

Module 5: Solving Linear Equations

Topic 1 Content: More Properties of Equality

Introduction



Today's Lesson

- You will extend your knowledge of the properties of equality.

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.

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More Properties of Equality

MORE PROPERTIES OF EQUALITY

Click the Properties Below to Learn More

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

Click the examples below to learn more.

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

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Multiplicative Property of Zero

Multiplicative Property of Zero

$$a \cdot 0 = 0$$

The product of a real number and 0 is always 0.

$$15 \cdot 0 = 0$$

$$0 \cdot -99 = 0$$

$$5,236 \cdot 0 = 0$$

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.

$$a \cdot 0 = 0$$

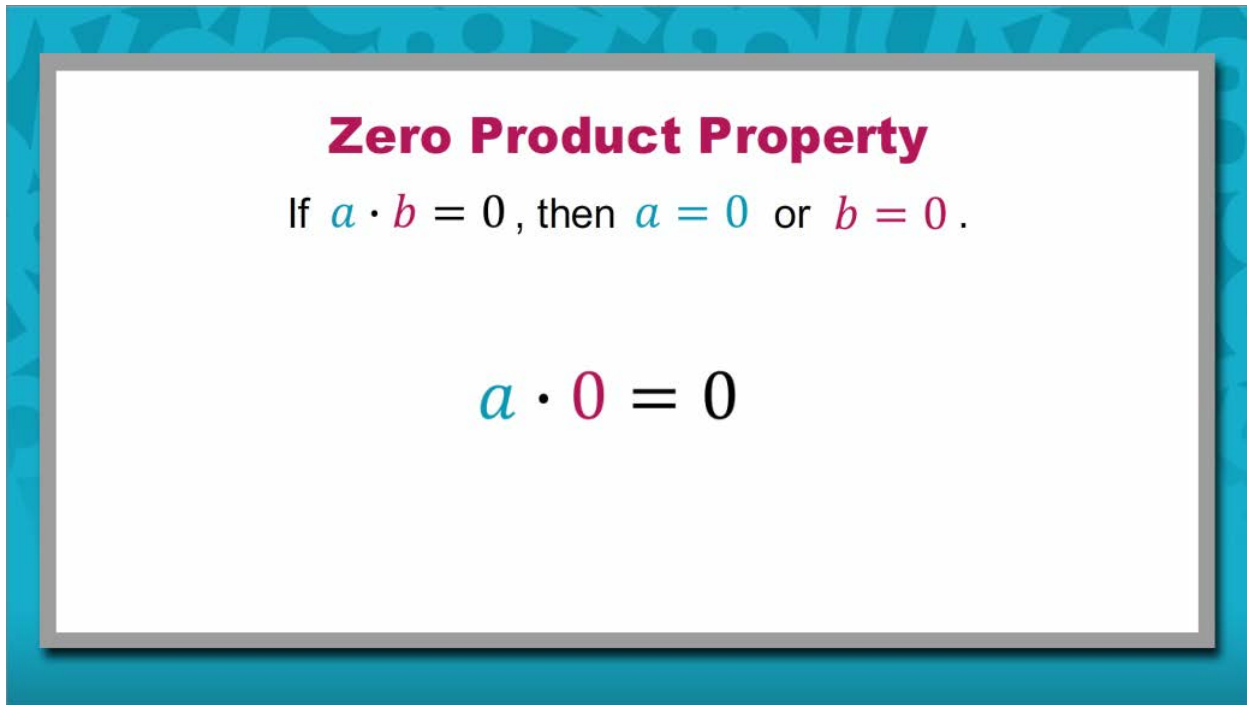
$$15 \cdot 0 = 0$$

$$0 \cdot -99 = 0$$

$$5,236 \cdot 0 = 0$$

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Zero Product Property



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

$$a \cdot 0 = 0$$

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 $a \cdot 0 = 0$.

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Reflexive Property

Reflexive Property

$$a = a$$

A real number is equal to itself.

$$5 = 5$$

$$-2 = -2$$

$$17 = 17$$

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.

$$a = a$$

$$5 = 5$$

$$-2 = -2$$

$$17 = 17$$

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Symmetric Property

Symmetric Property

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

A real number is equal to itself.

$$5x - 3 = 2x - 9$$

$$2x - 9 = 5x - 3$$

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 $b = a$.

$$5x - 3 = 2x - 9$$

$$2x - 9 = 5x - 3$$

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Transitive Property of Equality

Transitive Property of Equality

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

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

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

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

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 $a = c$.

