Module 5: Solving Linear Equations

Topic 1 Content: More Properties of Equality

Introduction

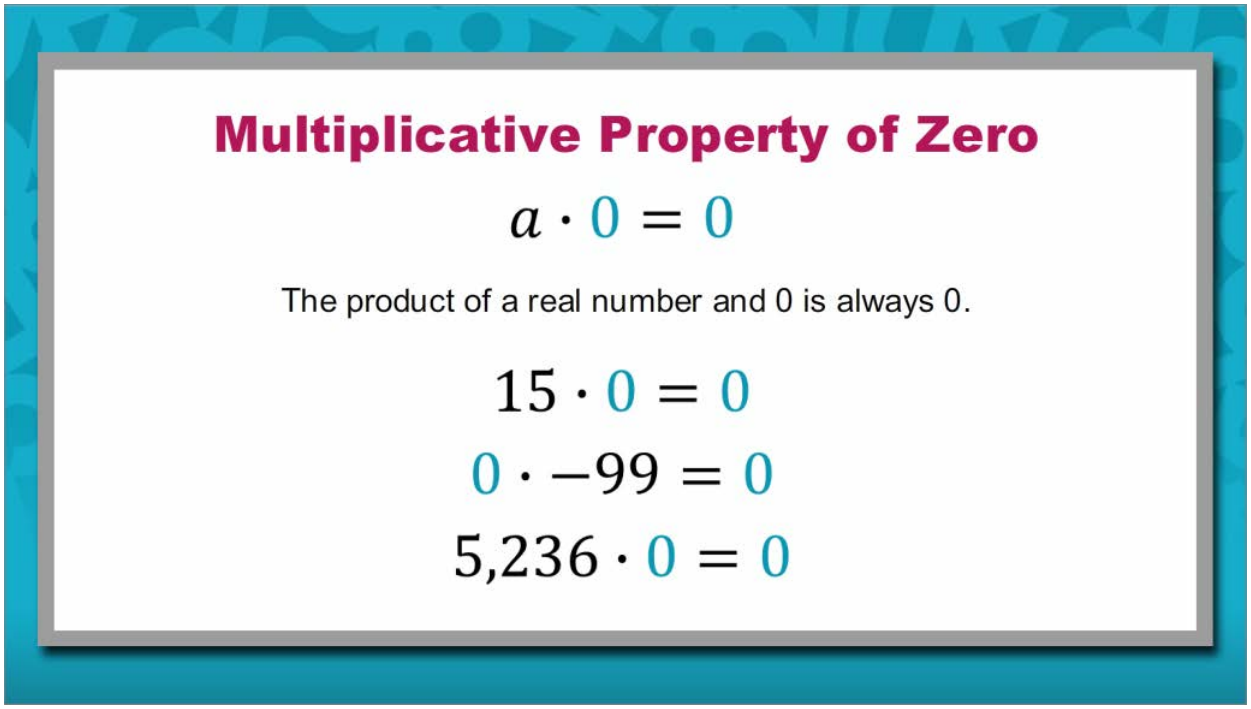
Hi there! I'm so glad you could join me for this lesson in Algebra I, where you will extend your knowledge of the properties of equality.

More Properties of Equality

Click the examples below to learn more.

- Multiplicative Property of Zero
- Zero Product Property
- Reflexive Property
- Symmetric Property
- Transitive Property of Equality
- Self-Check

