

Reasoning and Proof – Proving Segments

Notes Section 2.3

Name _____

Theorem = A statement that must be proved true through deductive reasoning using definitions, postulates, and undefined terms.

Proof = A logical argument in which each statement is supported by a statement that is accepted as being true.

Midpoint Theorem

If M is the midpoint of \overline{AB} , then $\overline{AM} \cong \overline{MB}$

Theorem 2-1: Congruence of segments is reflexive, symmetric, and transitive.

Reflexive Property

$$\overline{AB} \cong \overline{AB}$$

Symmetric Property

$$\text{If } \overline{AB} \cong \overline{CD}, \text{ then } \overline{CD} \cong \overline{AB}$$

Transitive Property

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

Prove the Midpoint Theorem using a two-column proof.
(If the directions tell you to write a proof, always do a TWO COLUMN proof.)

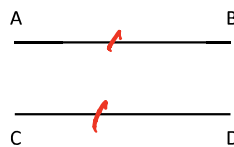
1. Given M is the midpoint of \overline{AB}

Prove $\overline{AM} \cong \overline{MB}$

Statement	Reason
#1) M is the midpoint of \overline{AB}	#1) GIVEN
#2) $AM = MB$	#2) Def'n of Midpoint
#3) $\overline{AM} \cong \overline{MB}$	#3) Def'n of \cong segments

2. Prove the symmetric part of Theorem 2-1

Given $\overline{AB} \cong \overline{CD}$
Prove $\overline{CD} \cong \overline{AB}$



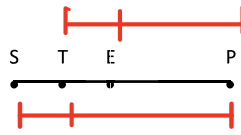
Statement	Reason
1) $\overline{AB} \cong \overline{CD}$	1) GIVEN
2) $AB = CD$	2) Def'n of \cong segments
3) $CD = AB$	3) Symmetric Prop of =
4) $\overline{CD} \cong \overline{AB}$	4) Def'n of \cong segments

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3. Given \overline{STEP}
 Prove $SP = ST + TE + EP$

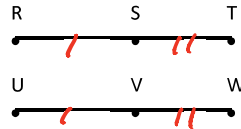


Statement

Reason

- | | | |
|------------------------|-----------------|----------------------------|
| 1) \overline{STEP} | | 1) GIVEN |
| 2) $SP = ST + TP$ | Picture | 2) Segment Add'n Postulate |
| 3) $TP = TE + EP$ | Picture | 3) Segment Add'n Postulate |
| 4) $SP = ST + TE + EP$ | (Combine 2 & 3) | 4) Substitution PoE |

4. Given $\overline{RS} \cong \overline{UV}$
 $\overline{ST} \cong \overline{VW}$
 Prove $\overline{RT} \cong \overline{UW}$



Statement

Reason

- | | | |
|---|-----------|------------------------------|
| 1) $\overline{RS} \cong \overline{UV}$
$\overline{ST} \cong \overline{VW}$ | | 1) GIVEN |
| 2) $RS = UV$
$ST = VW$ | (From 1) | 2) Def'n of \cong segments |
| 3) $RT = RS + ST$
$UW = UV + VW$ | (picture) | 3) Segment Add'n Postulate |
| 4) $RT = UV + VW$ | (2 and 3) | 4) Substitution PoE |
| 5) $RT = UW$ | (3 and 4) | 5) Substitution PoE |
| 6) $\overline{RT} \cong \overline{UW}$ | (5) | 6) Def'n of \cong segments |