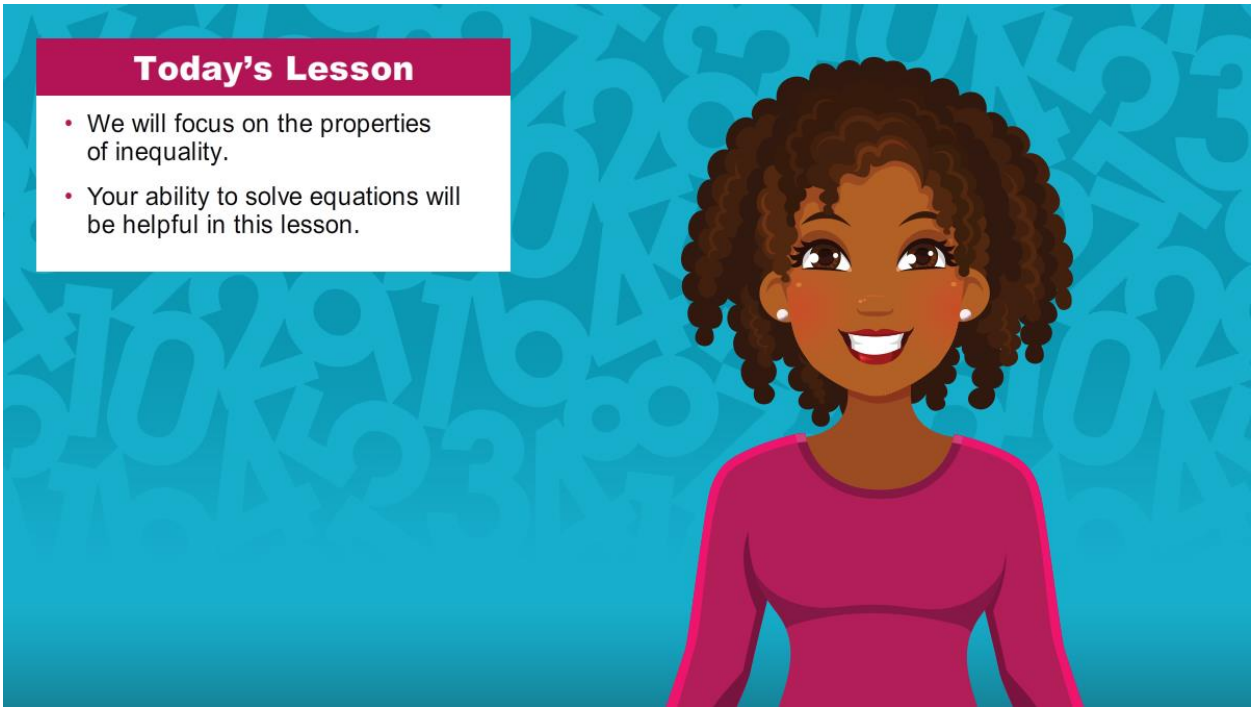
Module 7: Solving Linear Inequalities
Topic 1: Properties of Inequality

