

Points of Concurrency

	Incenter	Circumcenter	Centroid	Orthocenter
Formed by intersection of:	Angle Bisectors	Perpendicular Bisectors	Medians	Altitudes
Definition of segments	At each vertex, bisects angle into two \cong parts.	Bisects a side into two \cong parts and forms a 90° angle.	Connects a vertex to midpoint of the opposite side.	Connects a vertex at 90° (perpendicular) to opposite side (or extension of).
Location	Always Inside	<ul style="list-style-type: none"> • Inside (Acute Δ) • ON (Right Δ - at midpoint of hypotenuse) • Outside (Obtuse Δ) 	Always Inside	<ul style="list-style-type: none"> • Inside (Acute Δ) • ON (Right Δ - at vertex of right angle) • Outside (Obtuse Δ)
Segments ARE NOT always ...	<ul style="list-style-type: none"> ○ passing through midpoint of opposite side. ○ perpendicular (90°) to opposite side. 	<ul style="list-style-type: none"> ○ angle bisectors. 	<ul style="list-style-type: none"> ○ angle bisectors. ○ perpendicular (90°) to opposite side. 	<ul style="list-style-type: none"> ○ angle bisectors. ○ passing through midpoint of opposite side.
Special properties:	<ul style="list-style-type: none"> ➤ equidistant from the sides of the Δ. ➤ center of the inscribed circle. 	<ul style="list-style-type: none"> ➤ equidistant from the vertices of the Δ. ➤ center of circumscribed circle. 	<ul style="list-style-type: none"> ➤ located $\frac{2}{3}$ the distance from vertex to side. ➤ 2:1 ratio from vertex. ➤ center of gravity of Δ. 	<ul style="list-style-type: none"> ➤ NOTHING!

	Incenter	Circumcenter	Centroid	Orthocenter
Drawing / Picture (acute Δ)				
(right Δ)				
(obtuse Δ)				

Special Δ s,
special

properties:

Equilateral Δ s: All 4 points are located at the same point.

Isosceles Δ s: All 4 points are collinear.