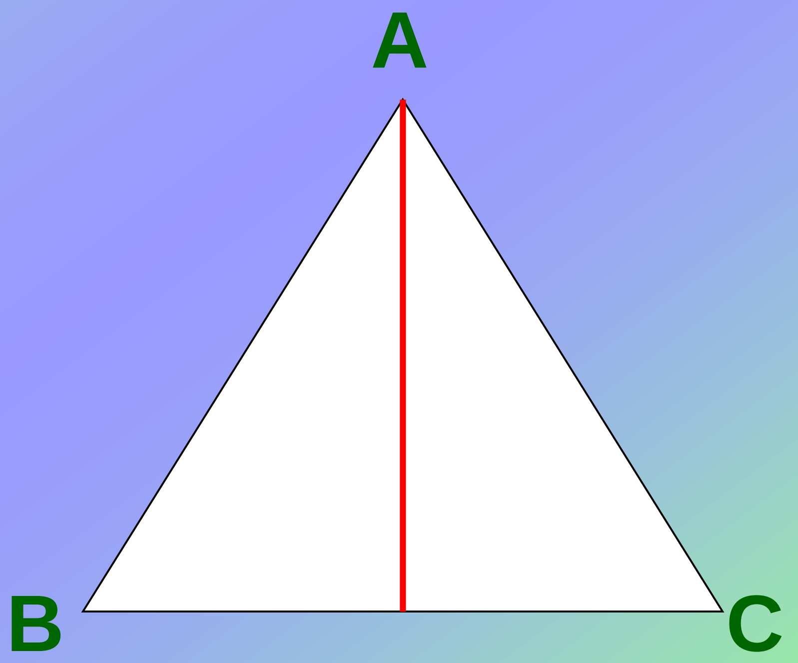
Section 3.4

Beyond CPCTC

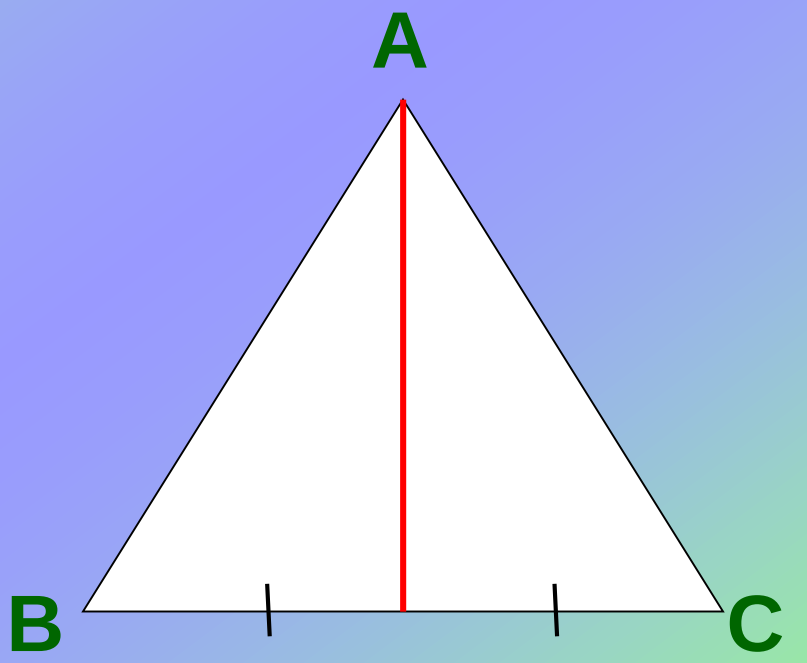
Median

- A median of a triangle is a line segment drawn from any vertex of the triangle to the midpoint of the opposite side.



