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# Unit 6, 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.

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## 2.2: Storytime

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

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.

$x + 5 = 20$ $x = 20 + 5$ $5x = 20$

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

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## 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, draw 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 |

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**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.

## Lesson 2 Glossary Terms

- solution to an equation
- variable
- coefficient

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1. Select **all** the true equations.

   A. $5 + 0 = 0$

   B. $15 \cdot 0 = 0$

   C. $1.4 + 2.7 = 4.1$

   D. $\frac{2}{3} \cdot \frac{5}{9} = \frac{7}{12}$

   E. $4\frac{2}{3} = 5 - \frac{1}{3}$

2. Mai's water bottle had 24 ounces in it. After she drank $x$ ounces of water, there were 10 ounces left. Select **all** the equations that represent this situation.

   A. $24 \div 10 = x$

   B. $24 + 10 = x$

   C. $24 - 10 = x$

   D. $x + 10 = 24$

   E. $10x = 24$

3. Priya has 5 pencils, each $x$ inches in length. When she lines up the pencils end to end, they measure 34.5 inches. Select **all** the equations that represent this situation.

   A. $5 + x = 34.5$

   B. $5x = 34.5$

   C. $34.5 \div 5 = x$

   D. $34.5 - 5 = x$

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E. $x = (34.5) \cdot 5$

4. Match each equation with a solution from the list of values.

A. $2a = 4.6$

B. $b + 2 = 4.6$

C. $c \div 2 = 4.6$

D. $d - 2 = 4.6$

E. $e + \frac{3}{8} = 2$

F. $\frac{1}{8}f = 3$

G. $g \div \frac{8}{5} = 1$

1. $\frac{8}{5}$

2. $1\frac{5}{8}$

3. 2.3

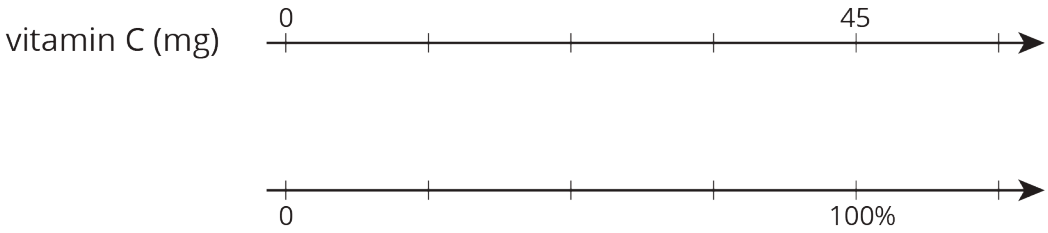
4. 2.6

5. 6.6

6. 9.2

7. 24

5. The daily recommended allowance of vitamin C for a sixth grader is 45 mg. 1 orange has about 75% of the recommended daily allowance of vitamin C. How many milligrams are in 1 orange? If you get stuck, consider using the double number line.




(from Unit 3, Lesson 11)

6. There are 90 kids in the band. 20% of the kids own their own instruments, and the rest rent them.

a. How many kids own their own instruments?

b. How many kids rent instruments?

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c. What percentage of kids rent their instruments?

(from Unit 3, Lesson 12)