3-2 Proofs of Triangles

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Objectives: -Prove Triangle Sum Theorem

-Prove 2 triangles are congruent

-Prove Perpendicular Bisector Theorem

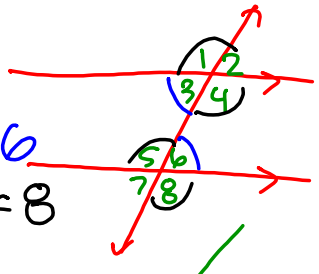
-Prove Base Angle Theorem

Things to Remember:

Parallel Lines Cut by a Transversal:

Alternate Interior Angles: $\angle 3 \cong \angle 6$

Alternate Exterior Angles: $\angle 1 \cong \angle 8$



Linear Pair: Linear Triplet

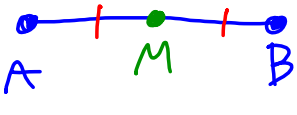
Triangle Interior Angles:

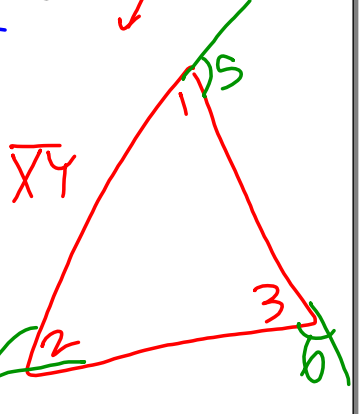
Triangle Exterior Angles:

Reflexive Property: $a = a$ $\overline{XY} \cong \overline{XY}$

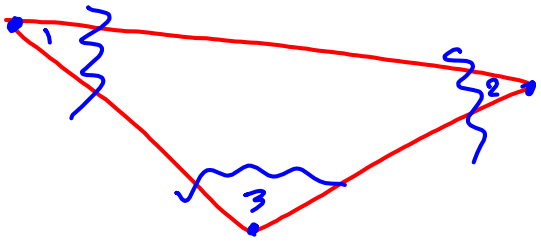
Definition of Midpoint:

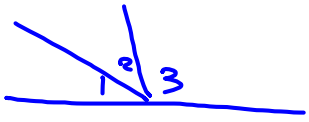
If M is a midpoint of $\overline{AB}$, then $\overline{AM} \cong \overline{MB}$





Angle Sum Task

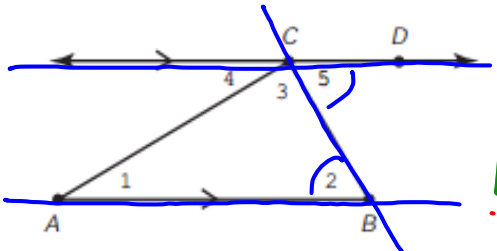




Page 212:

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



Given: Triangle ABC with AB || CD

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

AB // CD
Given

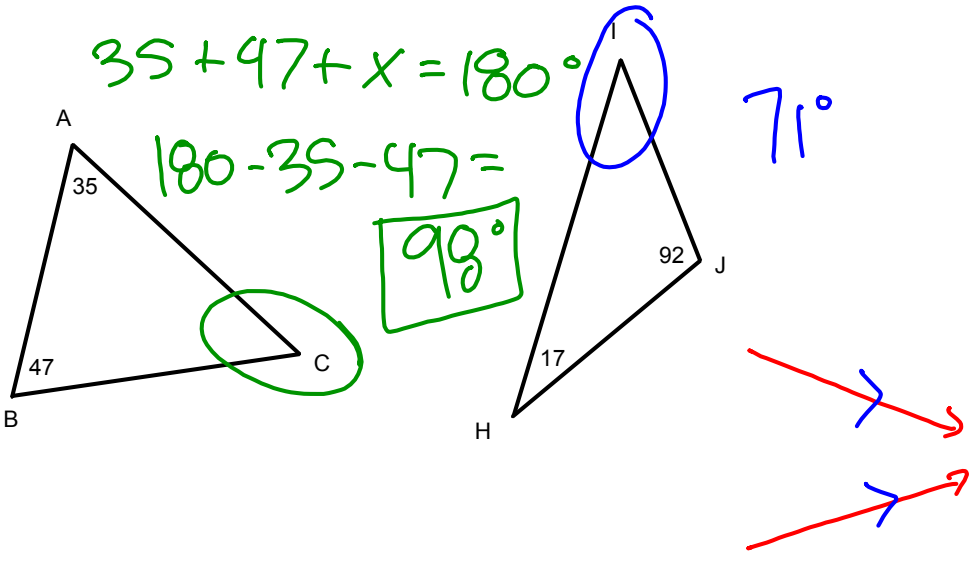
$\angle 4 + \angle 3 + \angle 5 = 180°$
Given

