTH1W)

"People have been doing algebra for hundreds of years, and 'X' is *still* unknown?"

Unit 3:Solving EQUATIONS

- It's time to find 'x'!!! 😂

MTH1W

Math 9 – Unit 3: Solving Equations Name: Mrs. Jacob

Lesson 3.1: Solving Equations Date: Feb 27, 2025

Learning Goal: We are learning to solve one and two-step equations.

In the last unit on Algebra, we learned how to manipulate variables within expressions. We will now look to solve the mystery of what number is hiding behind the variable as we move to equations. An equation is just an expression, but it has an equal sign, thus allowing us to come up with a numerical value for the variable.

A **REALLY** important concept that you will learn is how to **SHOW YOUR STEPS**.

General Idea:

- You're trying to clean up the numbers that are around x to get that x alone.
- The order in which you undo is the opposite of BEDMAS i.e. SAMDEB
- To get rid of a number, do the opposite thing to it on both sides of your equation:
  - If the number is added, subtract it from both sides
  - If the number is subtracted, add it to both sides
  - If the number is multiplied, divide it from both sides
  - If the number is divided, multiply it on both sides

First, we will look at one step equations. In one step equations you need to look at how the number is interacting with the variable. To "move" or eliminate the number away from the variable, you do the INVERSE operation to both sides of the equation. Keep in mind, an equation is like a balance scale. Everything must always be in balance, so if you add 10 to the left, you must add 10 to the right.

a) $x+8=12$

$-8 \quad -8$

$x = 12-8$

$x = 4$

b) $-13=m-7$

$-13+7 = m$

$-6 = m$

c) $-4y=24$

$y = \frac{24}{-4}$

$y = -6$

d) $\frac{p}{3}=10$

$p = (10)(3) = 30$

$p = 30$

e) $x^2 = 81$

$x = \sqrt{81}$

$x = \pm 9$

f) $\sqrt{x} = -7$

$x = (-7)^2$

$x = 49$

In two step equations, two numbers need to be moved away from the variable. The key is to move/eliminate the constant away from the variable side. Collect your variables on one side and your constants on the other side.

a) $15w+12=42$

$15w = 42-12$

$\frac{15w}{15} = \frac{30}{15}$

$w = 2$

b) $-9-4n=45$

$-4n = 45+9$

$\frac{-4n}{-4} = \frac{54}{-4}$

$n = -13.5$

c) $\frac{k}{3}-4=17$

$\frac{k}{3} = 17+4$

$3\left(\frac{k}{3}\right) = (21)3$

$k = 63$

d) $2.8x-14.4=19.2$

$2.8x = 19.2+14.4$

$\frac{2.8x}{2.8} = \frac{33.6}{2.8}$

$x = 12$

What if you have variables on both sides?!? Again, collect variable on one side, constant on other side.

e) $5x=4x+7$

$5x-4x = 7$

$x = 7$

f) $2w=0.35-5w$

$2w+5w = 0.35$

$\frac{7w}{7} = \frac{0.35}{7}$

$w = 0.05$

g) $2m+3m=8m-3$

$2m+3m-8m = -3$

$\frac{-3m}{-3} = \frac{-3}{-3}$

$m = 1$

h) $8k-3=4k+17$

$8k-4k = 17+3$

$\frac{4k}{4} = \frac{20}{4}$

$k = 5$

i) $16+3x-9=-3+8x+10$

$16-9+3-10 = 8x-3x$

$\frac{0}{5} = \frac{5x}{5}$

$0 = x$

j) $-29k-18+11=-36k-10k-177$

$-29k+36k+10k = -177+18-11$

$\frac{17k}{17} = \frac{-170}{17}$

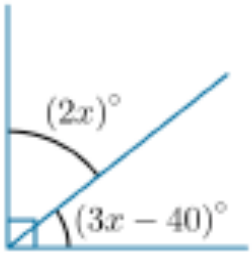
$k = -10$

Success Criteria:

- I can solve equations using inverse operations
- I can check my answer by substituting my answer into the original equation
- I can solve equations by grouping variables on one side of the equation, and constants on the other side of the equation

Build your Skills: :)

1. For each diagram, write an equation that can be used to determine the value of x and then use your equation to find the value of x.

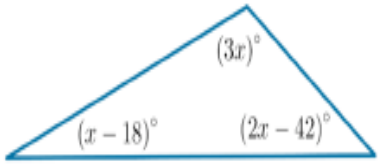


$2x + 3x - 40 = 90$

$\Rightarrow 5x = 90 + 40$

$\Rightarrow 5x = 130$

$\Rightarrow x = \frac{130}{5} = 26^\circ$



$3x + x - 18 + 2x - 42 = 180^\circ$

$\Rightarrow 3x + x + 2x = 180 + 18 + 42$

$\Rightarrow 5x = 240$

$\Rightarrow x = \frac{240}{5} = 48^\circ$

2. At a local pizzeria, a large pizza costs $12 plus $1.50 per topping.
   a) Write an equation to model the number of toppings that can be added to a large pizza if the customer has $21 to spend.
   b) Solve your equation to determine the number of toppings that can be added to a large pizza if a total of $21 will be spent.

Let the number of toppings be x

$\therefore$ Total cost for toppings = $\$1.50x$

a) customer has $21 to spend and fixed pizza cost = $12

$\therefore$ EQUATION :- $12 + 1.50x = 21$

b) $12 + 1.50x = 21$

$1.50x = 21 - 12$

$1.50x = 9$

$x = \frac{9}{1.50} = 6$

$\therefore$ 6 toppings can be added.