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Verify a Solution of an Equation notes

Verifying Solutions

Solving an equation is like discovering the answer to a puzzle. The purpose in solving an equation is to find the value or values of the variable that make each side of the equation the same (equal). Any value of the variable that makes the equation true is called a solution to the equation. It's the answer to the puzzle.

How to Determine Whether a Number is a Solution to an Equation	
Step 1	Substitute the number in for the variable in the equation.
Step 2	Simplify the expressions on both sides of the equation.
Step 3	Determine whether the resulting equation is true. If it is true, the number is a solution. If it is not true, the number is not a solution.

Example

Determine whether $x = 3/2$ is a solution of $4x - 2 = 2x + 1$.

your turn

Is $y = \frac{4}{3}$ a solution of $9y + 2 = 6y + 3$?

Is $y = \frac{7}{5}$ a solution of $5y + 3 = 10y - 4$?

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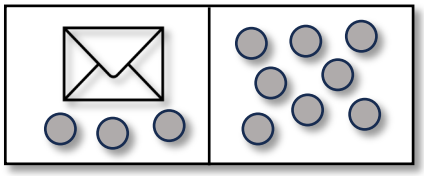
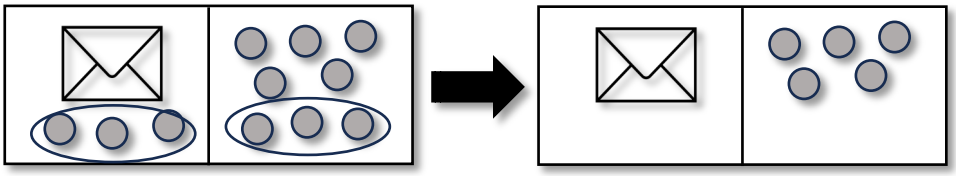
Solve Equations Using Addition & Subtraction notes

Solve Equations Using Subtraction

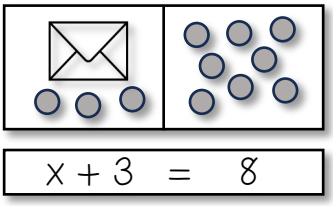
We can use a model to show the process of solving an equation. We can use an envelope to represent the variable in an equation since its contents are unknown, and each counter (circle) represents one.
Here we have an envelope and some counters on a workspace. Both sides have the same number of counters, but some are "hidden" in the envelope.



What are you thinking? What steps are you taking in your head to find how many hidden counters are in the envelope?
You might think to remove three counters from both sides to clearly see how many are in the envelope. Taking away those three counters you can easily tell there are five counters in the envelope.



What algebraic equation would match this situation? We can say that each side of the workspace is an expression, and the line down the middle is an equal sign. Since the envelope represents the variable, we can call it "x."



This model gives us an idea of what we need to do to solve one kind of equation. The goal is to isolate the variable (get it by itself) on one side of the equation. For equations like these we need to use the **Subtraction Property of Equality**:

If $a = b$, then
$a - c = b - c$

You can always check your solutions by substituting the value you found into your equation.

Example: $y + 35 = -41$

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Solve Equations Using Addition

What happens when an equation has a number subtracted from the variable, as in the equation x - 5 = 8? We just use another property! We want to isolate the variable, so to "undo" the subtraction we do the opposite of subtraction, addition, by using the **Addition Property of Equality:**

If $a = b$, then
$a + c = b + c$

Example

$a - 29 = -37$	$x - \frac{5}{8} = \frac{2}{4}$
$c - 0.63 = -4.5$	$9x - 5 - 8x - 6 = 9$
Your Turn!	
$n - 61 = -75$	$p - 42 = -73$
$h - \frac{2}{3} = \frac{5}{6}$	$q - \frac{1}{2} = \frac{5}{6}$
$w - 0.48 = -2.2$	$k - 0.94 = -4.7$
$8y - 4 - 7y = 5$	$6z + 5 - 5z - 4 = 3$

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Solve Equations Using Addition & Subtraction Practice