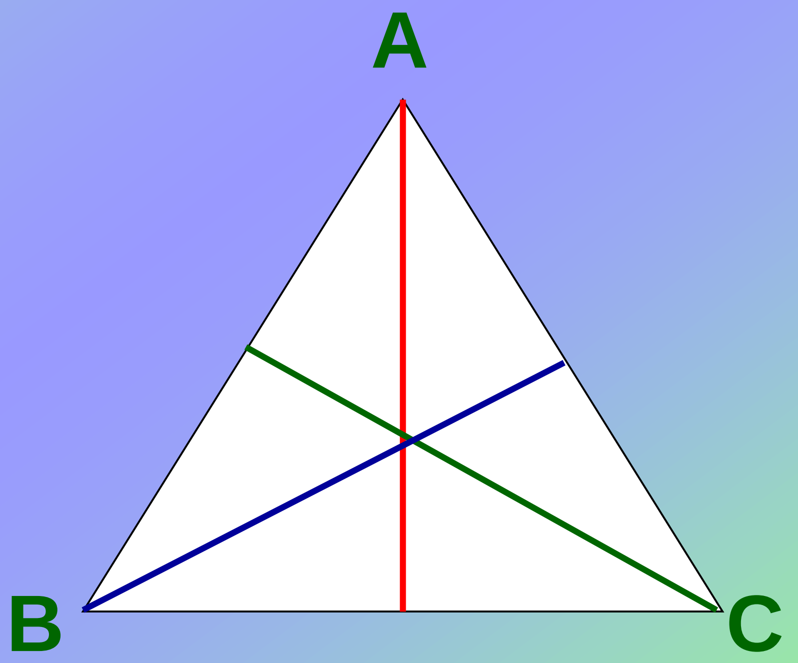
Median

- A median divides the opposite side into two congruent segments, or bisects the side to which it is drawn.



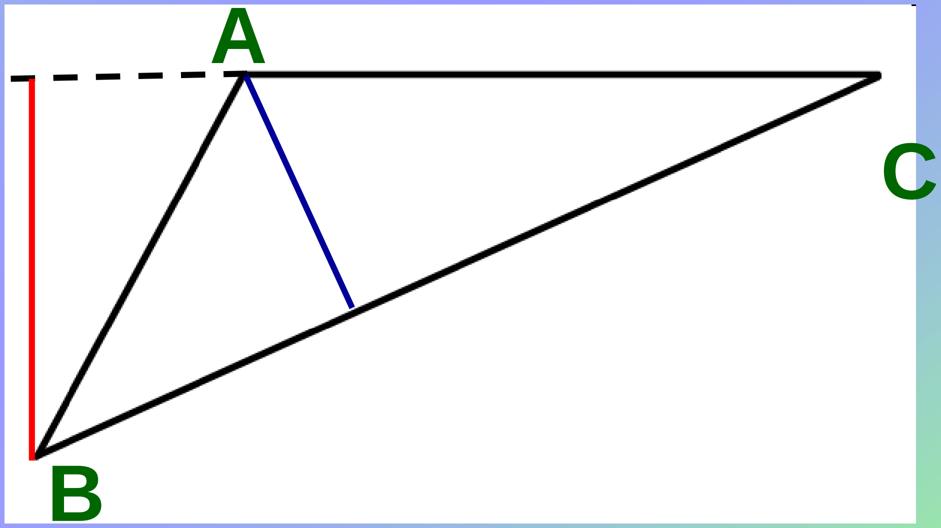
Median

- ***Every*** triangle has three medians.



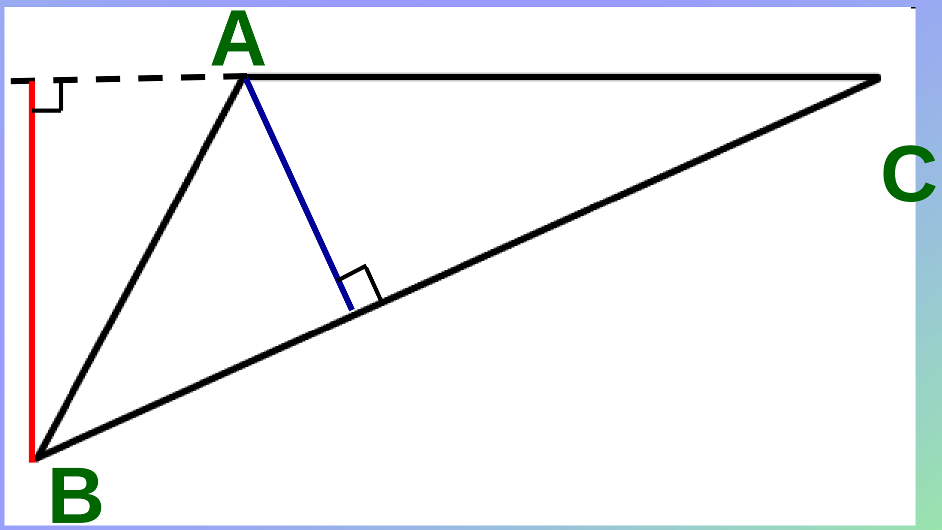
Altitude

- An altitude of a triangle is a line segment drawn from any vertex of the triangle to the opposite side, extended if necessary, and perpendicular to that side.