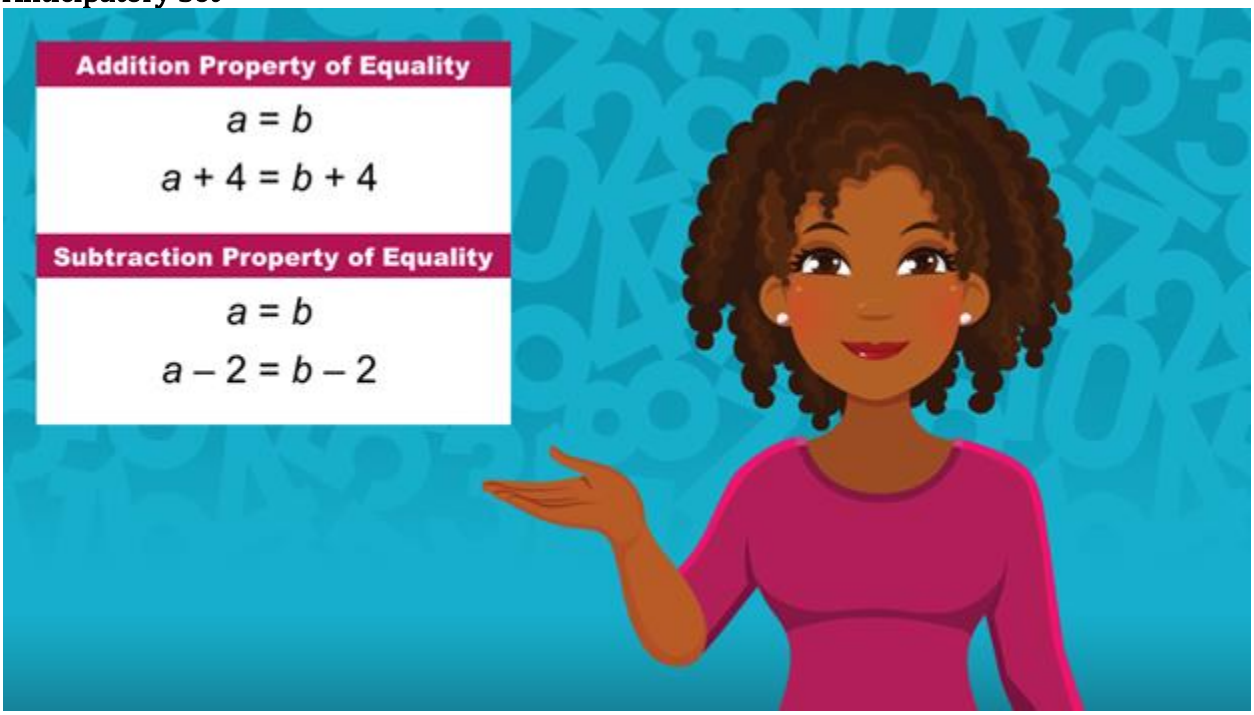
Introduction



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

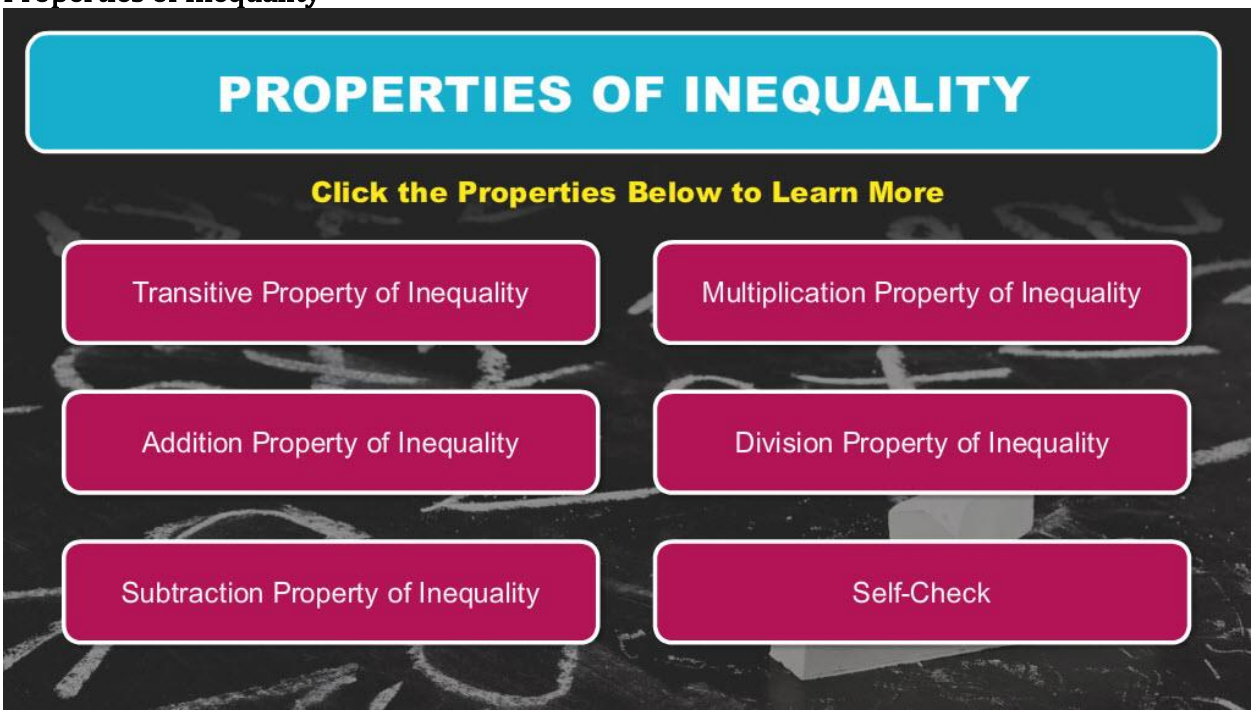
Anticipatory Set



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.

Properties of Inequality



Click the Properties Below to Learn More

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.

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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.

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.

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.

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.

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.

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.

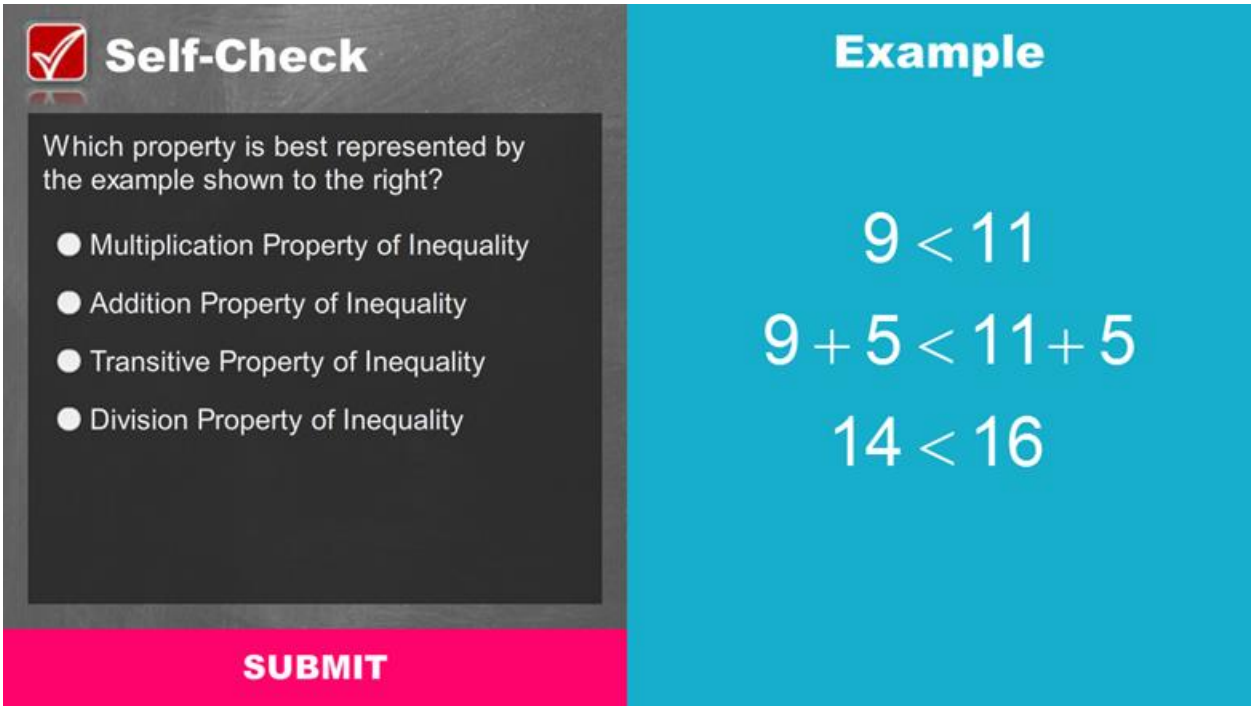
4. If $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$.

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 $c = -5$.

