

Section 2.6 Two-Column Proof with Segments

Again review that a proof must have the following five steps.

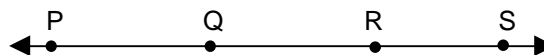
1. State the theorem to be proved.
2. List the given information
3. If possible draw a diagram to illustrate the given information.
4. State what is to be proved.
5. Develop a system of deductive reasoning.

In order to use deductive reasoning to construct a proof we rely on statements that are accepted to be true. In geometry those statements are postulates and definitions. We also depend on a list of undefined terms. Statements that are proved relying on undefined terms are called theorems. Once a theorem is proved, it may be used as a tool to prove other statements.

Theorem 2-1: Congruence of segments is reflexive, symmetric and transitive. The table below shows the symbolic for of Theorem 2-1.

Reflexive	Symmetric	Transitive
$\overline{AB} \cong \overline{AB}$	If $\overline{AB} \cong \overline{CD}$ then $\overline{CD} \cong \overline{AB}$	If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$ then $\overline{AB} \cong \overline{EF}$

Example 1: Justify each step of the proof.



Given.

Prove: $PQ = PS - QS$

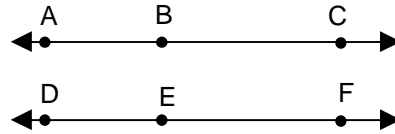
Statements	Reasons
1. Points P, Q, R, and S are collinear	1. Given
2. $PS = PQ + QS$	2. Segment Addition Postulate
3. $PS - QS = PQ$	3. Subtraction Property of Equality
4. $PQ = PS - QS$	4. Symmetric Property of Equality

It takes some practice to recognize the various postulates and properties that are used in these proofs. Please practice and study these examples and the example in the book until you can reproduce the proofs without looking back at the solutions.

Example 2: Write a two-column proof.

Given: $\overline{AC} \cong \overline{DF}$ and $\overline{AB} \cong \overline{DE}$

Prove: $\overline{BC} \cong \overline{EF}$



Statements	Reasons
1. $\overline{AC} \cong \overline{DF}$ and $\overline{AB} \cong \overline{DE}$	1. Given
2. $AC = DF$ and $AB = DE$	2. Definition Congruent Segments
3. $AC = AB + BC$ and $DF = DE + EF$	3. Segment Addition Postulate
4. $AC - AB = BC$ and $DF - DE = EF$	4. Subtraction property of equality
5. $DF - DE = BC$	5. Substitution property of equality
6. $BC = EF$	6. Substitution property of equality
7. $\overline{BC} \cong \overline{EF}$	7. Definition of Congruent Segments

It is also important to remember that there are often several methods that can be used to prove the same statement. When developing your own proof, just remember never to make a statement that cannot be justified with something given or something you have already proven within the proof.