

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Introduction



Today's Lesson

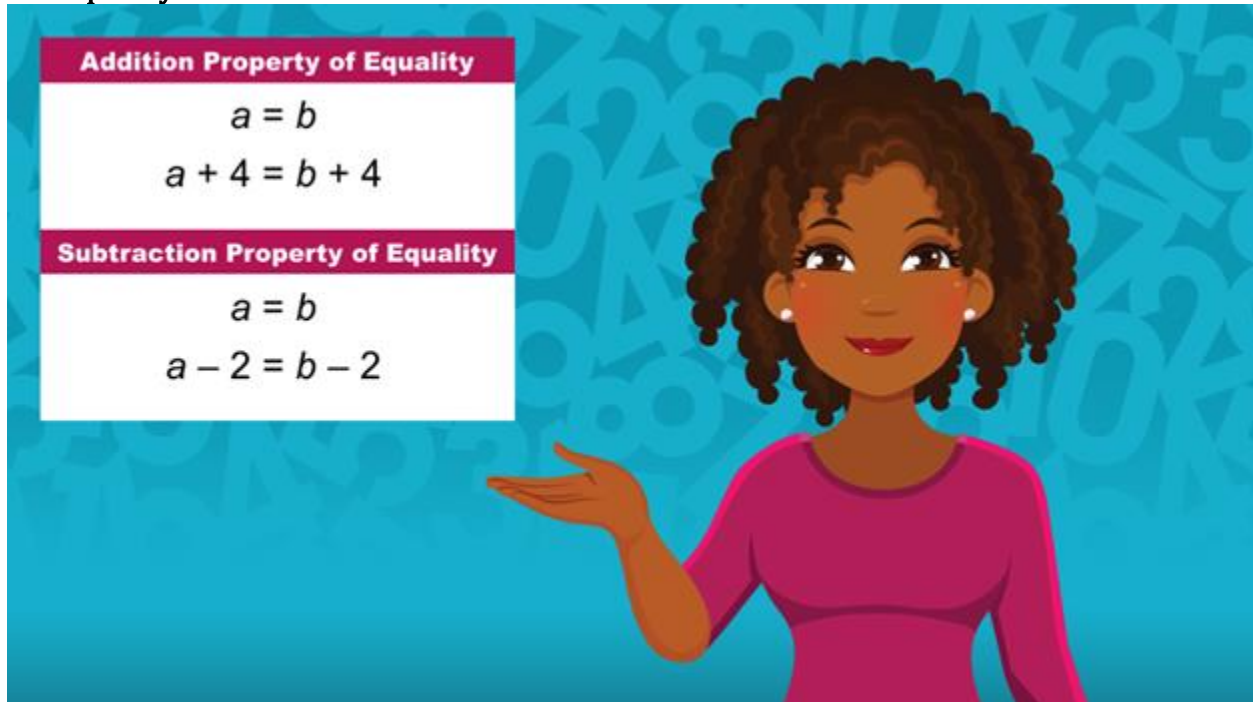
- We will focus on the properties of inequality.
- Your ability to solve equations will be helpful in this lesson.

Hi there! I'm glad to see you here for today's lesson in Algebra I. This lesson will focus on the properties of inequality. Your prior knowledge of the properties used to solve equations will be helpful in gaining an understanding of the workings of the properties of inequality.

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Anticipatory Set



The illustration shows a woman with dark curly hair and a pink long-sleeved shirt, gesturing with her right hand towards a white rectangular box. The box is divided into two sections. The top section has a pink header that reads "Addition Property of Equality" and contains the equations $a = b$ and $a + 4 = b + 4$. The bottom section has a pink header that reads "Subtraction Property of Equality" and contains the equations $a = b$ and $a - 2 = b - 2$. The background of the entire image is a blue pattern of mathematical symbols like plus, minus, multiplication, and division signs.

While studying how to solve equations, you learned about the properties that are used in order to arrive at the solution. Take, for example, the addition property of equality. You know that you can add the same value to each side of an equation, and the equation will remain true.

