Algebraic Reasoning

Lesson 2.4

Algebraic Properties of Equality

Property	Symbolically	What it Means
Addition Property of Equality	If a = b then a + c = b + c	You can add the same number to both sides
Subtraction Property of Equality	If a = b then a - c = b - c	You can subtract the same number from both sides
Multiplication Property of Equality	If a = b then a • c = b • c	You can multiply both sides by the same number.
Division Property of Equality	If a = b then a ÷ c = b ÷ c	You can divide both sides by the same number.
Substitution Property of Equality	If a = b then a can be substituted for b in any equation or expression.	

Solve 2x – 5 = 13. Justify each step.

$2x-5=13$	Given
$+5 \quad +5$ $2x-5+5=13+5$	Add Prop =
$\frac{2x}{2}=\frac{18}{2}$	Simplify
	Div. Prop =
$x=9$	Simplify

Property	Symbolically	What it Means
Distributive Property	$a(b + c) = ab + ac$ $a(b – c) = ab - ac$	Multiply each term in the parenthesis by the number outside it.

Solve 2(x + 1) = -4. Justify each step.

$2(x+1) = -4$	Given
$2x + 2 = -4$	Distrib Prop
$-2 \quad -2$	Subtr. Prop =
$\frac{2x}{2} = \frac{-6}{2}$	Simplify
$x = -3$	Div. Prop = Simplify

Reflexive, Symmetric, and Transitive

	Real Numbers	Segment Lengths	Angle Measures
Reflexive Property	$a = a$	$AB = AB$	$m\angle A = m\angle A$
Symmetric Property	If $a = b$, then $b = a$.	If $AB = CD$, then $CD = AB$	If $m\angle A = m\angle B$, then $m\angle B = m\angle A$.
Transitive Property	If $a = b$ and $b = c$ then $a = c$.	If $AB = CD$ and $CD = EF$, then $AB = EF$.	If $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then $m\angle A = m\angle C$.

Examples

Name the property of equality that justifies each statement.

If $m\angle A = m\angle B$,

then $m\angle B = m\angle A$

If JK + KL = GH + KL,

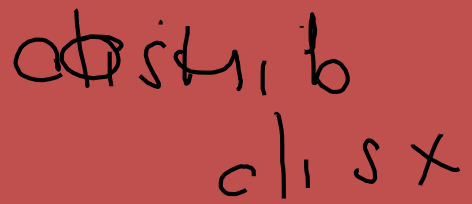
then JK = GH

Subtr. prop =

Examples

- Name the property of equality that justifies each statement.

If 3(x + 3) = 56, then 3x + 9 = 56



If x = y and y = 2 then x = 2.