

Lesson 1.3.3: Properties of Equality

Targets:

1. I can determine whether two equations have the same solution set using properties of equality.
2. I can use the properties of equality to manipulate equations.
3. I can use the properties of equality to solve equations (find solution sets).

Warm Up

Explain using what you have learned so far in this Unit to explain why each set of equation should have the same solution set. Use words like commutative, associative, or distributive.

a. $(x - 1)(x + 3) = 17 + x$ and $(x - 1)(x + 3) = x + 17$

b. $(x - 1)(x + 3) = 17 + x$ and $(x + 3)(x - 1) = 17 + x$

Practice 1

a. Use the commutative property to write an equation that has the same solution set as $x^2 - 3x + 4 = (x + 7)(x - 12)(5)$

b. Use the associative property to write an equation that has the same solution set as $x^2 - 3x + 4 = (x + 7)(x - 12)(5)$

c. Does this reasoning apply to the distributive property as well?

Intro to Properties of Equality

Explain why each set of equation should have the same solution set. These require different properties than we used in the warm up...

a. $(x - 1)(x + 3) = 17 + x$ and $(x - 1)(x + 3) + 500 = 517 + x$

b. $(x - 1)(x + 3) = 17 + x$ and $3(x - 1)(x + 3) = 51 + 3x$

Vocabulary

Watch the video and take notes here:

- a. Addition Property of Equality
- b. Subtraction Property of Equality
- c. Multiplication Property of Equality
- d. Division Property of Equality
- d. Others?

Practice 2

Consider the equation: $x^2 + 1 = 7 - x$

- a. Show that $x = 2$ and $x = -3$ is a solution set.
- b. Let's use the addition property of equality and see if it really does work.
 - i. Add 4 to both sides of the equation so that your new equation is $x^2 + 5 = 11 - x$
 - ii. Show that the original solution set still works: $x = 2$ and $x = -3$
- c. Let's continue to use the addition property of equality.
 - i. Add x to both sides of the equation so that your new equation is $x^2 + 5 + x = 11$
 - ii. Show that the original solution set still works: $x = 2$ and $x = -3$
- d. Now let's try the subtraction property of equality.
 - i. Subtract 5 from both sides of the equation so that your new equation is $x^2 + x = 6$
 - ii. Show that the original solution set still works: $x = 2$ and $x = -3$
- e. Now let's try the multiplication property of equality.
 - i. Multiply both sides by $\frac{1}{6}$ so your new equation is $\frac{x^2+x}{6} = 1$
 - ii. Show that the original solution set still works: $x = 2$ and $x = -3$
- f. Go back to part d and add $3x^2$ to both sides. Your new equation is $x^2 + x + 3x^2 = 6 + 3x^2$
 - i. Show that the original solution set still works: $x = 2$ and $x = -3$

Practice 3

Try using what we have learned about properties of equality to find the solution set to each equation.

a. Solve for r : $\frac{3}{2r} = \frac{1}{4}$

b. Solve for s : $s^2 + 5 = 30$

c. Solve for y : $4y - 3 = 5y - 8$

Practice 4

Consider the equation $3x + 4 = 8x - 16$. Solve for x using the given starting point.

Group 1	Group 2	Group 3	Group 4
<i>Subtract $3x$ from both sides</i>	<i>Subtract 4 from both sides</i>	<i>Subtract $8x$ from both sides</i>	<i>Add 16 to both sides</i>

Exit Ticket

1. Determine which of the following equations have the same solution set by recognizing the properties of equality that were used. There will be two different groups with 4 equations each.

a. $2x + 3 = 13 - 5x$

b. $6 + 4x = -10x + 26$

c. $6x + 9 = \frac{13}{5} - x$

d. $0.6 + 0.4x = -x + 2.6$

e. $3(2x + 3) = \frac{13}{5} - x$

f. $4x = -10x + 20$

g. $15(2x + 3) = 13 - 5x$

h. $15(2x + 3) + 97 = 110 - 5x$

2. Solve the following equation and check your solution: $-16 - 6v = -2(8v - 7)$