Another example is the subtraction property of equality. If you subtract the same value from each side of an equation, the equation will remain true. These properties, along with several others, are used in order to solve equations. Now that it's time to begin your study of linear inequalities, you must become familiar with the properties of inequality.

Module 7: Solving Linear Inequalities
Topic 1: Properties of Inequality

Properties of Inequality

PROPERTIES OF INEQUALITY

Click the Properties Below to Learn More

Transitive Property of Inequality

Multiplication Property of Inequality

Addition Property of Inequality

Division Property of Inequality

Subtraction Property of Inequality

Self-Check

Click the Properties Below to Learn More

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Transitive Property of Inequality

1. If $a < b$ and $b < c$, then $a < c$.

If a is less than b , and b is less than c , then a is less than c .

For example, let $a = 3$, $b = 4$, and $c = 5$.

$3 < 4$ Three is less than four.

$4 < 5$ Four is less than five.

$3 < 5$ Three is less than five.

2. If $a > b$ and $b > c$, then $a > c$.

If a is greater than b , and b is greater than c , then a is greater than c .

For example, let $a = 6$, $b = 5$, and $c = 2$.

$6 > 5$ Six is greater than five.

$5 > 2$ Five is greater than two.

$6 > 2$ Six is greater than two.

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Addition Property of Inequality

1. If $a < b$, then $a + c < b + c$.

If a is less than b , then the sum of a and c is less than the sum b and c .

For example, let $a = 3$, $b = 4$, and $c = 5$.

$3 < 4$ Three is less than four.

$3 + 5 < 4 + 5$ Three plus five is less than four plus five.

$8 < 9$ Eight is less than nine.

2. If $a > b$, then $a + c > b + c$.

If a is greater than b , then the sum of a and c is greater than the sum b and c .

For example, let $a = 6$, $b = 5$, and $c = 2$.

$6 > 5$ Six is greater than five.

$6 + 2 > 5 + 2$ Six plus two is greater than five plus two.

$9 > 7$ Nine is greater than seven.

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Subtraction Property of Inequality

1. If $a < b$, then $a - c < b - c$.

If a is less than b , then the difference of a and c is less than the difference b and c .

For example, let $a = 3$, $b = 4$, and $c = 5$.

$3 < 4$ Three is less than four.

$3 - 5 < 4 - 5$ Three minus five is less than four minus five.

$-2 < -1$ Negative two is less than negative one.

2. If $a > b$, then $a - c > b - c$.

If a is greater than b , then the difference of a and c is greater than the difference b and c .

For example, let $a = 6$, $b = 5$, and $c = 2$.

$6 > 5$ Six is greater than five.

$6 - 2 > 5 - 2$ Six minus two is greater than five minus two.

$4 > 3$ Five is greater than three.

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Multiplication Property of Inequality

1. If $a < b$ and $c > 0$, then $ac < bc$.

If a is less than b and c is greater than zero, then the product of a and c is less than the product of b and c .

For example, let $a = 3$, $b = 4$, and $c = 5$.

$3 < 4$ Three is less than four.

$3 \cdot 5 < 4 \cdot 5$ Three times five is less than four times five.

$15 < 20$ Fifteen is less than twenty.

2. If $a > b$ and $c > 0$, then $ac > bc$.

If a is greater than b and c is greater than zero, then the product of a and c is greater than the product of b and c .

For example, let $a = 6$, $b = 5$, and $c = 2$.

$6 > 5$ Six is greater than five.

$6 \cdot 2 > 5 \cdot 2$ Six times two is greater than five times two.

$12 > 10$ Twelve is greater than ten.

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Multiplication Property of Inequality (continued)

3. If $a < b$ and $c < 0$, then $ac > bc$.

If a is less than b and c is less than zero, then the product of a and c is greater than the product of b and c .

For example, let $a = 2$, $b = 3$, and $c = -4$.

$2 < 3$ Two is less than three.

$2 \cdot -4 > 3 \cdot -4$ Two times negative four is greater than three times negative four.

$-8 > -12$ Negative eight is greater than negative twelve.