$\angle 4 \cong \angle 1$
AIA

$\angle 5 \cong \angle 2$
AIA

$\angle 1 + \angle 3 + \angle 2 = 180°$
Substitution

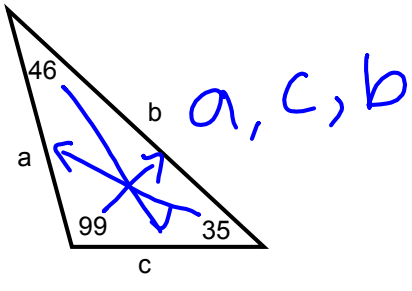
Find the missing angle measures:



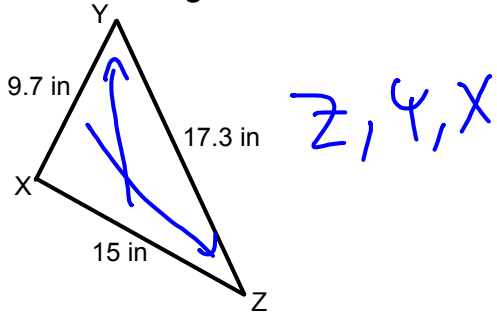
Side/Angle Relationships:

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

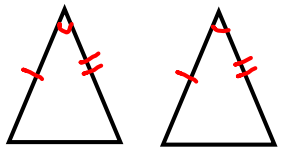


List the angles in order, smallest to largest

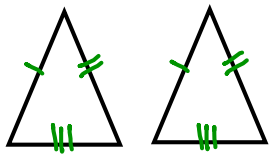


4 Ways to Prove Triangles are Congruent (≅)

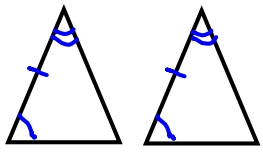
1. Side-Angle-Side (SAS)



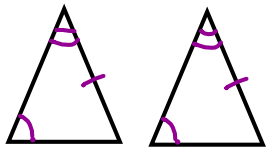
2. Side-Side-Side (SSS)



3. Angle-Side-Angle (ASA)

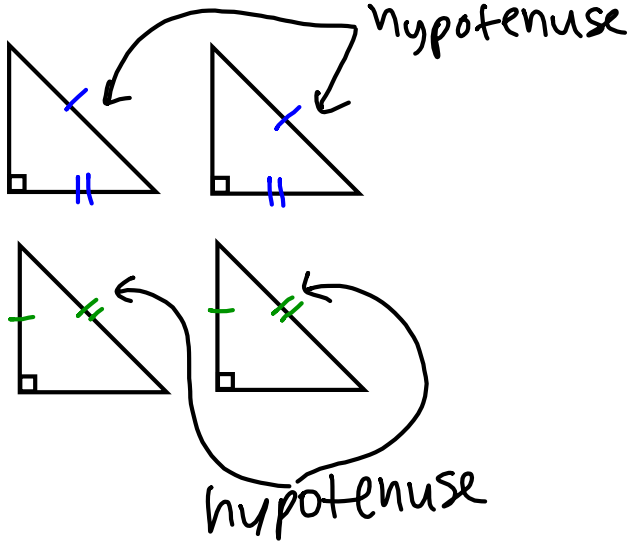


4. Angle-Angle-Side (AAS)



Hypotenuse-Leg:

Proving **RIGHT** triangles are congruent

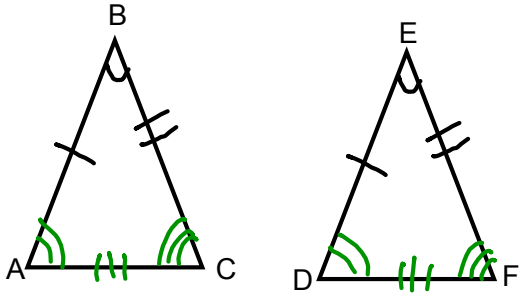


CPCTC

Corresponding Parts of Congruent Triangles are Congruent

Write a congruency statement for each side and angle:

