# Special Segments in Triangles

**Altitude**:  A segment that has an endpoint at a vertex of a triangle and the other is on the side opposite the vertex and perpendicular to this line. (The altitude may lie on the outside or inside of the triangle.)

**Orthocenter**:  The intersection of the altitudes of a triangle.

**Perpendicular Bisector**:  A line or line segment that passes through the midpoint of a side of a triangle *and* is perpendicular to that side.

**Circumcenter**:  Point of intersection of the perpendicular bisectors of a triangle.  The circumcenter is equidistant from the vertices of the triangle.

**Median**:  A segment that connects a vertex of a triangle to the midpoint of the side opposite the vertex.

**Centroid**:  Point of intersection of the medians of a triangle.  The centroid is two-thirds of the distance from each vertex to the midpoint of the opposite side.

**Angle Bisector**:  A segment that bisects an angle of the triangle and has one endpoint at a vertex of the triangle and the other on another point on the triangle.

**Incenter**:  The intersection of the angle bisectors of a triangle.  The incenter is equidistant from the three sides of the triangle.

*Any point on the perpendicular bisector of a segment is equidistant from the endpoints of the segment.*

*Any point that is equidistant from the endpoints of a segment lies on the perpendicular bisector of the segment.*

*Any point on the bisector of an angle is equidistant from the sides of the angle.*

*Any point on or in the interior of an angle and equidistant for the sides of an angle lies on the bisector of the angle.*

**Special Triangles**:

Isosceles Triangle:  The median, angle bisector, altitude, and perpendicular bisector from the same vertex is the same segment.  The centroid, incenter, orthocenter, and circumcenter will be collinear.

Equilateral Triangle:  The medians, angle bisectors, altitudes, and perpendicular bisectors from each vertex form three segments on the interior of the triangle.  The centroid, incenter, orthocenter, and circumcenter are all the same point.

Right Triangle:  Two of the altitudes are the legs of the triangle. The orthocenter lies on the vertex of the right angle.

Euler Segment:  The segment formed by connecting the Centroid, Orthocenter and Circumcenter.  (They are always collinear)