## 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.
	1. If $a$ is 3, $b$ is 4, and $c$ is 5, is the equation true or false?
	2. Find new values of $a$, $b$, and $c$ that make the equation true.
	3. Find new values of $a$, $b$, and $c$ that make the equation false.
2. The equation $x⋅y=z$ could be true or false.
	1. If $x$ is 3, $y$ is 4, and $z$ is 12, is the equation true or false?
	2. Find new values of $x$, $y$, and $z$ that make the equation true.
	3. 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.

$x+5=20$

$x+20=5$

$x=20+5$

$5⋅20=x$

$5x=20$

$20x=5$

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. $\frac{2}{3}⋅d=\frac{10}{9}$
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 $7+1=4⋅2$. 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 $7⋅x=21$. 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.



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