SAS



$\angle A \cong \angle D$ CPCTC

$\angle B \cong \angle E$ given

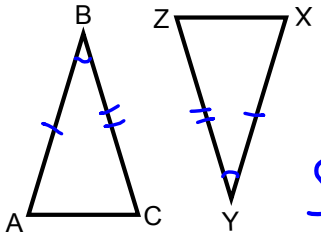
$\angle C \cong \angle F$ CPCTC

$\overline{AB} \cong \overline{DE}$ given

$\overline{BC} \cong \overline{EF}$ given

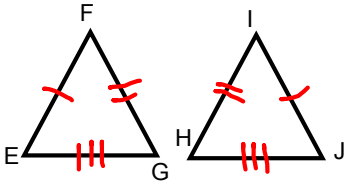
$\overline{AC} \cong \overline{DF}$ CPCTC

Complete the congruency statement:



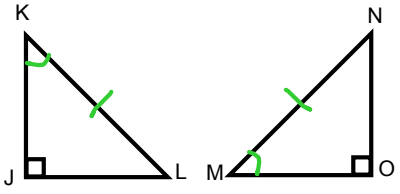
$\Delta ABC \cong \Delta XYZ$

SAS



$\Delta EFG \cong \Delta JIH$

SSS



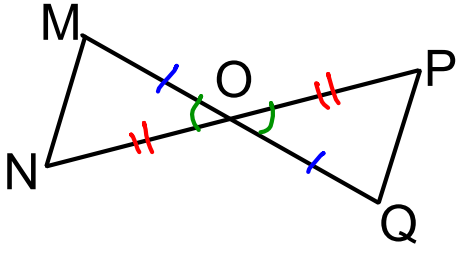
$\Delta JKL \cong \Delta OMN$

AAS

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

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

Prove: $\Delta MON \cong \Delta QOP$

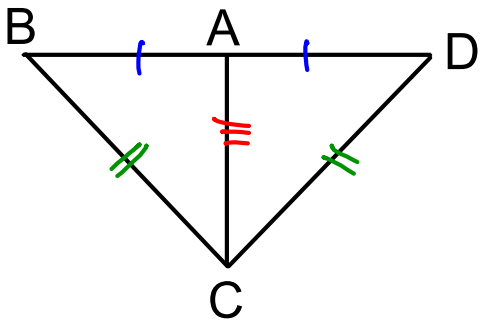


Flow Chart

Statement	Reason
O is mid. of $\overline{MQ}$	Given
O is mid. $\overline{PN}$	Given
$\overline{MO} \cong \overline{OQ}$	def of mid.
$\overline{PO} \cong \overline{ON}$	def of mid.
$\angle POQ \cong \angle MON$	V.A.
$\Delta MON \cong \Delta QOP$	SAS

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

Prove: $\Delta ABC \cong \Delta ADC$



Two-Column

Statement	Reason
$\overline{AB} \cong \overline{AD}$	Given
$\overline{BC} \cong \overline{CD}$	Given
$AC \cong AC$	Reflexive
$\Delta ABC \cong \Delta ADC$	SSS

VOCAB

Perpendicular:

Line Segment:

Endpoints:

Bisector:

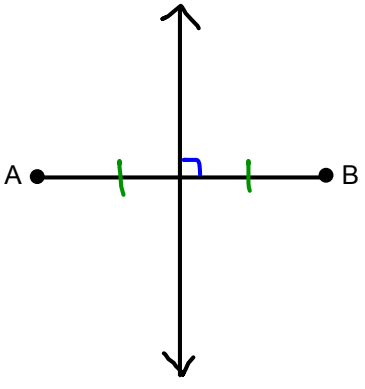
Equidistant:

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.

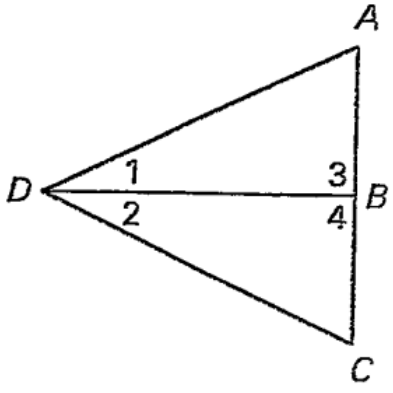
Prove this theorem:



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

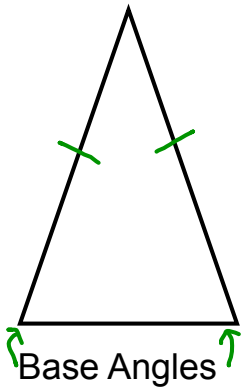
$DB \perp AC$

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



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: