

Module 5: Solving Linear Equations

Topic 1 Content: Solving Literal Equations

Introduction



Today's Lesson

- You will apply the properties of equality to solve literal equations.

Hello and welcome! I'm so glad you could join me for this lesson in Algebra I, where you will learn how to apply the properties of equality to solve literal equations.

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Solving Literal Equations

SOLVING LITERAL EQUATIONS

Click the Examples Below to Learn More

Example 1

Self-Check

Example 2

Click the examples below to learn more.

- Example One
- Example Two
- Self-Check

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Example 1

EXAMPLE 1

The formula for the surface area (SA) of a triangular prism is $SA = hp + 2B$. Solve for B .

$$\begin{aligned} SA &= hp + 2B \\ -hp \quad -hp \\ \hline SA - hp &= 2B \\ \frac{SA - hp}{2} &= \frac{2B}{2} \\ B &= \frac{SA - hp}{2} \end{aligned}$$

The formula for the surface area (SA) of a triangular prism is $SA = hp + 2B$.

Solve for B .

$$\begin{aligned} SA &= hp + 2B \\ SA &= hp + 2B \\ -hp \quad -hp \\ \hline SA - hp &= 2B \end{aligned}$$

$$\begin{aligned} SA &= hp + 2B \\ -hp \quad -hp \\ SA - hp &= 2B \\ \frac{SA - hp}{2} &= \frac{2B}{2} \\ SA - hp &= B \\ \frac{SA - hp}{2} &= B \end{aligned}$$

$$B = \frac{SA - hp}{2}$$

Because you are asked to solve for B , the goal in this equation is to isolate B .

Begin by applying the Subtraction Property of Equality; subtract hp from each side of the equation. The result is $SA - hp = 2B$. You are now one step closer to isolating B .

Notice that B has a coefficient of 2. The final step to isolating B is to apply the Division Property of Equality; divide both sides of the equation by 2. The result is $\frac{SA - hp}{2} = B$. Or if you prefer, apply the Symmetric Property of Equality to state the result as $B = \frac{SA - hp}{2}$.

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Example 2

EXAMPLE 2

The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for h .

$$A = \frac{1}{2}h(b_1 + b_2)$$

To begin isolating the variable h , apply the Multiplication Property of Equality by...

- multiplying both sides of the equation by 2
- multiplying both sides of the equation by $\frac{1}{2}$
- dividing both sides of the equation by 2

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$$A = \frac{1}{2}h(b_1 + b_2)$$

The goal for this equation is to isolate h .

To begin isolating the variable h , apply the Multiplication Property of Equality by...

- A) multiplying both sides of the equation by 2
- B) multiplying both sides of the equation by $\frac{1}{2}$
- C) dividing both sides of the equation by 2

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Example 2 (continued)

EXAMPLE 2

The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for h .

$$A = \frac{1}{2}h(b_1 + b_2)$$

Begin isolating h by multiplying both sides of the equation by 2.

$$2 \cdot A = \frac{1}{2}h(b_1 + b_2) \cdot 2$$

multiplying both sides of the equation by 2

$$2A = h(b_1 + b_2)$$

Next

The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for h .

$$A = \frac{1}{2}h(b_1 + b_2)$$

Begin isolating h by multiplying both sides of the equation by 2.

$$2 \cdot A = \frac{1}{2}h(b_1 + b_2) \cdot 2$$
$$2A = h(b_1 + b_2)$$

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Example 2 (continued)

EXAMPLE 2

The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for h .

$$2A = h(b_1 + b_2)$$

The last step to isolate h is to apply the Division Property of Equality by...

dividing both sides of the equation by 2

dividing both sides of the equation by $(b_1 + b_2)$

dividing both sides of the equation by $\frac{1}{2}$

The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for h .

$$2A = h(b_1 + b_2)$$

The last step to isolate h is to apply the Division Property of Equality by...

- A) dividing both sides of the equation by 2
- B) dividing both sides of the equation by $(b_1 + b_2)$
- C) dividing both sides of the equation by 2

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Example 2 (continued)

EXAMPLE 2

The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for h .

$$2A = h(b_1 + b_2)$$

$$\frac{2A}{(b_1 + b_2)} = \frac{h(b_1 + b_2)}{(b_1 + b_2)}$$

$$\frac{2A}{(b_1 + b_2)} = h$$

The last step to isolate h is to divide both sides of the equation by the sum $(b_1 + b_2)$.

dividing both sides of the equation by $(b_1 + b_2)$

The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for h .

$$2A = h(b_1 + b_2)$$

The last step to isolate h is to divide both sides of the equation by the sum $(b_1 + b_2)$.