Multiplicative Property of Zero



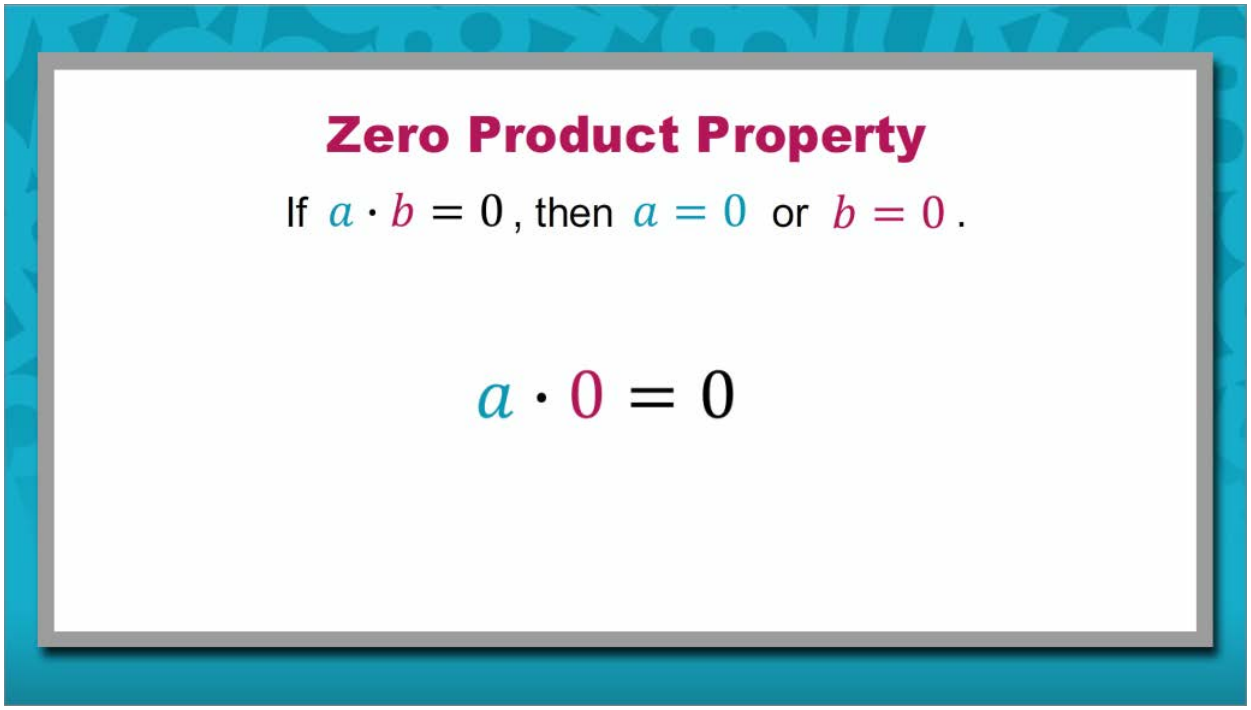
The Multiplicative Property of Zero states that for all real numbers, $a \cdot 0 = 0$. In other words, the product of a real number and 0 is always 0.

Multiplying any real number by 0 always results in a product of 0, regardless of the value of the real number.

$$a \cdot 0 = 0$$

$$15 \cdot 0 = 0$$
$$0 \cdot -99 = 0$$
$$5{,}236 \cdot 0 = 0$$

Zero Product Property



The Zero Product Property states that if the product of two real numbers is 0 then one of the factors is 0.

Recall that the Multiplicative Property of Zero states that the product of a real number and 0 equals 0.

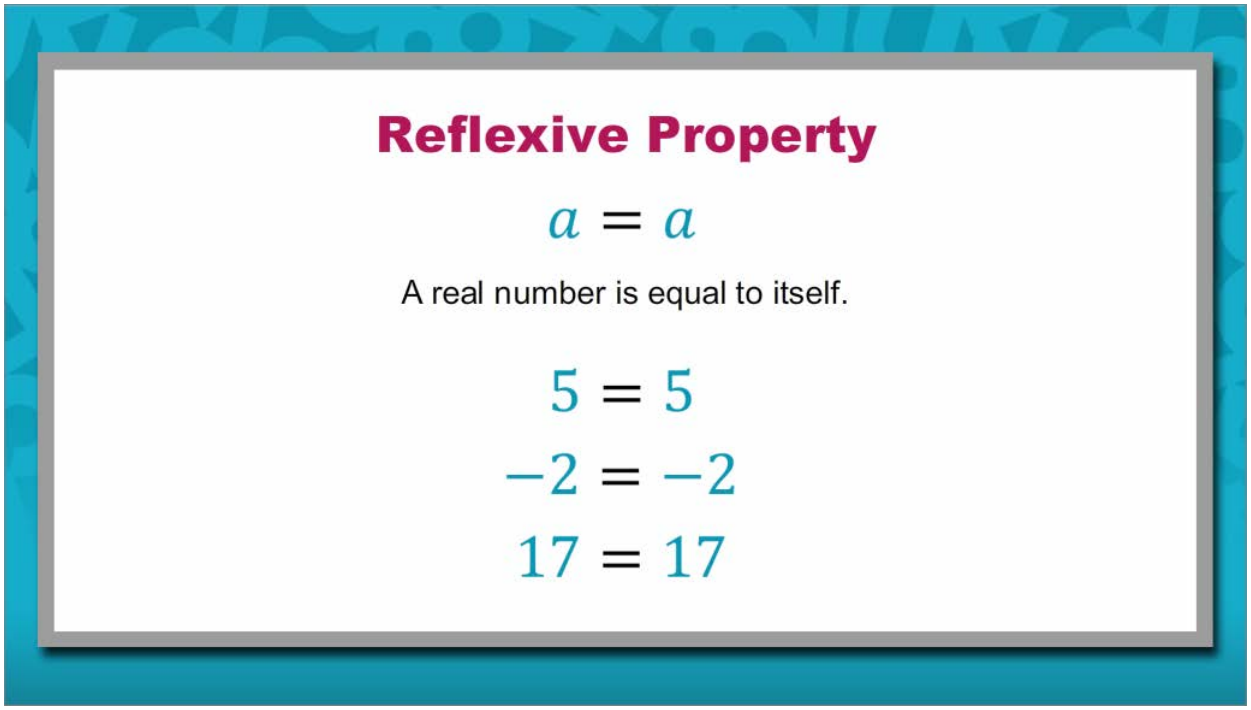
Therefore, if $a \cdot b = 0$ equals 0, then $a = 0$ or $b = 0$.

If $a \cdot b = 0$, then $a = 0$ or $b = 0$.

Multiplicative Property of Zero
$x \cdot 0 = 0$

If $a \cdot b = 0$, then $0 \cdot b = 0$ or $a \cdot 0 = 0$.

