2.5 Algebraic Proofs

proof: argument that uses logic, definitions, properties, & previously proven statements to show a conclusion is true.

Properties

1. Addition Prop: $a=b$, then $a+c=b+c$
2. Subtraction Prop.: if $a=b$, then $a-c=b-c$
3. Multiplication Prop: if $a=b$, then $ac=bc$
4. Division Prop: if $a=b$, then $\frac{a}{c}=\frac{b}{c}$
5. reflexive Prop: $a=a$
6. symmetric Prop: $a=b$, then $b=a$
7. Transitive Prop: if $a=b$ and $b=c$, then $a=c$
8. Distributive Prop: $a(b+c)=ab+ac$
9. Substitution Prop: if $a=b$, then b can be substituted for a in any expression.

Ex: Solve & justify each step:

$8 = 2(x+1)$ — Distributive Prop.

$8 = 2x + 2$ — Subtraction Prop.

$-2 \quad -2$

$\frac{6}{2} = \frac{2x}{2}$ — Division Prop.

$3 = x$ — symmetric prop.

$x = 3$

Properties of Congruence

1. Reflexive Prop: $\overline{AB} \cong \overline{AB}$
2. Symmetric Prop: $\angle 1 \cong \angle 2$, then $\angle 2 \cong \angle 1$
3. Transitive Prop: if $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$

* congruence is for figures, and equality is for numbers.

$\angle 1 \cong \angle 2$

$m\angle 1 = m\angle 2$

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