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


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

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

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Self-Check

**Self-Check**

Which of the following statements is a valid explanation of the Zero Product Property?

- The product of 0 and a real number equals 0.
- The value of 0 is equal to itself.
- If the product of two real numbers is 0, then one of the factors is 0.
- A real number is equal to itself.

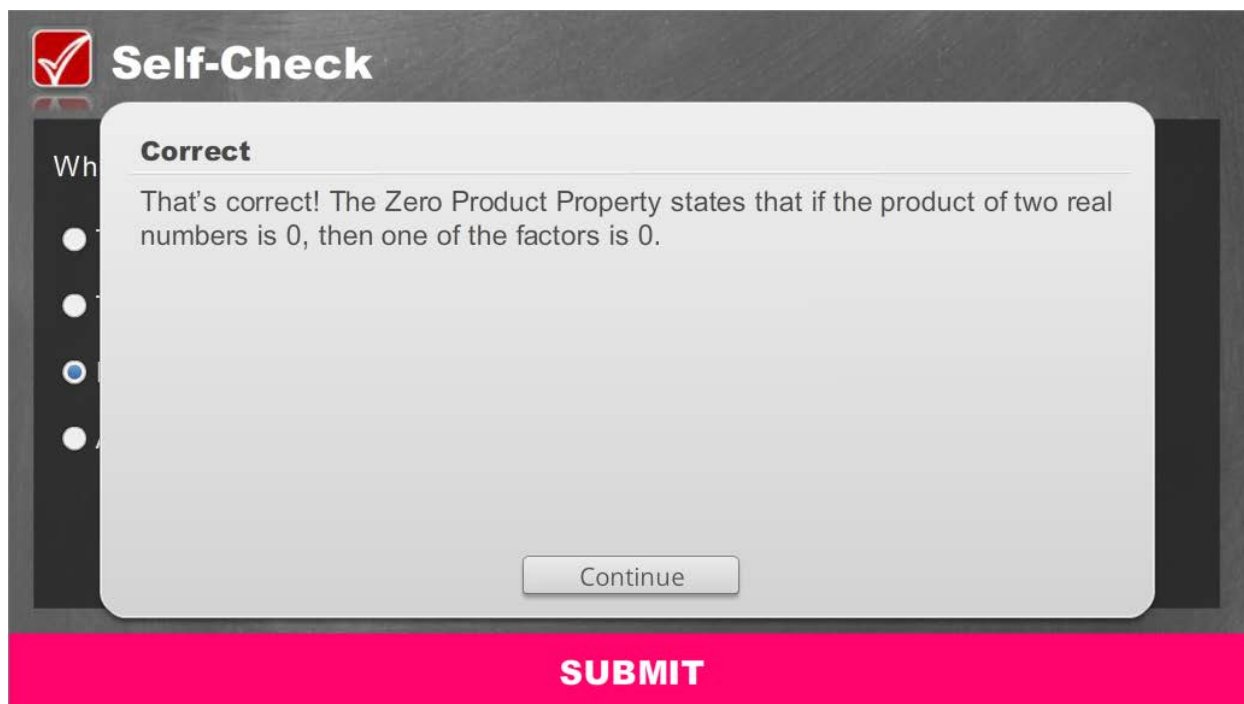
SUBMIT

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

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Self-Check: Answer



The image shows a digital interface for a self-check. At the top left, there is a red checkmark icon and the text "Self-Check". Below this, on the left side, is a vertical list of four circular indicators; the third one from the top is highlighted in blue. The main content area is a light gray rounded rectangle with the word "Correct" in bold at the top. Below it, the text reads: "That's correct! The Zero Product Property states that if the product of two real numbers is 0, then one of the factors is 0." At the bottom of this box is a "Continue" button. Below the entire interface is a bright pink horizontal bar with the word "SUBMIT" in white capital letters.

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

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Conclusion



The image shows a digital interface for a lesson conclusion. On the left, a white box with a pink header titled "Today's Lesson" contains a checklist of five items, each with a checkmark: "Multiplicative Property of Zero", "Zero Product Property", "Reflexive Property", "Symmetric Property", and "Transitive Property of Equality". Below the list are two pink buttons: "Exit Lesson" and "Restart Lesson". To the right of the box is a cartoon illustration of a smiling woman with dark curly hair, wearing a pink long-sleeved top. The background is a blue pattern of mathematical symbols like pi, infinity, and numbers.

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