Example

$5(n - 4) - 4n = -9$	$3(2x - 1) - 5x = 2(x + 1) - 2(x + 3)$

your turn

$5(g - 3) - 4g = -10$	$4(x + 2) - 3x = -8$
$4(2h - 3) - 7h = 6(h - 2) - 6(h - 1)$	$2(5x + 2) - 9x = 3(x - 2) - 3(x- 4)$

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Translate to an Equation and Solve notes

Translating Equations

To solve problems algebraically, we begin by translating English sentences into equations. The first step is to for the word or words that would translate to the equal sign. Here are some of the most common words used to represent the equal sign.

Equal Sign =
Is
Is equal to
Is the same as
The result is
Gives
Was
Will be

To translate an English sentence into an equation we:

1. Locate the "equals" words.
2. Translate the words to the left of the "equals" words into an algebraic expression.
3. Translate the words to the right of the "equals" words into an algebraic expression.

Example

Translate and solve:	
Eleven more than x is equal to 54	
The difference of 12x and 11x is -14	
Your Turn!	
Ten more than y is equal to 42	Twelve less than w is equal to 51
The difference of 5x and 4x is 15	The difference of 8z and 7z is -9

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Translate and Solve Applications notes

Translate and Solve Applications

Questions requiring an algebraic solution often arise from real-life questions. Since questions are asked in English and not algebraic notation, its important to be able to translate between the two.

You can start by restating the problem in one sentence, assign a variable, and then translate the sentence into an equation to solve. When assigning a variable, its helpful to choose a letter that reminds you of what you are looking for. For example, you might use "m" for miles or "c" for cost!

Example

The Maxey family recycled newspapers for three months. The three months of newspapers weighed a total of 69 pounds. The second and third months weighed 29 pounds total. How much did the newspapers weigh the first month?

Roland paid $28,986 for his new car. This was $876 less than the sticker price. What was the sticker price of the car?

Your Turn!

The Porter family has two cats, Zoe and Allice. Together they weigh 25 pounds. Zoe weighs 15 pounds. How much does Alice weigh?

Sam and Hank are roommates. Together they have 79 books. Sam has 37 books. How many books does Hank have?

The admission price for the movies during the day is $7.35. This is $3.25 less than the price at night. How much does the movie cost at night?

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Unit 2.1 Solve Equations With Addition & Subtraction *Practice*

Determine whether the given value is a solution to the equation.	
1. $6y + 10 = 12y$ when $y = 5/3$	2. $8z - 1 = 6z$ when $z = -1/2$
Solve each equation.	
3. $x + 25 = 36$	4. $y + 45 = -65$
5. $b + \frac{1}{4} = \frac{3}{4}$	6. $p + 2.3 = -9.4$
7. $m - 18 = -200$	8. $x - 1/3 = 3$
9. $z - 3.8 = 11$	10. $x + 0.52 = -8.7$
11. $c + 31 - 10 = 45$	12. $m + 17 - 28 = 6$
13. $-6x - 14 + 7x - 6 = -16$	14. $5(z - 6) - 4z = -8$

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Unit 2.1 Solve Equations With Addition & Subtraction *Practice*

Solve the equations.

15. $8(x + 1.5) - 7x = 5.4$

16. $6b - 5(b - 2) + 9 = -13$

17. $6(x - 2) - 5x = 4(x + 5) - 4(x - 1)$

18. $-(k + 2) + 2k - 3 = 5$

19. $8(4y + 5) - 5(6y) - y = 53 - 6(y + 2) + 3(2y + 3)$

Translate to an equation and then solve.

20. Three less than x is -18.

21. The difference of 9x and 8x is 107.

22. The sum of -4y and -5y is -54.

23. Nine more than x is equal to 55.

24. Ava rode her bike a total of 18 miles, from home to the store and then to the park. The distance from Ava's house to the store is 7 miles. What is the distance from the store to the park?

25. Cody's temperature was 0.8 degrees higher this morning than it had been last night. His temperature this morning was 101.3 degrees. What was his temperature last night?