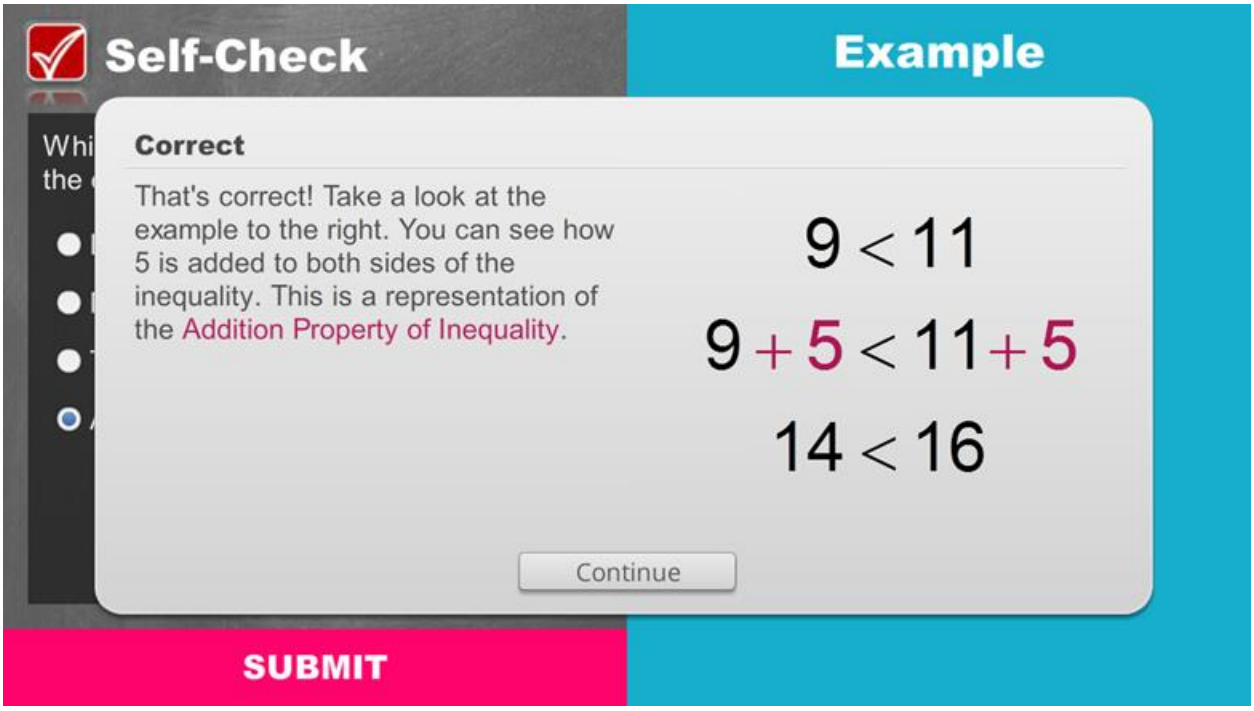
$40 > 15$	Forty is greater than fifteen.
$\frac{40}{-5} < \frac{15}{-5}$	Forty divided by negative five is less than fifteen divided by negative five.
$-8 < -3$	Negative eight is less than negative three.

