Lesson 2: Truth and Equations

Let's use equations to represent stories and see what it means to solve equations.

2.1: Three Letters

1. The equation $a + b = c$ could be true or false.

    a. If a is 3, b is 4, and c is 5, is the equation true or false?

    b. Find new values of a, b, and c that make the equation true.

    c. Find new values of a, b, and c that make the equation false.

2. The equation $x \cdot y = z$ could be true or false.

    a. If x is 3, y is 4, and z is 12, is the equation true or false?

    b. Find new values of x, y, and z that make the equation true.

    c. Find new values of x, y, and z that make the equation false.

2.2: Storytime

Here are three situations and six equations. Which equation best represents each situation? If you get stuck, consider drawing a diagram.

$x + 5 = 20$ $\quad$ $x = 20 + 5$ $\quad$ $5x = 20$

$x + 20 = 5$ $\quad$ $5 \cdot 20 = x$ $\quad$ $20x = 5$

1. After Elena ran 5 miles on Friday, she had run a total of 20 miles for the week. She ran x miles before Friday.

2. Andre's school has 20 clubs, which is five times as many as his cousin's school. His cousin's school has x clubs.

3. Jada volunteers at the animal shelter. She divided 5 cups of cat food equally to feed 20 cats. Each cat received x cups of food.

2.3: Using Structure to Find Solutions

Here are some equations that contain a **variable** and a list of values. Think about what each equation means and find a **solution** in the list of values. If you get stuck, consider drawing a diagram. Be prepared to explain why your solution is correct.

1. $1000 - a = 400$

2. $12.6 = b + 4.1$

3. $8c = 8$

4. $\frac{2}{3} \cdot d = \frac{10}{9}$

5. $10e = 1$

6. $10 = 0.5f$

7. $0.99 = 1 - g$

8. $h + \frac{3}{7} = 1$

List:	$\frac{1}{8}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{3}{5}$	$\frac{5}{3}$	$\frac{7}{3}$	0.01	0.1	0.5
	1	2	8.5	9.5	16.7	20	400	600	1400

Are you ready for more?

One solution to the equation $a + b + c = 10$ is $a = 2$, $b = 5$, $c = 3$.

How many different whole-number solutions are there to the equation $a + b + c = 10$? Explain or show your reasoning.

Lesson 2 Summary

An equation can be true or false. An example of a true equation is $7 + 1 = 4 \cdot 2$. An example of a false equation is $7 + 1 = 9$.

An equation can have a letter in it, for example, $u + 1 = 8$. This equation is false if u is 3, because $3 + 1$ does not equal 8. This equation is true if u is 7, because $7 + 1 = 8$.

A letter in an equation is called a **variable**. In $u + 1 = 8$, the variable is u. A number that can be used in place of the variable that makes the equation true is called a **solution** to the equation. In $u + 1 = 8$, the solution is 7.

When a number is written next to a variable, the number and the variable are being multiplied. For example, $7x = 21$ means the same thing as $7 \cdot x = 21$. A number written next to a variable is called a **coefficient**. If no coefficient is written, the coefficient is 1. For example, in the equation $p + 3 = 5$, the coefficient of p is 1.