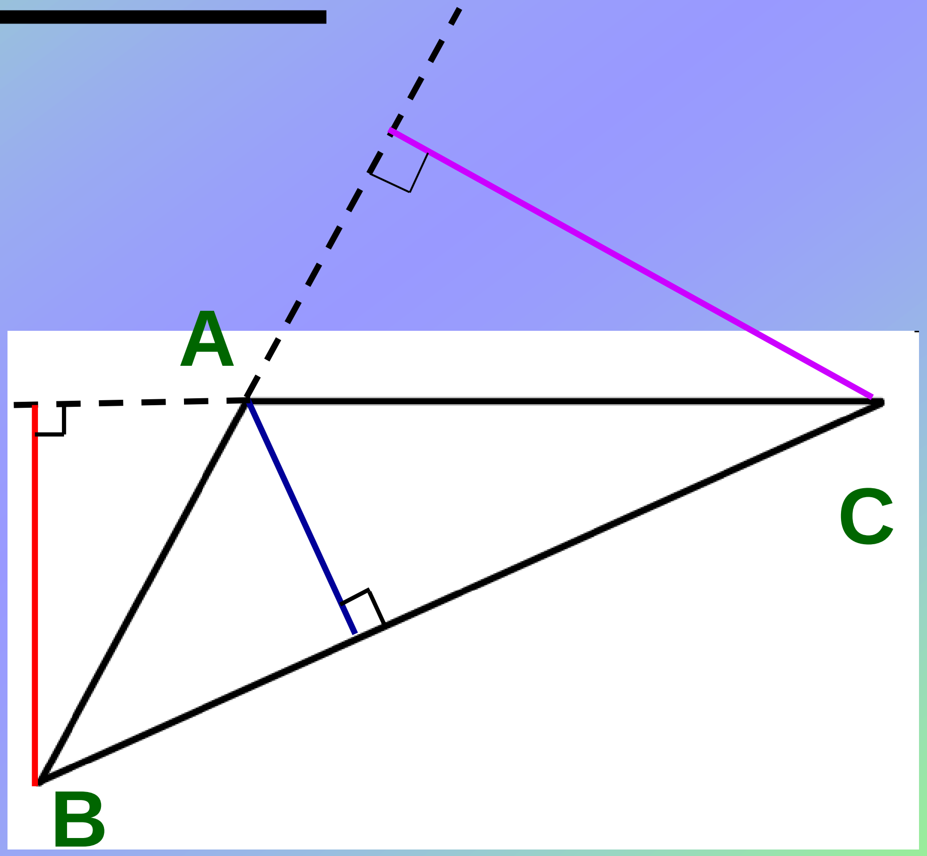
Altitude

- An altitude of a triangle forms a right angle with the side to which it is drawn.



Altitude

- Every triangle has three altitudes.



Median or Altitude?

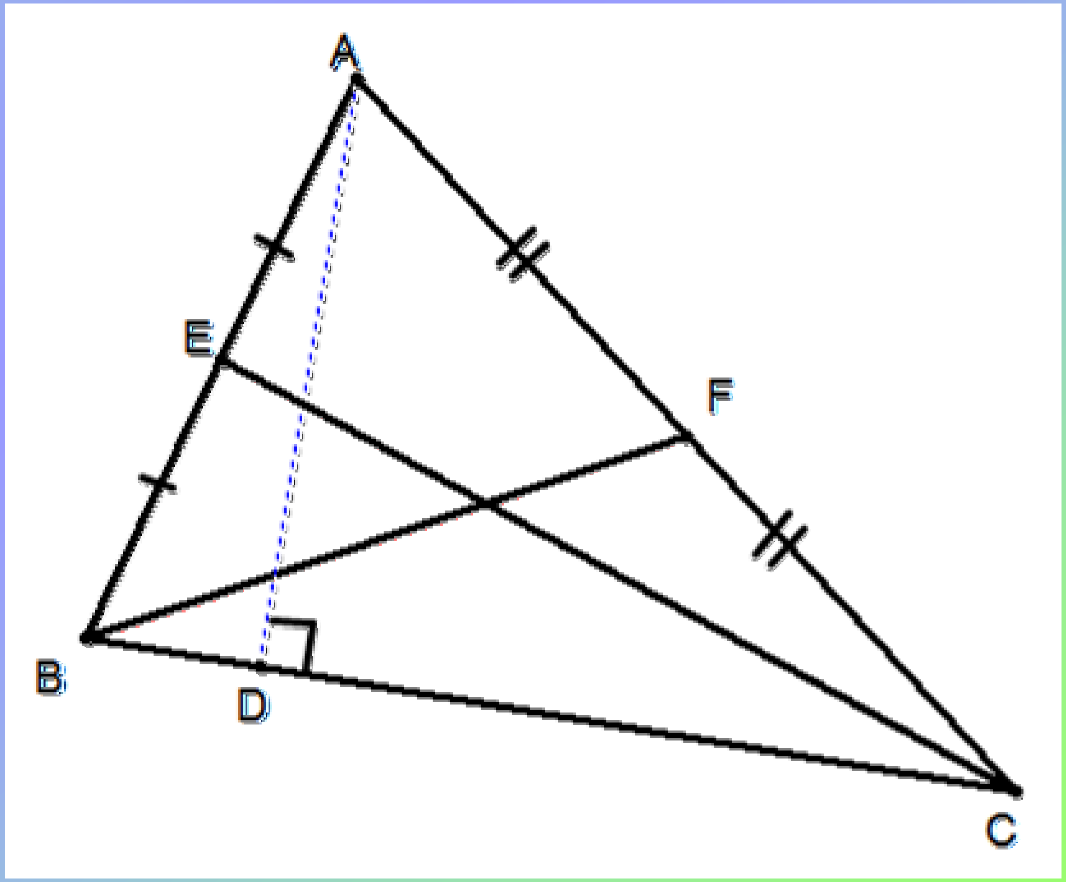
- Identify the median(s) and altitude(s) shown in each of the following diagrams:

Median(s):

$\overline{CE}$, $\overline{BF}$

Altitude(s):

$\overline{AD}$



Median or Altitude?