Reflexive Property

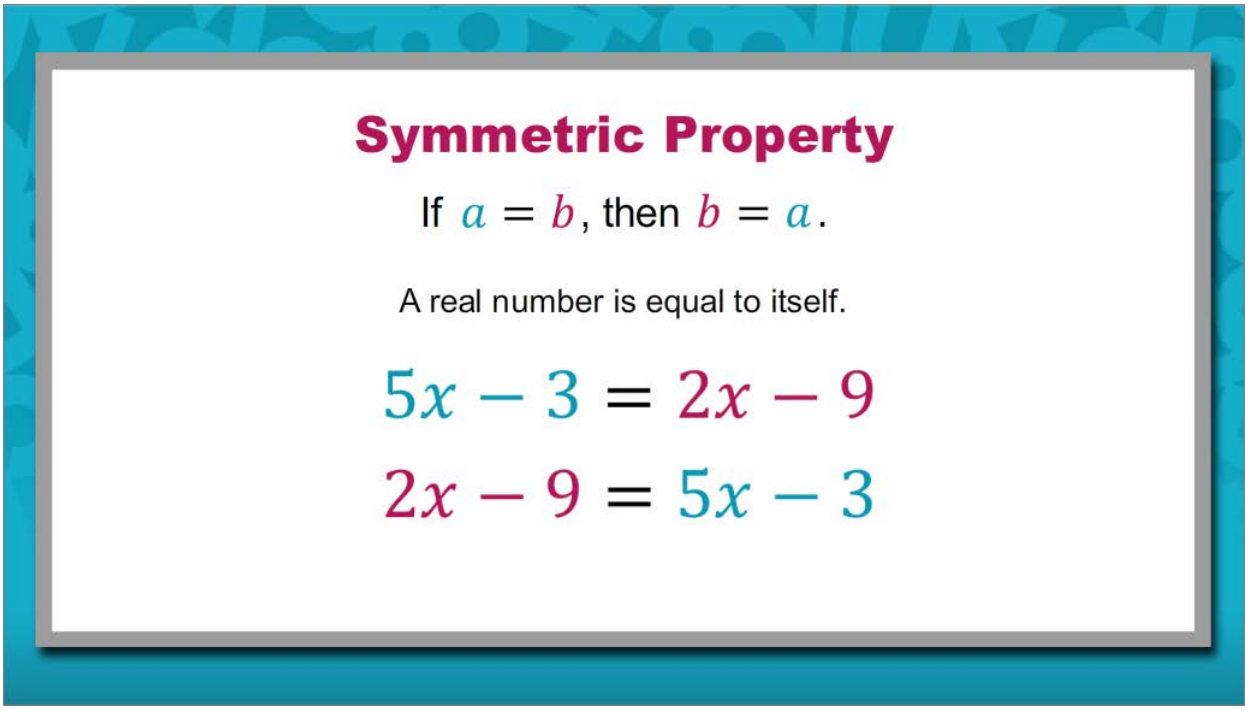


The Reflexive Property may be one of the most straightforward of all the properties of equality. This property states that a real number is equal to itself. For example: $5 = 5$, $-2 = -2$, and $17 = 17$.

You will see the importance of this property as you continue to investigate solutions to linear equations.

$$a = a$$
$$5 = 5$$
$$-2 = -2$$
$$17 = 17$$

Symmetric Property



The Symmetric Property states that if $a = b$, then $b = a$. In other words, the order of equality does not affect an equation.

For example consider the following equation: If $5x - 3 = 2x - 9$, then $2x - 9 = 5x - 3$.

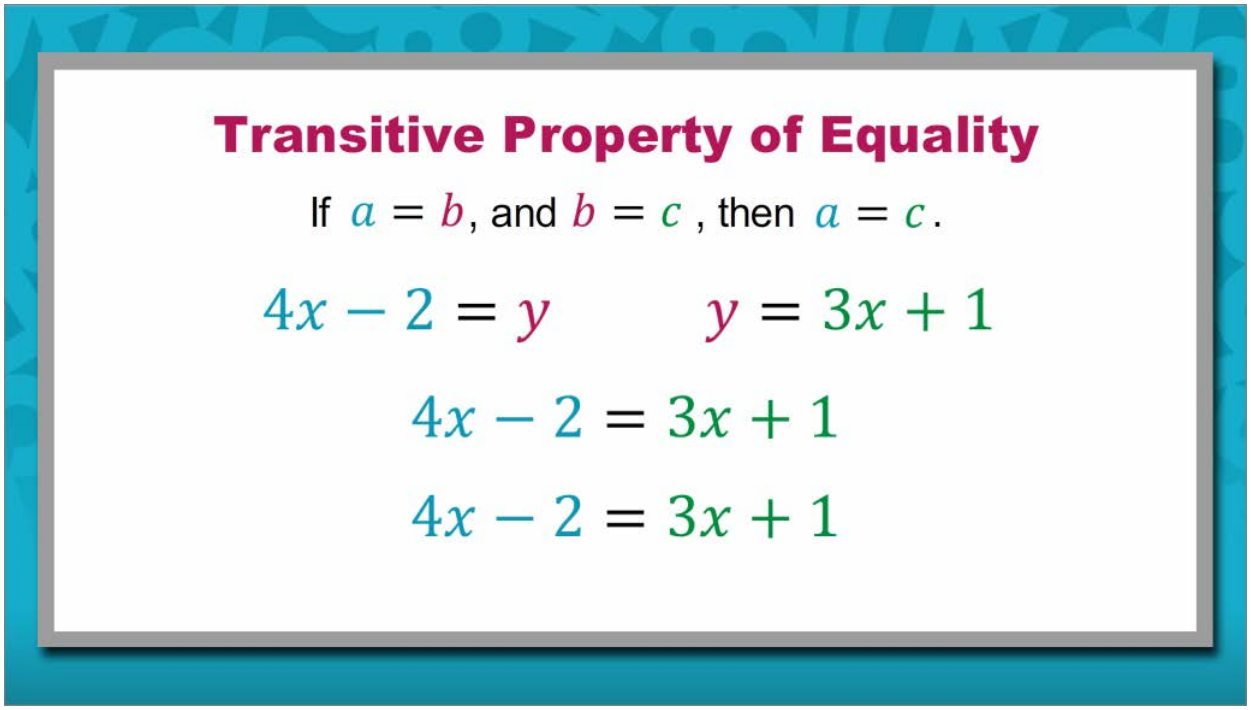
The order of equality does not affect the equation. The first equation will have the same solution as the second equation.

