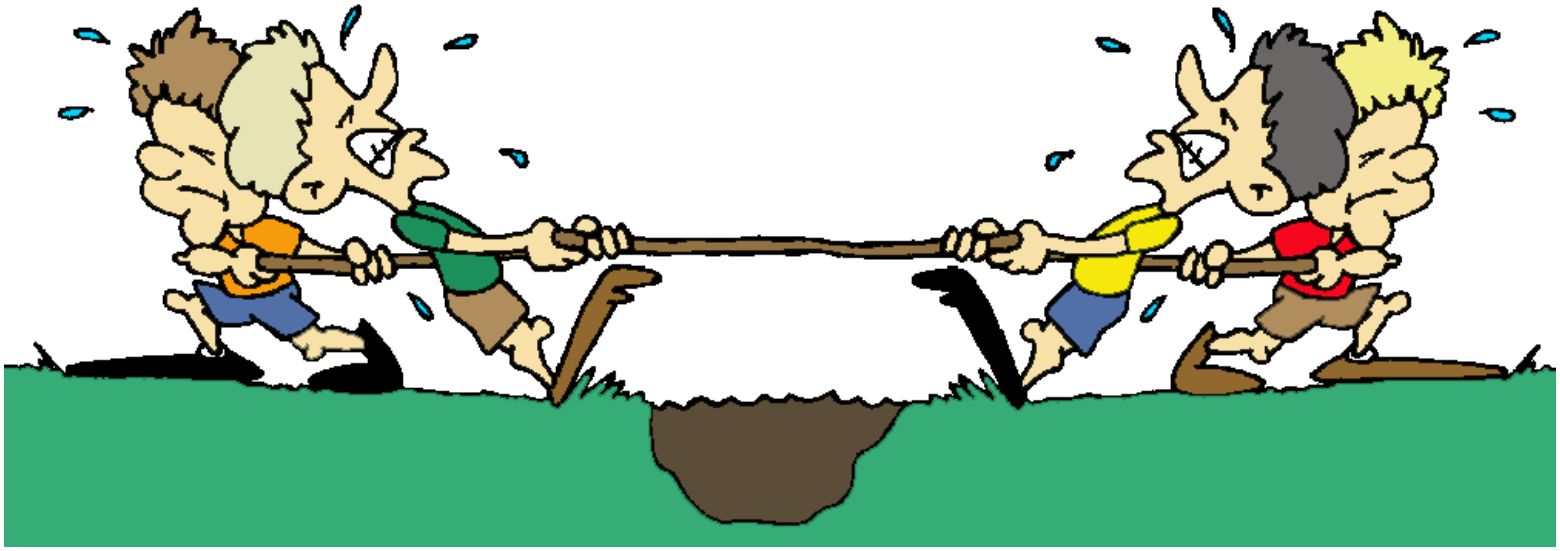
ALGEBRAIC PROPERTIES

Let's Keep Those Equations Balanced!



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Learning Goal for Focus 2
(HS.A-CED.A.1, 2 & 3, HS.A-REI.A.1, HS.A-REI.B.3):
The student will create equations from multiple representations and solve linear equations and inequalities in one variable explaining the logic in each step.

4	3	2	1	0
In addition to level 3.0 and above and beyond what was taught in class, the student may: **- Make connection with other concepts in math** **- Make connection with other content areas.**	The student will ***create*** equations from multiple representations and ***solve*** linear equations and inequalities in one variable ***explaining*** the logic in each step. - ***rearrange*** formulas to highlight a quantity of interest. -***Graph*** created equations on a coordinate graph.	The student will be able to ***solve*** linear equations and inequalities in one variable and ***explain*** the logic in each step. - ***Use*** equations and inequalities in one variable to solve problems.	With help from the teacher, the student has partial success with solving linear equations and inequalities in one variable.	Even with help, the student has no success with solving linear equations and inequalities in one variable.

What are Algebraic Properties of Equality?

- In mathematics **equality** is a relationship between two mathematical expressions, asserting that the quantities have the **same value**.

- Algebraic Properties of Equality help us to justify how we solve equations and inequalities.

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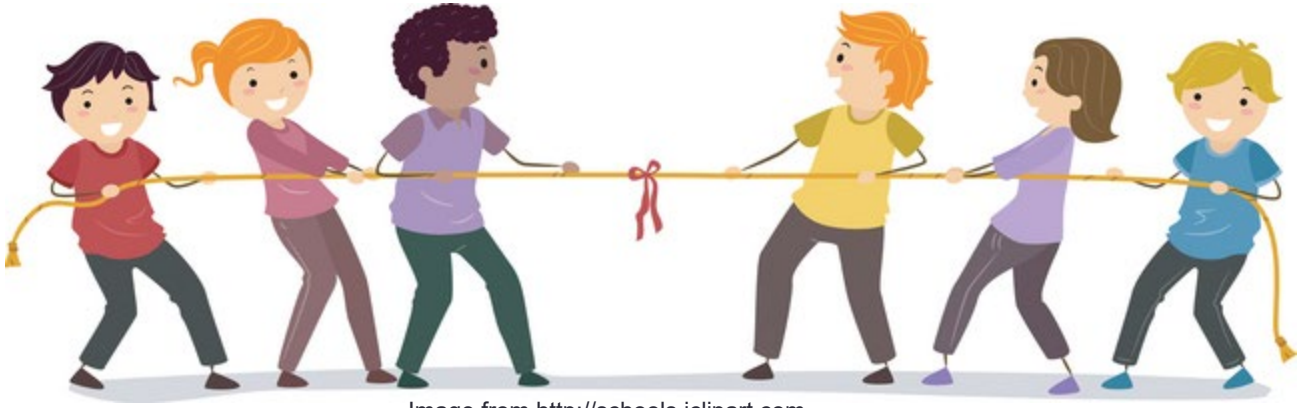
1. Addition Property of Equality

- This property tells us that ***adding the same number to each side*** of an equation gives us an equivalent equation.