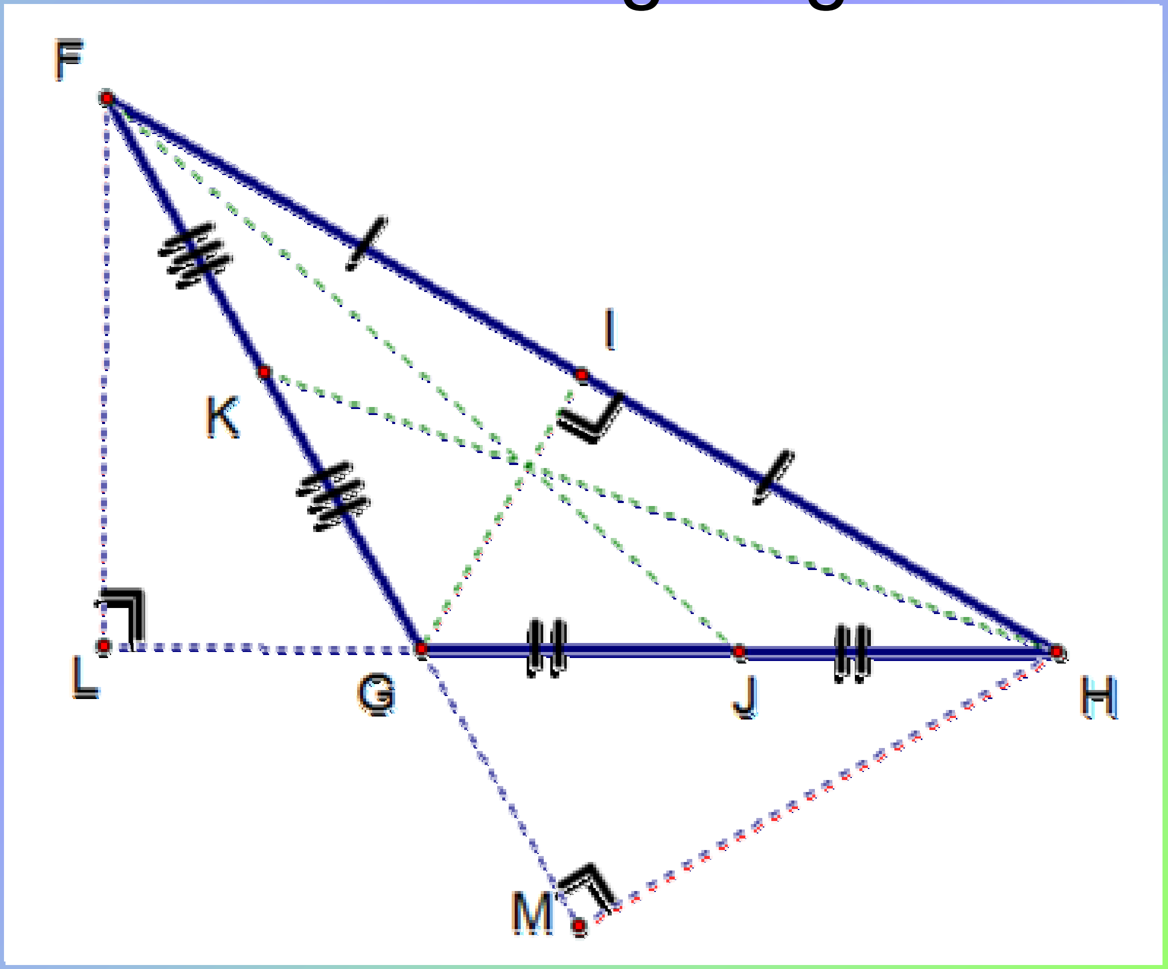
- Identify the median(s) and altitude(s) shown in each of the following diagrams:

Median(s):

$\overline{GI}$, $\overline{FJ}$, $\overline{HK}$

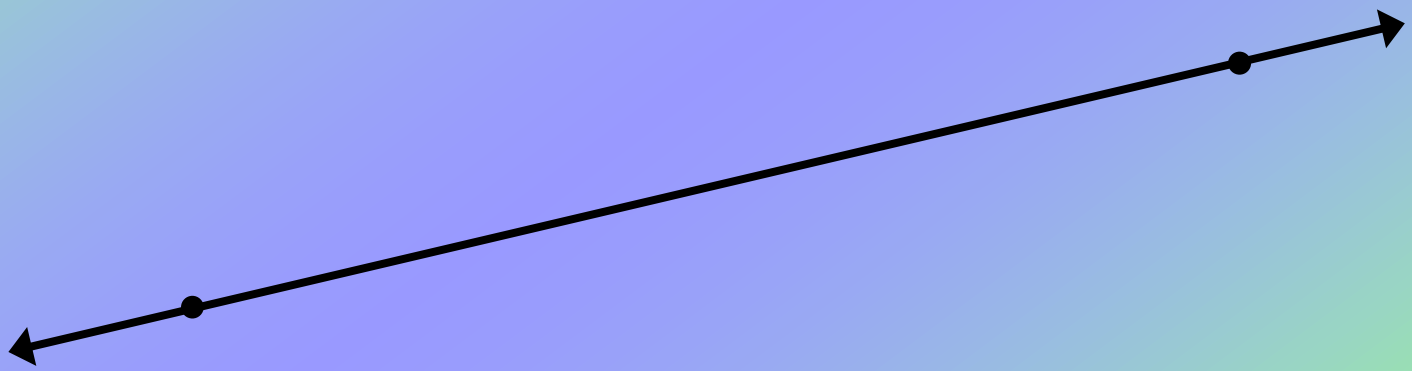
Altitude(s):

$\overline{GI}$, $\overline{FL}$, $\overline{HM}$



Postulate

- Two points determine a line (or ray or segment).