4. If $a > b$ and $c < 0$, then $ac < bc$.

If a is greater than b and c is less than zero, then the product of a and c is less than the product of b and c .

For example, let $a = 6$, $b = 5$, and $c = -4$.

$6 > 5$ Six is greater than five.

$6 \cdot -4 < 5 \cdot -4$ Six times negative four is less than five times negative four.

$-24 < -20$ Negative twenty-four is less than negative twenty.

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Division Property of Inequality

1. If $a < b$ and $c > 0$, then $\frac{a}{c} < \frac{b}{c}$.

If a is less than b and c is greater than zero, then the quotient of a and c is less than the quotient of b and c .

For example, let $a = 6$, $b = 12$, and $c = 3$.

$6 < 12$ Six is less than twelve.

$\frac{6}{3} < \frac{12}{3}$ Six divided by three is less than twelve divided by three.

$2 < 4$ Two is less than four.

2. If $a > b$ and $c > 0$, then $\frac{a}{c} > \frac{b}{c}$.

If a is greater than b and c is greater than zero, then the quotient of a and c is greater than the quotient of b and c .

For example, let $a = 40$, $b = 15$, and $c = 5$.

$40 > 15$ Forty is greater than fifteen.

$\frac{40}{5} > \frac{15}{5}$ Forty divided by five is greater than fifteen divided five.

$8 > 3$ Eight is greater than three.

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Division Property of Inequality (continued)

3. If $a < b$ and $c < 0$, then $\frac{a}{c} > \frac{b}{c}$.

If a is less than b and c is less than zero, then the quotient of a and c is greater than the quotient of b and c .

For example, let $a = 6$, $b = 12$, and $c = -3$.

$6 < 12$ Six is less than twelve.

$\frac{6}{-3} > \frac{12}{-3}$ Six divided by negative three is greater than twelve divided by negative three.

$-2 > -4$ Negative two is greater than negative four.

4. If $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$.

If a is greater than b and c is less than zero, then the quotient of a and c is less than the quotient of b and c .

For example, let $a = 40$, $b = 15$, and $c = -5$.

$40 > 15$ Forty is greater than fifteen.

$\frac{40}{-5} < \frac{15}{-5}$ Forty divided by negative five is less than fifteen divided by negative five.

$-8 < -3$ Negative eight is less than negative three.

Module 7: Solving Linear Inequalities
Topic 1: Properties of Inequality

Self-Check 1

Self-Check

Which property is best represented by the example shown to the right?

- Multiplication Property of Inequality
- Addition Property of Inequality
- Transitive Property of Inequality
- Division Property of Inequality

Example

$$9 < 11$$
$$9 + 5 < 11 + 5$$
$$14 < 16$$

SUBMIT

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

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Self-Check 1: Answer

The screenshot shows a self-check interface with a dark grey header on the left and a blue header on the right. The left header contains a red checkmark icon and the text "Self-Check". The right header contains the text "Example". Below the headers is a light grey rounded rectangle containing the text "Correct" and a paragraph: "That's correct! Take a look at the example to the right. You can see how 5 is added to both sides of the inequality. This is a representation of the **Addition Property of Inequality**." To the right of the text are three mathematical inequalities: $9 < 11$, $9 + 5 < 11 + 5$, and $14 < 16$. Below the inequalities is a "Continue" button. At the bottom of the interface is a pink bar with the text "SUBMIT".

Self-Check

Example

Correct

That's correct! Take a look at the example to the right. You can see how 5 is added to both sides of the inequality. This is a representation of the **Addition Property of Inequality**.

$$9 < 11$$
$$9 + 5 < 11 + 5$$
$$14 < 16$$


Continue

SUBMIT

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

Module 7: Solving Linear Inequalities
Topic 1: Properties of Inequality

Self-Check 2

 **Self-Check**

Which property is best represented by the example shown to the right?

