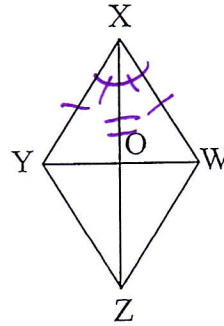# Two-Column Proofs

1. Mark the given information on the diagram. Give a reason for each step in the two-column proof. Choose the reason for each statement from the list below.

Given: $\overline{YX} \cong \overline{WX}$

$\overline{ZX}$ bisects $\angle YXW$

Prove: $\overline{YZ} \cong \overline{WZ}$

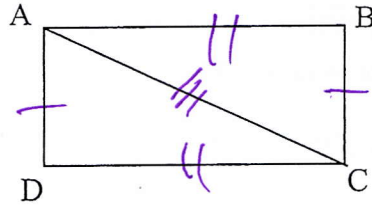| Statement	Reason
1. $\overline{YX} \cong \overline{WX}$	1. Given
2. $\overline{ZX}$ bisects $\angle YXW$	2. Given
3. $\angle YXZ \cong \angle WXZ$	3. Def'n of angle bisector
4. $\overline{XZ} \cong \overline{XZ}$	4. RP₀ C
5. $\triangle YXZ \cong \triangle WXZ$	5. SAS
6. $\overline{YZ} \cong \overline{WZ}$	6. CPCTC

Choose a reason from this list:

Definition of angle bisector
Definition of congruent triangles or CPCTC
Given
Given
Reflexive property of congruence (RP₀ C)
Side-Angle-Side congruence (SAS)

Corresponding Points of Congruent Triangles are Congruent (CPCTC)

Two-Column Proofs (Continued)

2. Mark the given information on the diagram. Give a reason for each step in the two-column proof. Choose the reason for each statement from the list below.

Given: $\overline{AD} \cong \overline{BC}$
         $\overline{AB} \cong \overline{DC}$

Prove: $\overline{AD} \parallel \overline{BC}$

Statement	Reason
1. $\overline{AD} \cong \overline{BC}$	1. Given
2. $\overline{AB} \cong \overline{DC}$	2. Given
3. $\overline{AC} \cong \overline{AC}$	3. RP₀C
4. $\triangle CAD \cong \triangle ACB$	4. SSS
5. $\angle DAC \cong \angle BCA$	5. CPCTC
6. $\overline{AD} \parallel \overline{BC}$	6. Converse of AIA Theorem

Choose a reason from this list:

Definition of congruent triangles
Given
Given
If alternate interior angles are congruent then the lines are parallel. (Converse of AIA Theorem)
Reflexive property of congruence (RP₀C)
Side-Side-Side congruence (SSS)
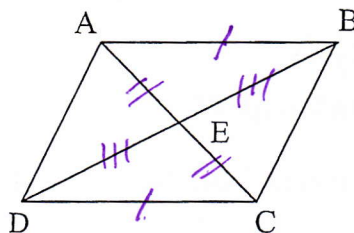
Two-Column Proofs (Continued)

3. Complete the following proof by filling in each statement. Remember to mark all given information on the diagram.

   Given: ABCD is a parallelogram

   Prove: △ABE ≅ △CDE

Statement	Reason
1. ABCD is a parallelogram	1. Given
2. $\overline{AB} \cong \overline{DC}$	2. In a parallelogram, opposite sides are congruent.
3. $\overline{AE} \cong \overline{EC}$	3. In a parallelogram, diagonals bisect each other.
4. $\overline{DE} \cong \overline{EB}$	4. In a parallelogram, diagonals bisect each other.
5. △ABE ≅ △CDE	5. Side-Side-Side congruence

Choose a statement from this list:

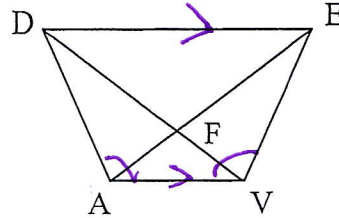$\overline{AE} \cong \overline{EC}$ ✓
ABCD is a parallelogram ✓
$\overline{DE} \cong \overline{EB}$ ✓
△ABE ≅ △CDE
$\overline{AB} \cong \overline{DC}$ ✓

Two-Column Proofs (Continued)

4. Fill-in the statements and reasons for the following proof.

Given: $\overline{DE} \parallel \overline{AV}$

$\triangle DAV \cong \triangle EVA$

Prove: DAVE is an isosceles trapezoid

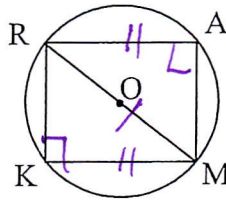| Statement	Reason
1. $\overline{DE} \parallel \overline{AV}$	1. Given
2. $\triangle DAV \cong \triangle EVA$	2. Given
3. DAVE is a trapezoid	3. Definition of trapezoid
4. $\overline{DA} \cong \overline{EV}$	4. Def'n of congruent triangles
5. DAVE is an isosceles trap.	5. Def'n of isosceles trapezoid

Possible Statements	Possible Reasons
DAVE is a trapezoid ✓	Given ✓
$\overline{DA} \cong \overline{EV}$ ✓	Definition of isosceles trapezoid ✓
DAVE is an isosceles trapezoid ✓	Given ✓
$\triangle DAV \cong \triangle EVA$ ✓	Definition of trapezoid ✓
$\overline{DE} \parallel \overline{AV}$ ✓	Definition of congruent triangles

Two-Column Proofs (Continued)

5. Complete the following proof.

Given: $\overline{MR}$ is a diameter of $\odot$ O

$\overline{AR} \cong \overline{MK}$

Prove: $\triangle MAR \cong \triangle RKM$

Statement	Reason
1. $\overline{MR}$ is a diameter of $\odot$ O	1. Given
2. $\overset{\frown}{MAR}$ and $\overset{\frown}{MKR}$ are semicircles	2. Def'n of a semicircle
3. $\angle MAR$ and $\angle MKR$ are right angles	3. An angle inscribed in a semicircle is a right angle
4. $\angle MAR \cong \angle MKR$	4. All right angles are $\cong$
5. $\overline{MR} \cong \overline{MR}$	5. R.P.o C
6. $\overline{AR} \cong \overline{MK}$	6. Given
7. $\triangle MAR \cong \triangle RKM$	7. HL

Choose from this list of reasons.

An angle inscribed in a semicircle is a right angle. ✓
All right angles are congruent ✓
Definition of a semicircle ✓
Given ✓
Given ✓
Hypotenuse-Leg Congruence (HL)
Reflexive property of congruence (R P. C)