Self-Check 1



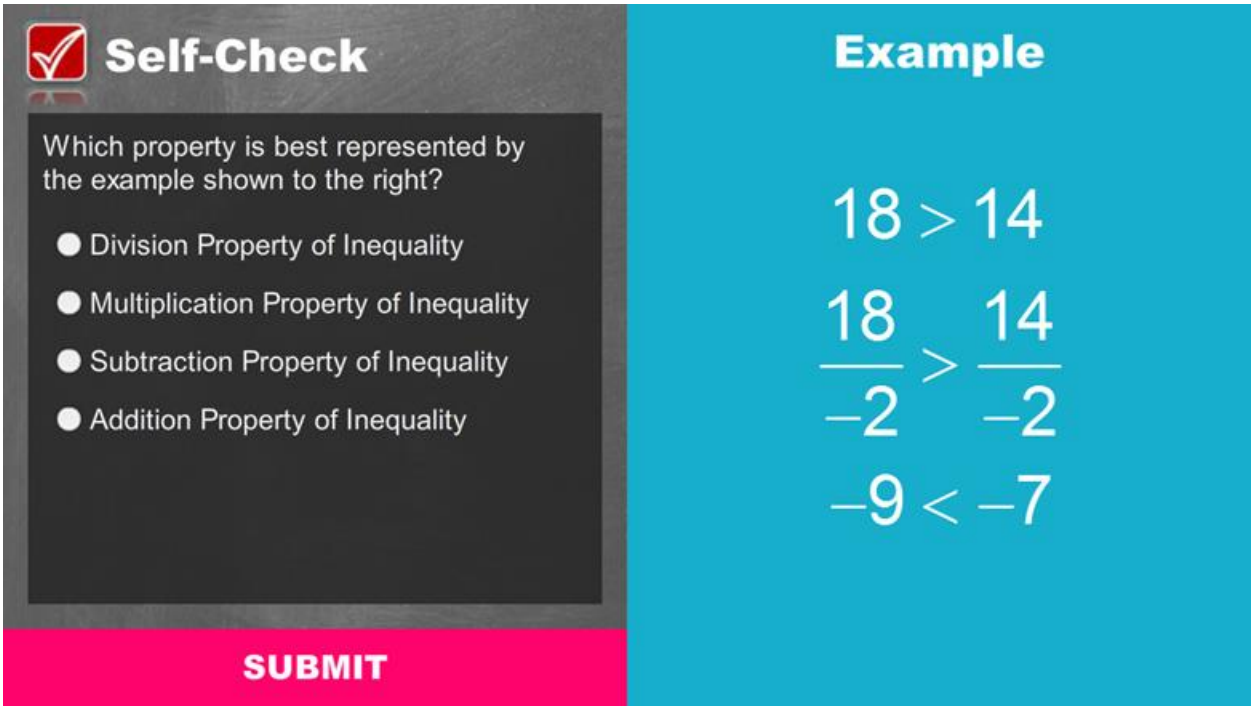
Solve the problem in the image above to check your understanding of the content.

Self-Check 1: Answer



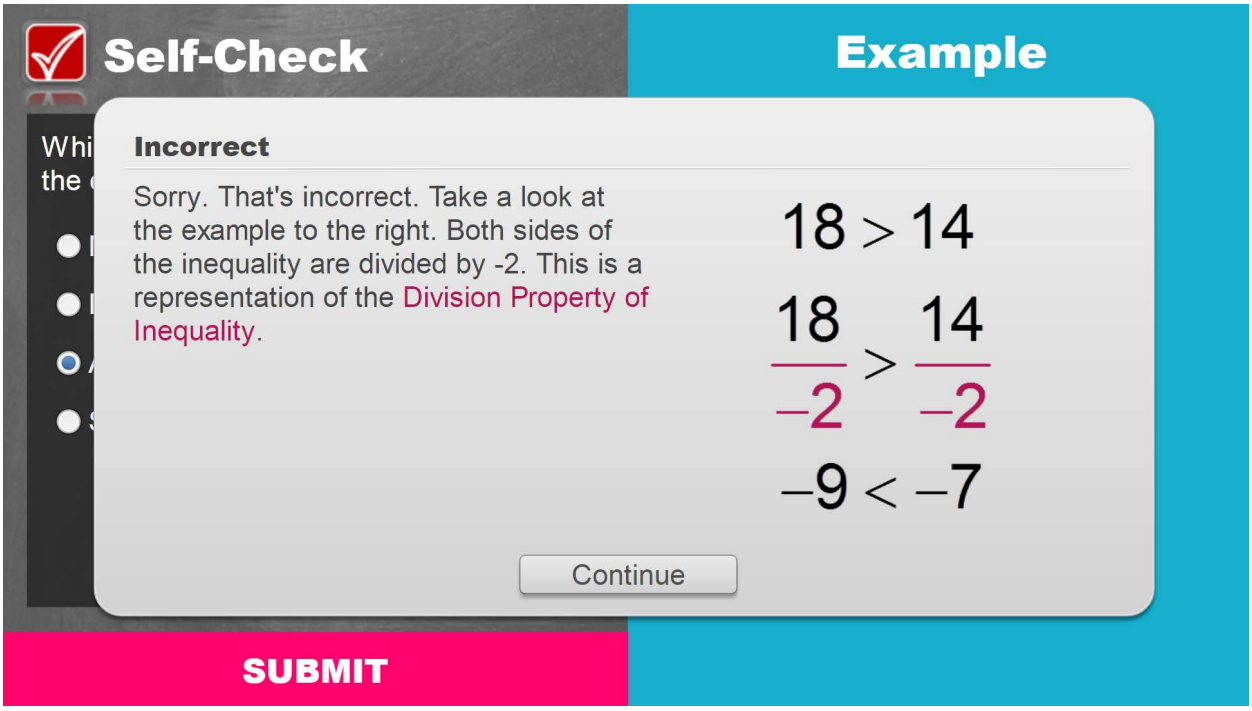
For your reference, the image above shows the correct solution to the self-check problem.

