

TOPIC: 2.5 Reason using Properties from Algebra

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DATE:

ESSENTIAL QUESTION: How do you solve an equation?

QUESTIONS:

What are the four algebra properties of equality?

VOCABULARY: Equation contains expressions and equal sign

Algebraic Properties of Equality:

Addition Property:

If $a = b$, then $a + c = b + c$.

Subtraction Property

If $a = b$, then $a - c = b - c$.

Multiplication Property:

If $a = b$, then $a * c = b * c$.

Division Property

If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.

What is the difference and how would you use the following properties?

Substitution Property:

If $a = b$, then a can be substituted for b in any equation or expression.

Distributive Property:

$a(b + c) = ab + ac$, where a , b and c are real numbers.

Reflexive Property

For any real number a , $a = a$.

Symmetric Property

For any real numbers a and b , if $a = b$, then $b = a$.

Transitive Property

For any real numbers a , b and c , if $a = b$ and $b = c$, then $a = c$.

SUMMARY:

To solve an equation use algebraic properties of equality and the distributive property to isolate the variable. Usually the distributive property is first, followed by combining like terms, then the add/sub property, finally the mult. or division property.

QUESTIONS:

Name the property being illustrated.

Solve the equation and name the property used.

Use the properties of equality to prove the statement.

EXAMPLES:

For A1-A3, write which property is being shown.

A1. If $3x + 2 = 17$, then $17 = 3x + 2$.

Symmetry

A2. Given x is a real number, then $5x = 5x$.

Reflexive

A3. If $3x = 2x + 2$ and $2x + 2 = x + 4$, then $3x = x + 4$.

Transitive

A4. Given that $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \underline{\overline{EF}}$.

A5. Solve the equation. Name the property being used for each step.

$$-4(11x + 2) = 80$$

$$-44x + -8 = 80 \quad (\text{distribute})$$

$$\begin{array}{r} -44x + -8 = 80 \\ +8 \quad +8 \\ \hline -44x = 88 \end{array} \quad (\text{Addition})$$

$$\begin{array}{r} -44x = 88 \\ \hline -44 \quad -44 \\ \hline x = -2 \end{array} \quad (\text{division})$$

A6. You are designing a logo to sell daffodils. Use the diagram below and determine if the measure of angle EBA equals the measure of angle DBC.

conversation discussion

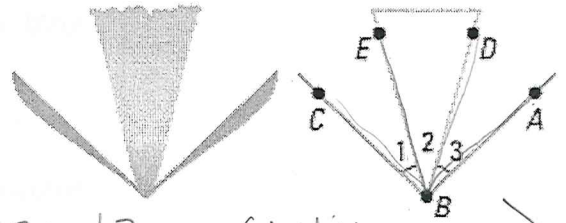
$$m\angle 1 = m\angle 3$$

so if you add $m\angle 2$ to $\angle 1$ and $\angle 3$

$$\text{then } m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$$

$$m\angle DBC = m\angle EBA$$

(Addition prop of equality)



A7. In the diagram below, $AB = CD$. Show that $AC = BD$.

$$AB = CD$$

$$AB + BC = CD + BC$$

$$AC = BD$$