- Division Property of Inequality
- Multiplication Property of Inequality
- Subtraction Property of Inequality
- Addition Property of Inequality

SUBMIT

Example


$$18 > 14$$
$$\frac{18}{-2} > \frac{14}{-2}$$
$$-9 < -7$$

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

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Self-Check 2: Answer

**Self-Check**

Example

Incorrect

Sorry. That's incorrect. Take a look at the example to the right. Both sides of the inequality are divided by -2. This is a representation of the **Division Property of Inequality**.

$$18 > 14$$
$$\frac{18}{-2} > \frac{14}{-2}$$
$$-9 < -7$$

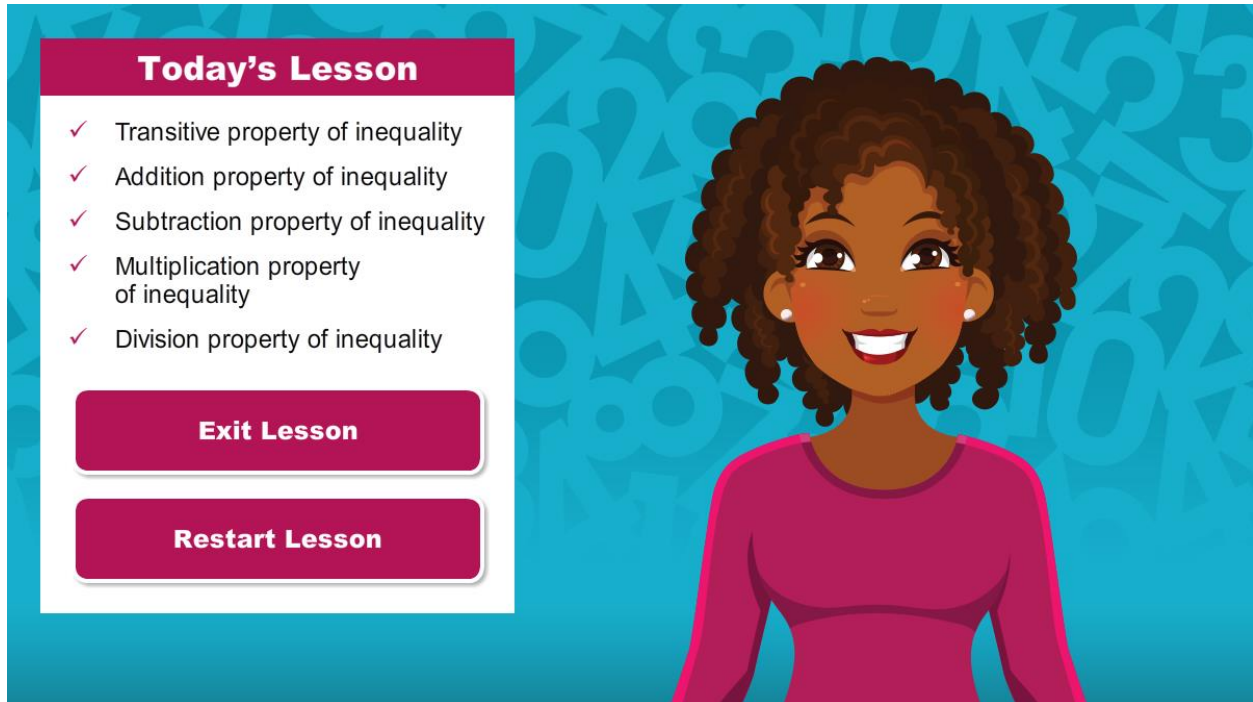
SUBMIT

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

Module 7: Solving Linear Inequalities

Topic 1: Properties of Inequality

Conclusion



The image shows a digital interface for the conclusion of a lesson. On the left, a white box with a pink header titled "Today's Lesson" contains a checklist of five items, each with a checkmark: "Transitive property of inequality", "Addition property of inequality", "Subtraction property of inequality", "Multiplication property of inequality", and "Division property of inequality". 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 skin and curly hair, wearing a pink top. The background is a blue pattern of mathematical symbols.

Congratulations! You have reached the conclusion of this lesson on the properties of inequality and now have a deeper understanding of the workings of these very important properties. Your newly acquired knowledge will help you continue your success in the study of linear inequalities.