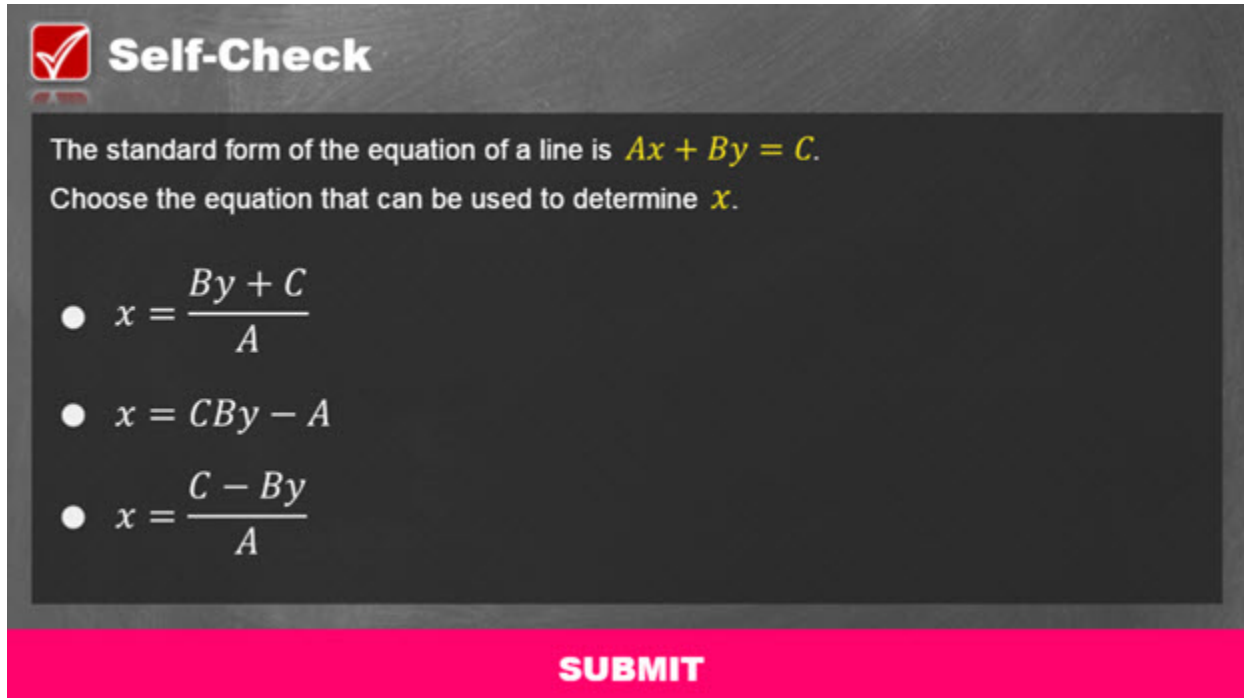
$$\frac{2A}{(b_1 + b_2)} = \frac{h(b_1 + b_2)}{(b_1 + b_2)}$$

$$\frac{2A}{(b_1 + b_2)} = h$$

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Self-Check

A self-check interface with a dark grey background. At the top left is a red checkmark icon in a square, followed by the text "Self-Check" in white. Below this, the text "The standard form of the equation of a line is $Ax + By = C$." is displayed in white, with $Ax + By = C$ in yellow. The next line says "Choose the equation that can be used to determine x ." in white. Three radio button options are listed: $x = \frac{By + C}{A}$, $x = CBy - A$, and $x = \frac{C - By}{A}$. At the bottom is a bright pink bar with the word "SUBMIT" in white capital letters.

Self-Check

The standard form of the equation of a line is $Ax + By = C$.

Choose the equation that can be used to determine x .

- $x = \frac{By + C}{A}$
- $x = CBy - A$
- $x = \frac{C - By}{A}$

SUBMIT

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

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Self-Check: Answer

Correct

That's correct! Apply the properties of equality to solve for x .

Begin by subtracting By from both sides of the equation.

$$\begin{array}{r} Ax + By = C \\ \underline{-By \quad -By} \end{array}$$

Subtraction Property of Equality

Next, divide both sides by A .

$$\frac{Ax}{A} = \frac{C - By}{A}$$

Division Property of Equality

The result is...

$$x = \frac{C - By}{A}$$

Continue

SUBMIT

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 right is a cartoon illustration of a young woman with dark skin and curly hair, wearing a pink long-sleeved shirt. On the left is a white box with a pink header that says "Today's Lesson". Below the header, there is a checkmark icon followed by the text "Applied the properties of equality to solve literal equations". At the bottom of the box are two pink buttons: "Exit Lesson" and "Restart Lesson". The background is a teal color with faint mathematical symbols like pi, infinity, and numbers.

You have reached the conclusion of this lesson where you learned how to apply the properties of equality to solve literal equations.