If $a - b = c$,

then $a - b + b = c + b$



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2. Subtraction Property of Equality

- This property tells us that ***subtracting the same number to each side*** of an equation gives us an equivalent equation.

If a + b = c,

then a + b - b = c - b

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3. Multiplication Property of Equality

- This property tells us that ***multiplying the same (non-zero) number to each side*** of an equation gives us an equivalent equation.

If $\frac{a}{b} = c$, (and $b \neq 0$),

then $\frac{a}{b} \cdot b = c \cdot b$

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4. Division Property of Equality

- This property tells us that ***dividing the same (non-zero) number to each side*** of an equation gives us an equivalent equation.

If $a \cdot b = c$ (and $b \neq 0$),

then $\frac{a \cdot b}{b} = \frac{c}{b}$

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5. Associative Property of Addition or Multiplication

- Keep the ***same order***, just move the parenthesis.

$$(a + b) + c = a + (b + c)$$

$$(ab)c = a(bc)$$

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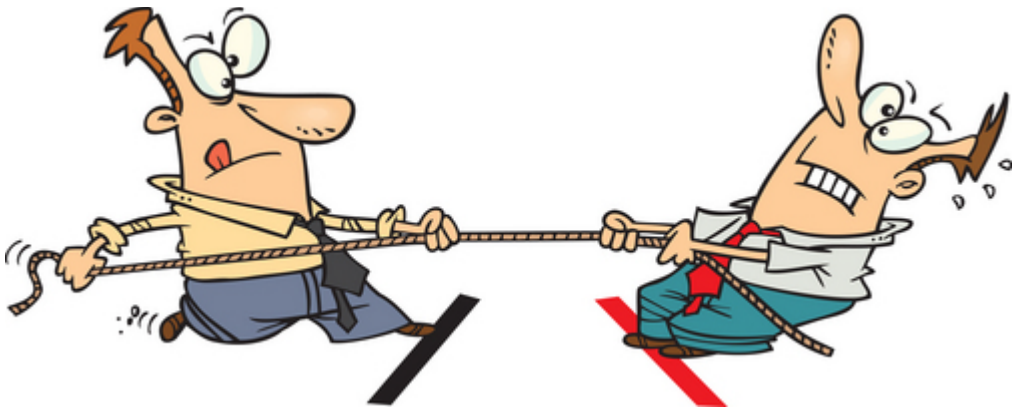
6. Commutative Property of Addition or Multiplication

When you add or multiply two numbers, you will get the same answer when you ***switch the order***.

$$a + b = b + a$$

$$ab = ba$$



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7. Distributive Property

- This property "***distributes***" a value, using multiplication, to each number in the parenthesis.

$$a(b + c) = ab + ac$$

Everyone in this problem got an "***a***"

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8. Identity Property

The number you can add or multiply by and still get the ***same*** number.

$a + 0 = a$

$a \cdot 1 = a$

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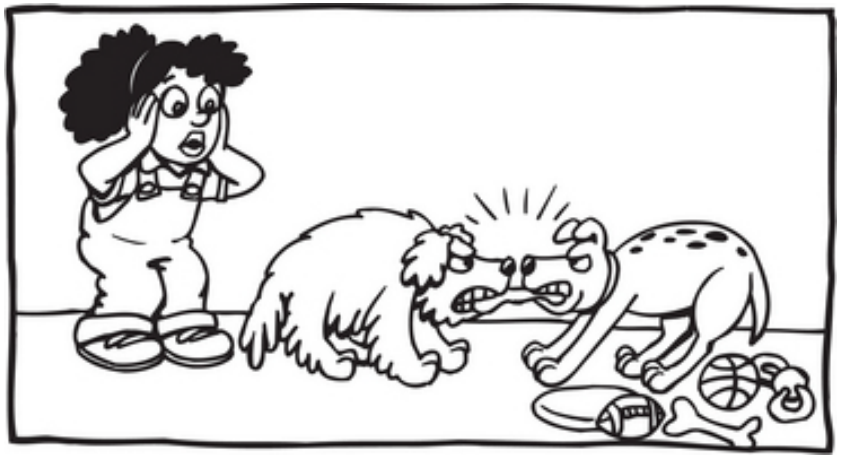
9. Inverse Property

What number can you add to ***a*** and get 0?

$a + (-a) = 0$

What number can you multiply ***a*** by and get 1?

$a(^1/_a) = 1$



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Justify each step by stating the property that was used.

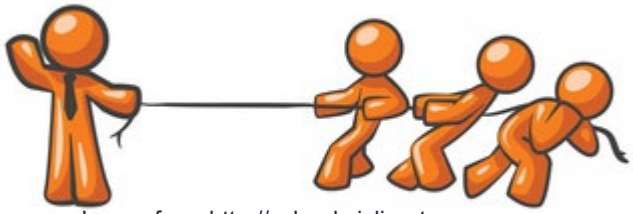
6x + 9 = 51

1) 6x = 42

2) x = 7

1) Subtraction Property of Equality

2) Division Property of Equality



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Justify each step by stating the property that was used.

$3(2x - 5) = 63$

1) $6x - 15 = 63$
2) $6x = 78$
3) $x = 13$

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1) Distributive Property
2) Addition Property of Equality
3) Division Property of Equality

Remember to keep your equations balanced…

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