If $a = b$, then $b = a$.

$5x - 3 = 2x - 9$

$2x - 9 = 5x - 3$

Transitive Property of Equality



The Transitive Property of Equality states that if $a = b$, and $b = c$, then $a = c$. Consider the following example:

If $4x - 2 = y$ and $y = 3x + 1$, then $4x - 2 = 3x + 1$.

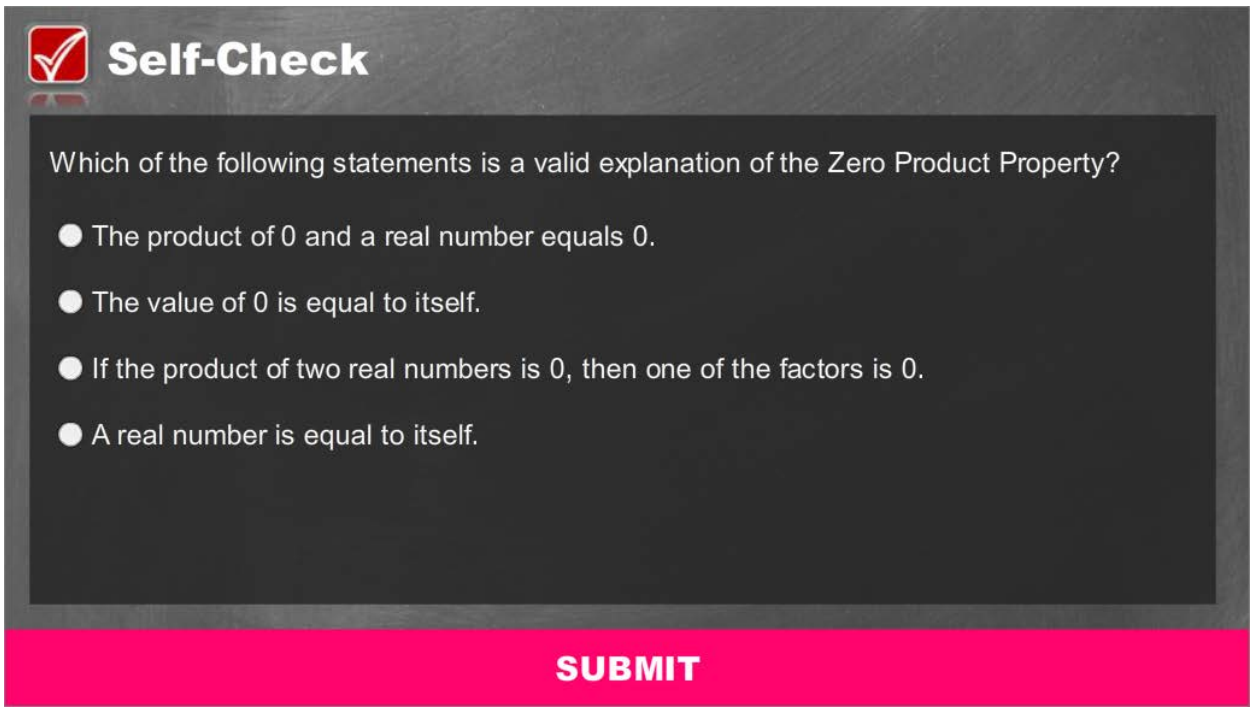
Since you know that $y = 3x + 1$, you can substitute the expression $3x + 1$ in the original equation.