Self-Check 2



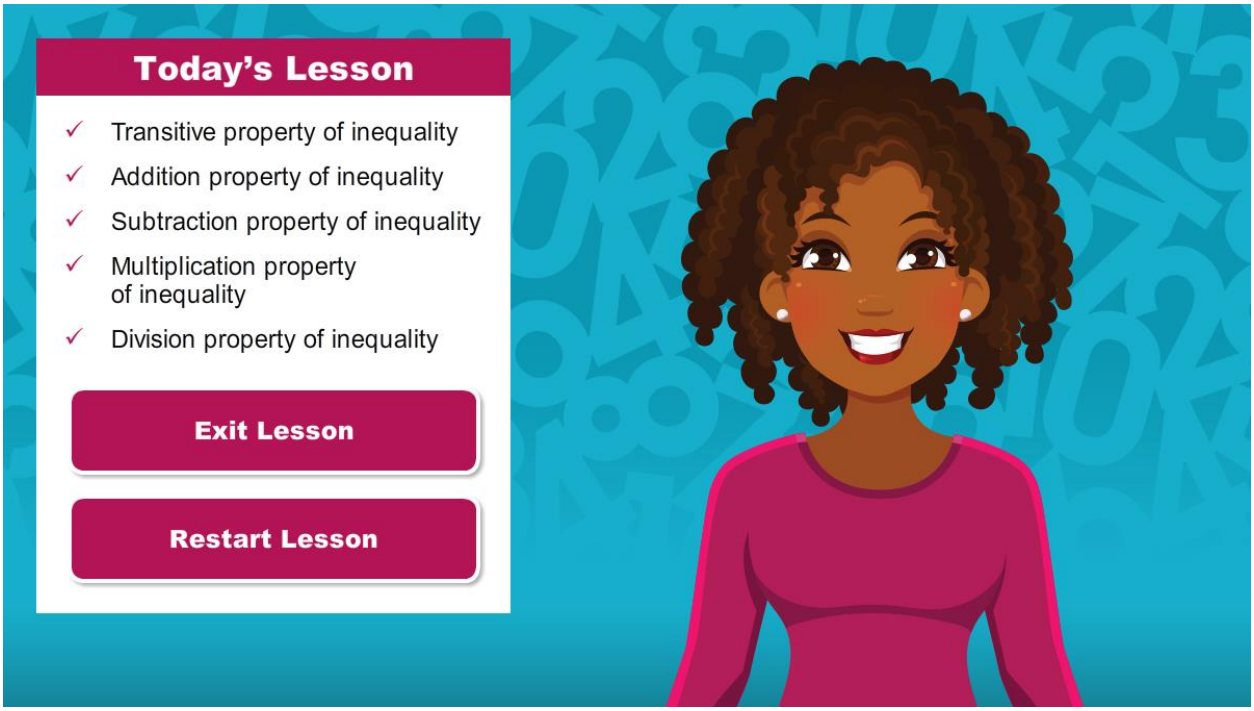
Solve the problem in the image above to check your understanding of the content.

Self-Check 2: Answer



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

Conclusion



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.