

Lesson 2.5

Algebraic Properties, Properties of Equality, & Congruence Theorems

KEY CONCEPT

For Your Notebook

Algebraic Properties of Equality

Let a , b , and c be real numbers.

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 $ac = bc$.

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

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

THEOREMS

For Your Notebook

THEOREM 2.1 Congruence of Segments

Segment congruence is reflexive, symmetric, and transitive.

Reflexive For any segment AB , $\overline{AB} \cong \overline{AB}$.

Symmetric If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$.

Transitive If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$.

Proofs: p. 137; Ex. 5, p. 121; Ex. 26, p. 118

THEOREM 2.2 Congruence of Angles

Angle congruence is reflexive, symmetric, and transitive.

Reflexive For any angle A , $\angle A \cong \angle A$.

Symmetric If $\angle A \cong \angle B$, then $\angle B \cong \angle A$.

Transitive If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$.

Proofs: Ex. 25, p. 118; Concept Summary, p. 114; Ex. 21, p. 137

KEY CONCEPT

For Your Notebook

Distributive Property

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

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Reflexive Property of Equality

- Real Numbers** For any real number a , $a = a$.
- Segment Length** For any segment AB , $AB = AB$.
- Angle Measure** For any angle A , $m\angle A = m\angle A$.

Symmetric Property of Equality

- Real Numbers** For any real numbers a and b , if $a = b$, then $b = a$.
- Segment Length** For any segments AB and CD , if $AB = CD$, then $CD = AB$.
- Angle Measure** For any angles A and B , if $m\angle A = m\angle B$, then $m\angle B = m\angle A$.

Transitive Property of Equality

- Real Numbers** For any real numbers a , b , and c , if $a = b$ and $b = c$, then $a = c$.
- Segment Length** For any segments AB , CD , and EF , if $AB = CD$ and $CD = EF$, then $AB = EF$.
- Angle Measure** For any angles A , B , and C , if $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then $m\angle A = m\angle C$.