If $a = b$, and $b = c$, then $a = c$.

$4x - 2 = y$ $\qquad$ $y = 3x + 1$

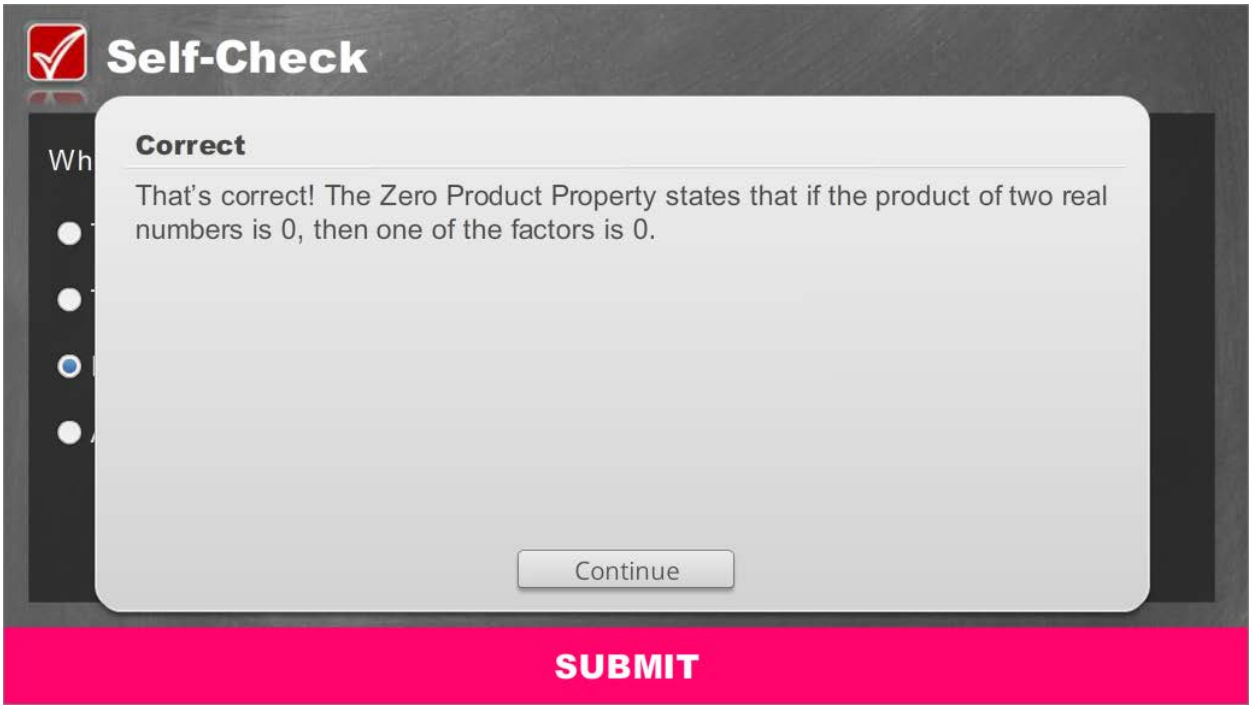
$4x - 2 = 3x + 1$
$4x - 2 = 3x + 1$

Self-Check



Solve the problem in the image above to check your understanding of the content.

Self-Check: Answer



For your reference, the image above shows the correct solution to the self-check problem.

Conclusion

You have reached the conclusion of this lesson where you continued to learn about the properties of equality.