Auxiliary Lines

- Given:

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

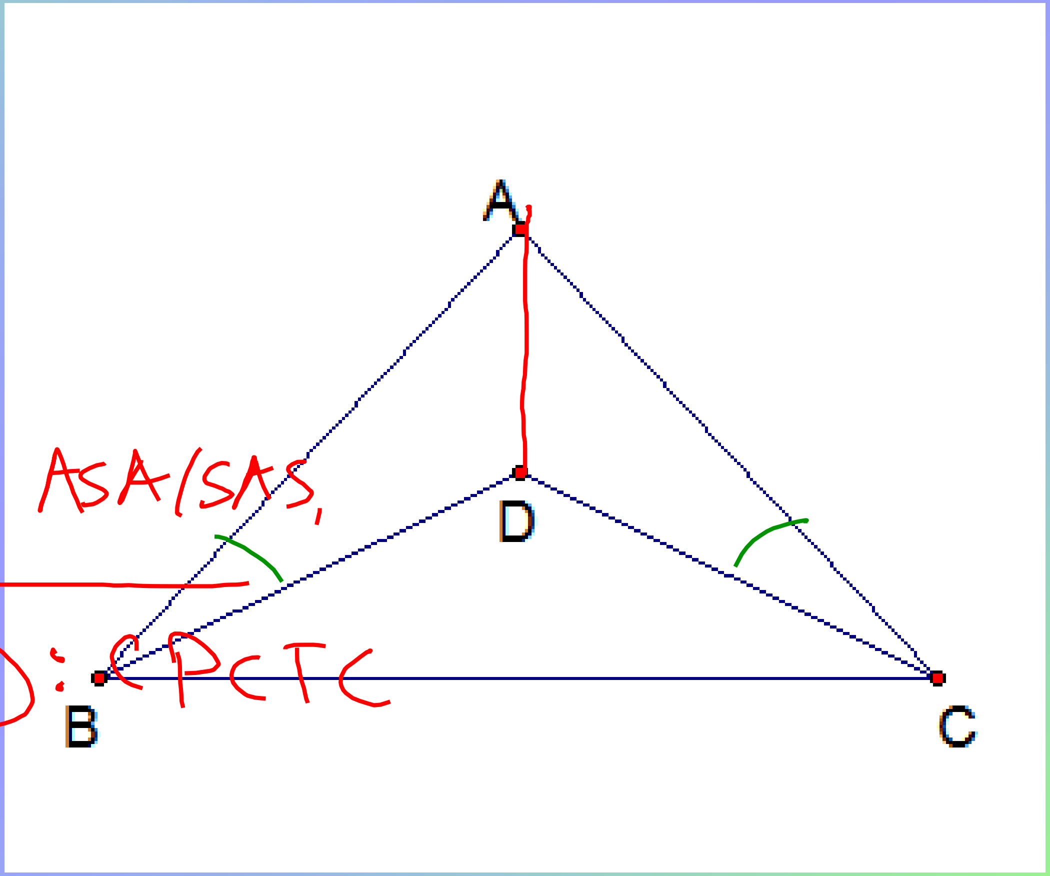
$$\overline{BD} \cong \overline{CD}$$

2 Δ's ≅ : ASA/SAS,

- Prove:

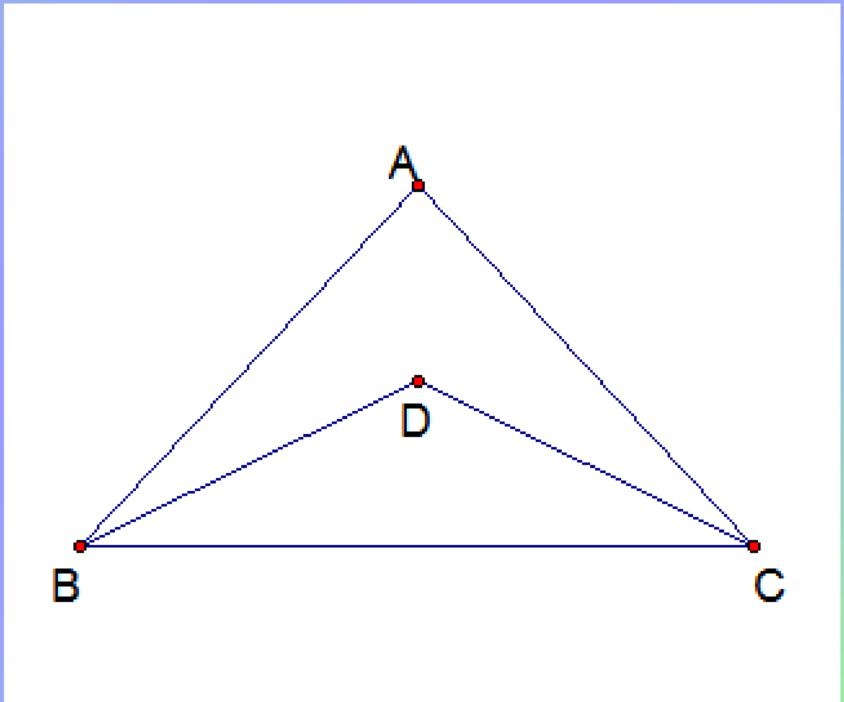
$$\angle ABD \cong \angle ACD$$

: CPCTC



Auxiliary Lines

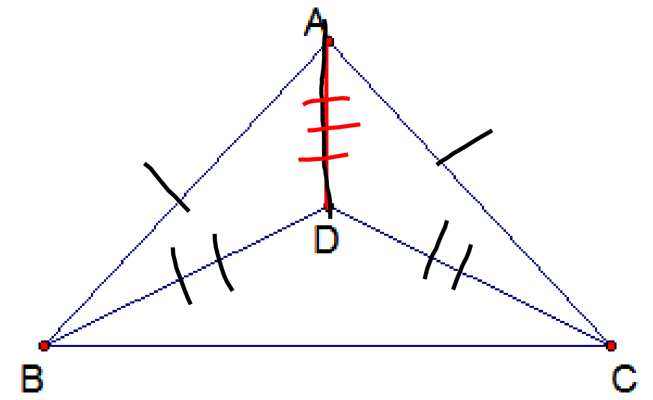
- Sometimes, it may be necessary or helpful to add lines, rays, or segments to a given diagram. We can connect any two points already in our diagram, using the previous postulate as justification – any two points determine a line.



- Given: $\overline{AB} \cong \overline{AC}$

  $\overline{BD} \cong \overline{CD}$

- Prove: $\angle ABD \cong \angle ACD$

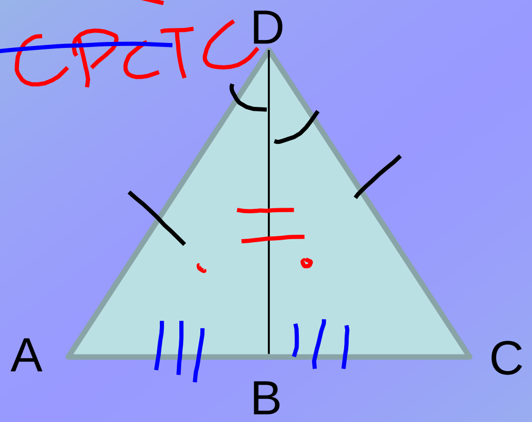


Statements	Reasons
1. $\overline{AB} \cong \overline{AC}$, $\overline{BD} \cong \overline{CD}$	1. Given
2. Draw $\overline{AD}$	2. Two points determine a line.
3. $\overline{AD} \cong \overline{AD}$	3. Reflexive Property
4. $\triangle ABD \cong \triangle ACD$	4. SSS (1, 1, 3)
5. $\angle ABD \cong \angle ACD$	5. CPCTC

Given: $\overline{AD} \cong \overline{CD}$

$\angle ADB \cong \angle CDB$

Prove: $\overline{DB}$ *is the median to* $\overline{AC}$



Statements	Reasons
1) $\overline{AD} \cong \overline{CD}$	1) Given
2) $\angle ADB \cong \angle CDB$	2) Given
3) $\overline{DB} \cong \overline{DB}$	3) Reflexive
4) $\Delta DAB \cong \Delta DCB$	4) SAS
5) $\overline{AB} \cong \overline{BC}$	5) CPCTC
6) $\overline{DB}$ *is the median to* $\overline{AC}$	6) Definition of median