3-2 Proofs of Triangles

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Objectives:
- -Prove Triangle Sum Theorem
- -Prove 2 triangles are congruent
- -Prove Perpendicular Bisector Theorem
- -Prove Base Angle Theorem

Things to Remember:

Parallel Lines Cut by a Transversal:

Alternate Interior Angles:

Alternate Exterior Angles:

Linear Pair:

Triangle Interior Angles:

Triangle Exterior Angles:

Reflexive Property:

Definition of Midpoint:

Angle Sum Task

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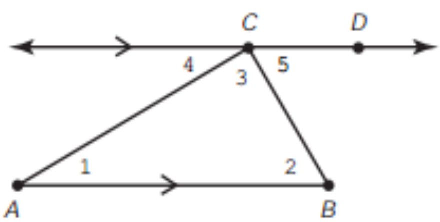
The Triangle Sum Theorem: The sum of the measures of the interior angles of a triangle is 180°.

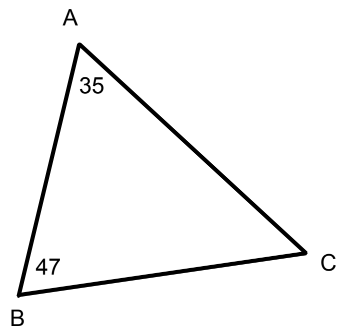
Prove the Triangle Sum Theorem using the diagram shown:

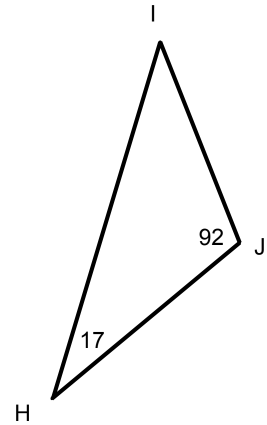


Given: Triangle ABC with AB || CD

Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$

Find the missing angle measures:

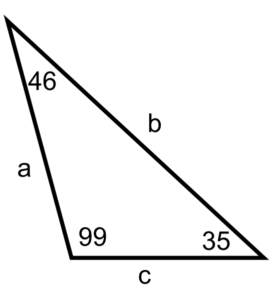




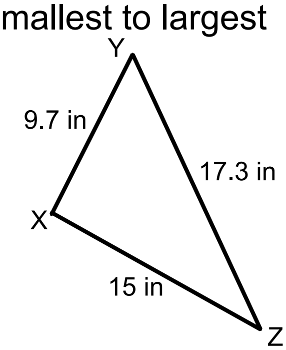
Side/Angle Relationships:

The largest angle is always opposite the longest side. The smallest angle is always opposite the shortest side.

List the sides in order, smallest to largest

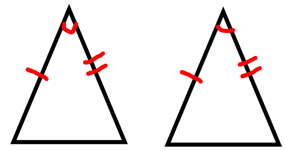


List the angles in order, smallest to largest

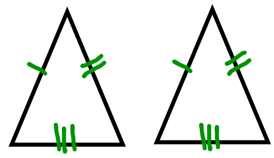


4 Ways to Prove Triangles are Congruent (≅)

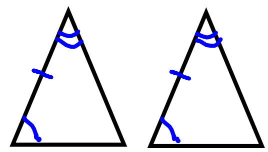
1. Side-Angle-Side (SAS)



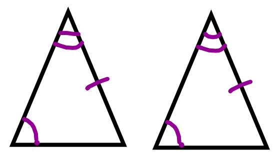
2. Side-Side-Side (SSS)



3. Angle-Side-Angle (ASA)

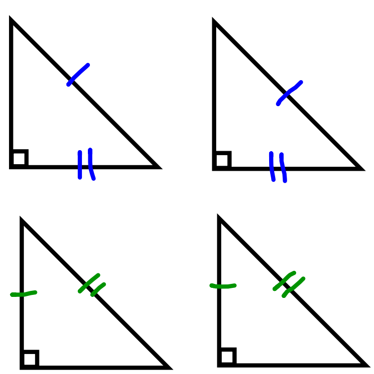


4. Angle-Angle-Side (AAS)



Hypotenuse-Leg:

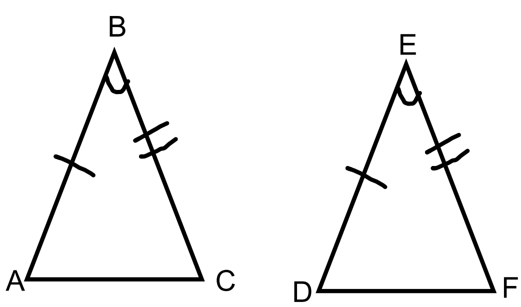
Proving **RIGHT** triangles are congruent



CPCTC

Corresponding Parts of Congruent Triangles are Congruent

Write a congruency statement for each side and angle:



$\angle A \cong$

$\angle B \cong$

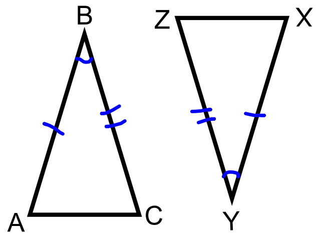
$\angle C \cong$

$\overline{AB} \cong$

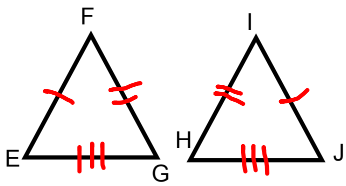
$\overline{BC} \cong$

$\overline{AC} \cong$

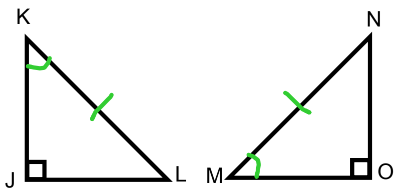
Complete the congruency statement:



Δ ABC ≅



Δ EFG ≅

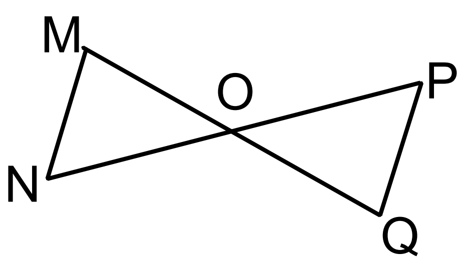


Δ JKL ≅

Given: O is the midpoint of $\overline{MQ}$

O if the midpoint of $\overline{PN}$

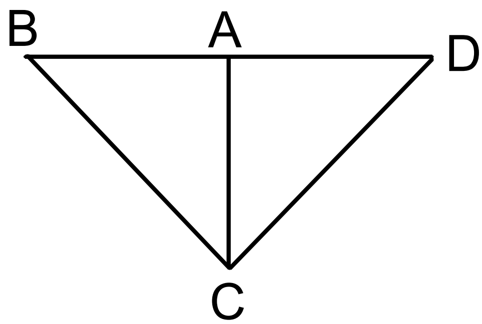
Prove: ΔMON ≅ ΔQOP



Flow Chart

Given: $\overline{AB} \cong \overline{AD}$ and $\overline{BC} \cong \overline{CD}$

Prove: ΔABC ≅ ΔADC

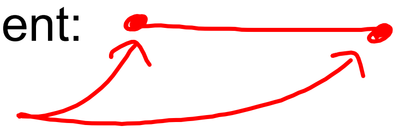


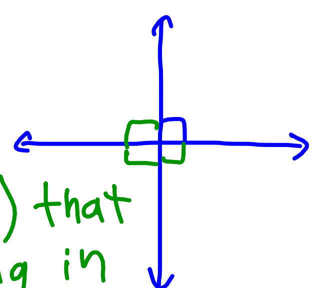
Two-Column

VOCAB

*Perpendicular: 2 lines intersecting at 90°

Line Segment:



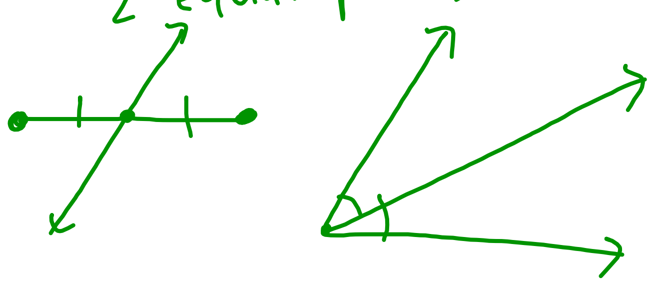


Endpoints:

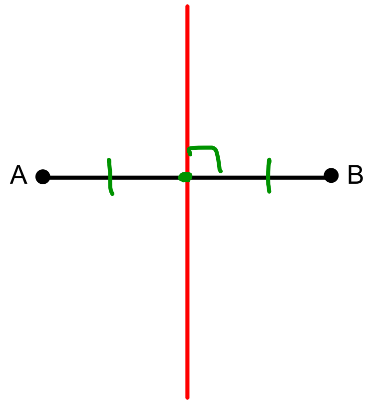
*Bisector: a line (segment, ray) that divides something in 2 equal parts

Equidistant:

↓ equal distance



What would a perpendicular bisector to this line segment look like?

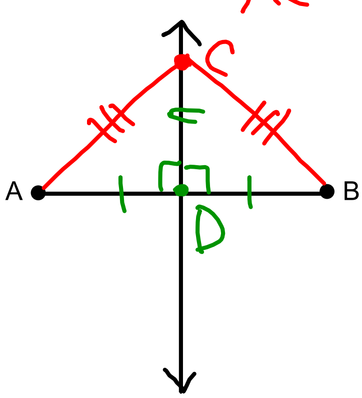


Draw in all congruencies; angles and lengths.

Perpendicular Bisector Theorem: Any point on the perpendicular bisector of a line segment is equidistant from the endpoints of that segment.

Prove this theorem:

$\overline{AC} \cong \overline{BC}$

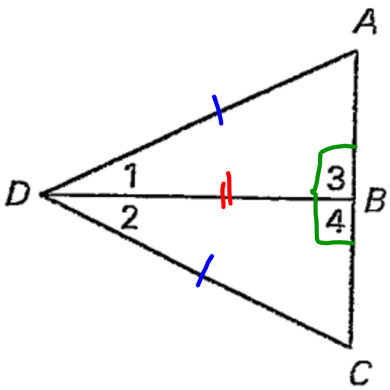


Statements	Reason
$\overline{AD} \cong \overline{BD}$	given
$\angle ADC \cong \angle BDC$	given
$\overline{CD} \cong \overline{CD}$	reflexive
$\triangle ADC \cong \triangle BDC$	SAS
$\overline{AC} \cong \overline{BC}$	CPCTC

Given: $\overline{DA} \cong \overline{DC}$

$DB \perp AC$

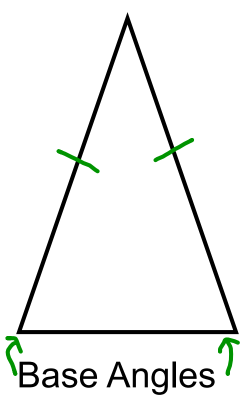
Prove: $\Delta ADB \cong \Delta CDB$



Statement	Reason
$\overline{DA} \cong \overline{DC}$	given
$\angle DBA \cong \angle DBC$	given ($\perp$)
$\overline{DB} \cong \overline{DB}$	reflexive
$\Delta ADB \cong \Delta CDB$	hyp-leg

Isosceles Triangle:

At least 2 sides (called the *legs*) of the triangles are congruent.



Base angle theorem: The base angles of an isosceles triangle are congruent.

Prove Base Angle Theorem: