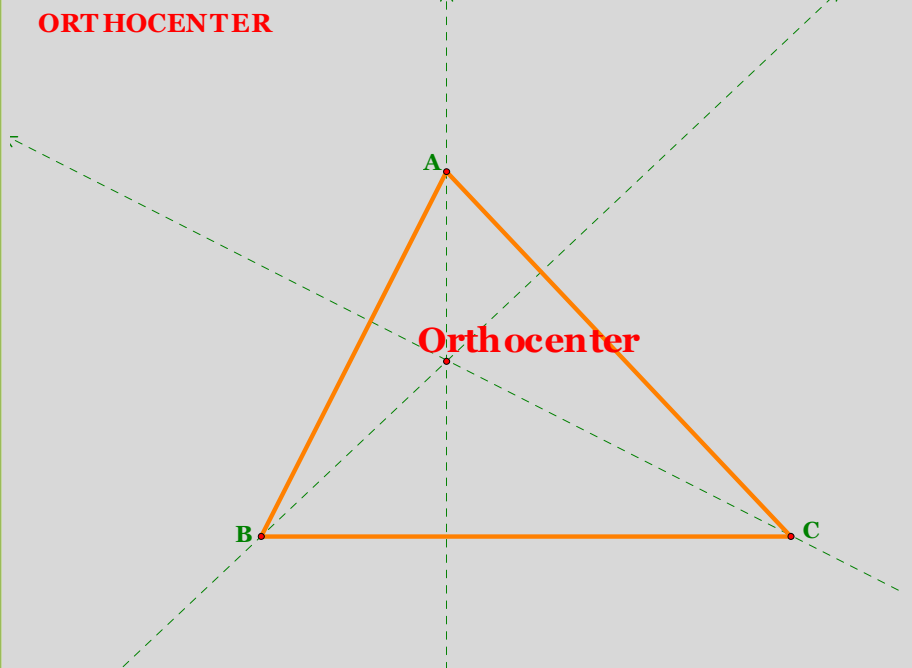
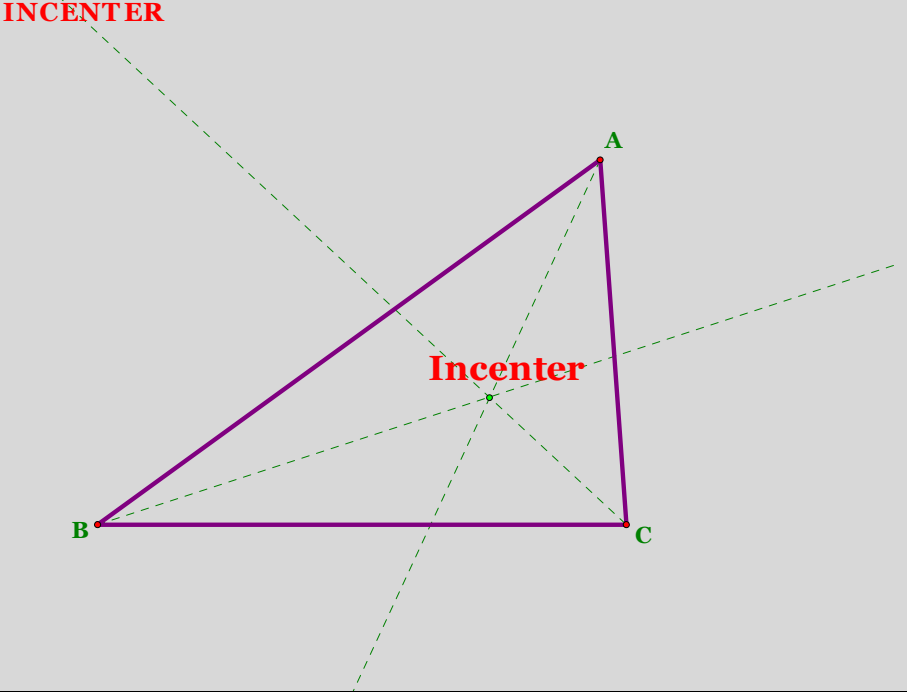


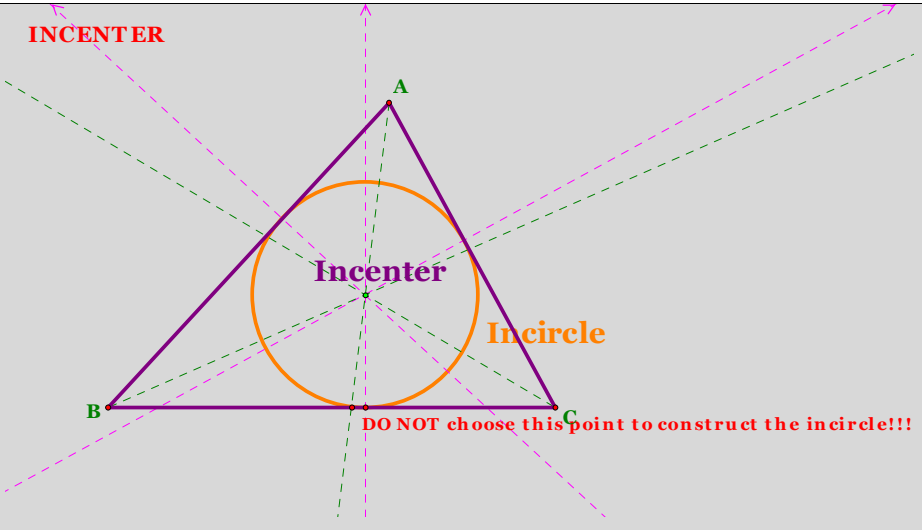
Centers of Triangle

1. Orthocenter

Definition	Intersection of three altitudes
How To	<ol style="list-style-type: none"> Construct a triangle using “Line” command on the left menu Choose one vertex and opposite side by click Go to “Construct” and click “Perpendicular Line” Repeat b & c for other vertices Find the intersection of three altitudes, and this is the “Orthocenter” of your triangle
GSP	
Properties	<ul style="list-style-type: none"> Can exist outside of the triangle
References	
Animation	Orthocenter Ani.gsp

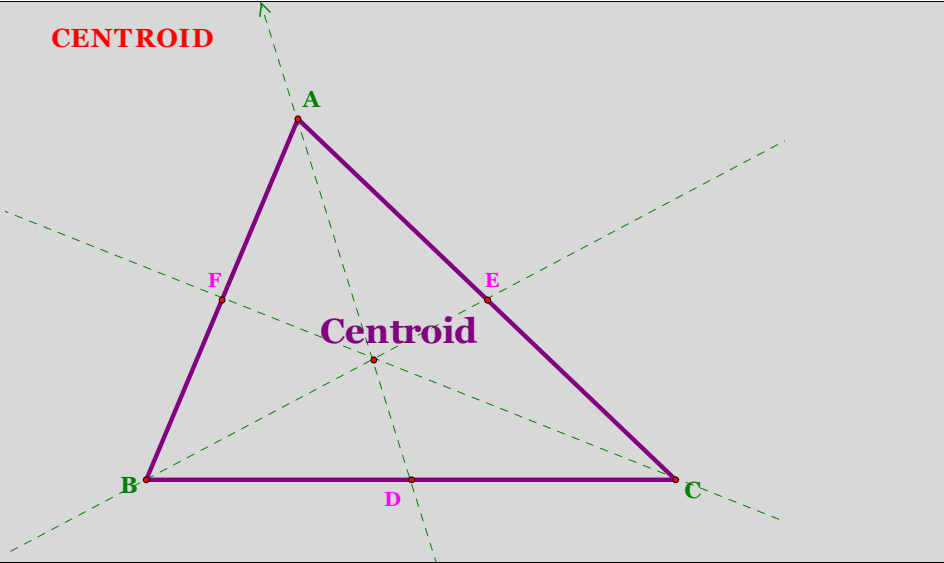
2. Incenter

Definition	Intersection of three angle bisectors
How To	<ol style="list-style-type: none"> Construct a triangle using “Line” command on the left menu Choose three vertices in order (e.g. if you want to choose angle A, then click B-A-C or C-A-B in order) Go to “Construct” and click “Angle Bisector” Repeat b & c for other vertices Find the intersection of three angle bisectors, and this is the “Incenter” of your triangle
GSP	
Properties	<ul style="list-style-type: none"> ▪ Equidistance to each side ▪ Always exsist inside of the triangle

References	 <p>➤ When you construct the incenter, you should find an intersecting point that is perpendicular to each side and passes through “Incenter.”</p>
Animation	<p>Incenter Ani.gsp</p>

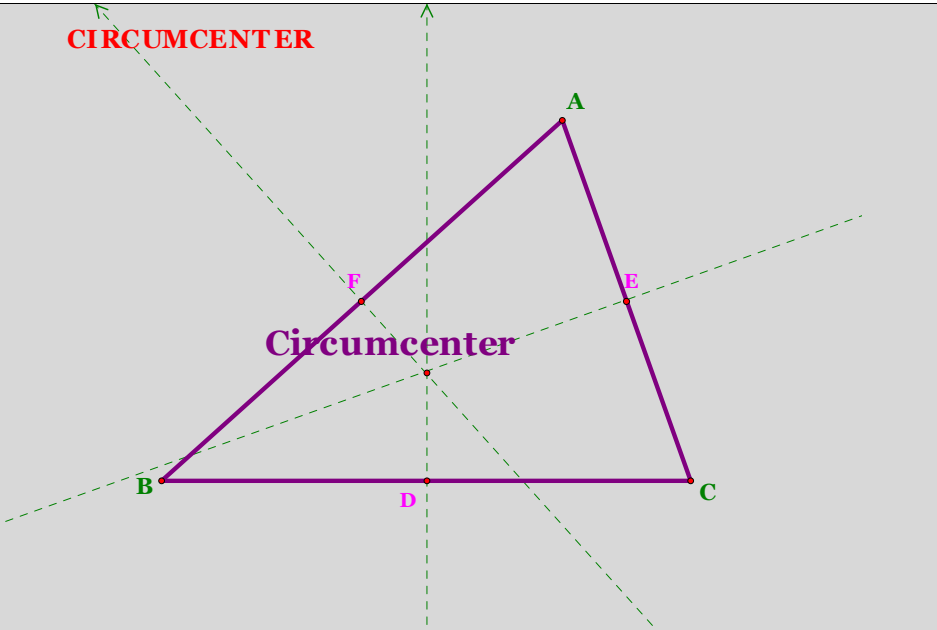
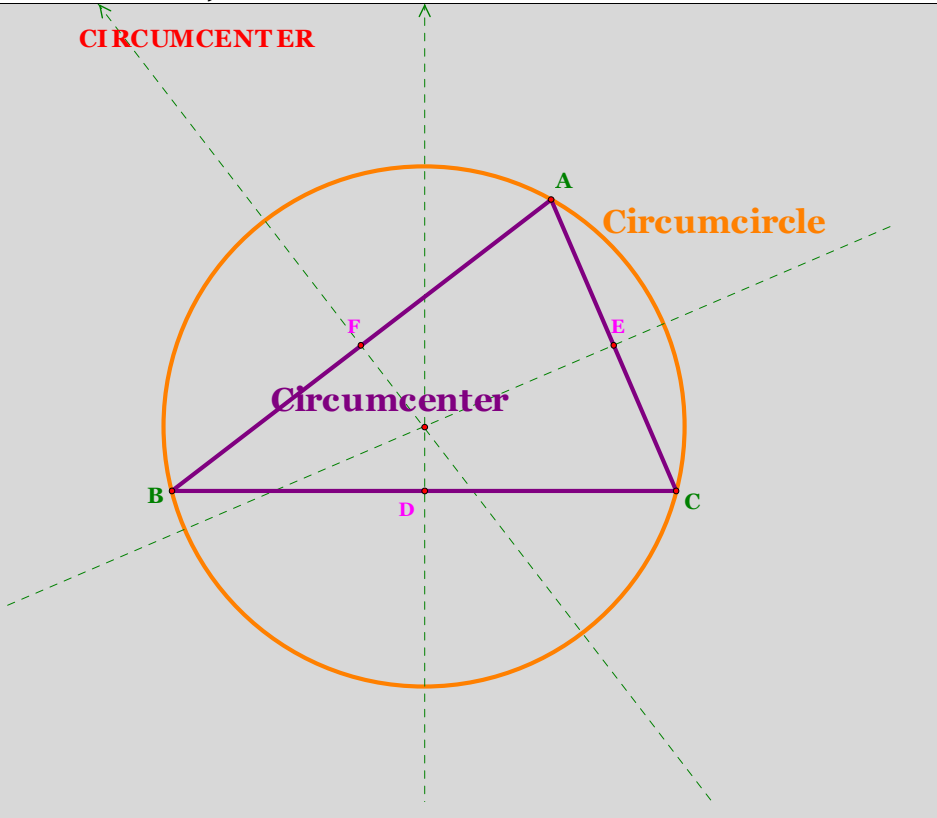
3. Centroid

Definition	Intersection of three medians
How To	<ol style="list-style-type: none"> a. Construct a triangle using “Line” command on the left menu b. Choose a side c. Go to “Construct” and click “Midpoint” d. Choose the midpoint and opposite vertex e. Go to “Construct” again and click “Line” f. Repeat b ~ e for other sides g. Find the intersection of three medians, and this is the “Centroid” of your triangle

GSP	
Properties	<ul style="list-style-type: none"> ▪ Always exist inside of the triangle (→ moves “left & right”, parallel to the base)
References	
Animation	Centroid Ani.gsp

4. Circumcenter

Definition	Intersection of three perpendicular bisectors
How To	<ol style="list-style-type: none"> a. Construct a triangle using “Line” command on the left menu b. Choose a side c. Go to “Construct” and click “Midpoint” d. Choose the midpoint and the side that includes the midpoint e. Go to “Construct” again and click “Perpendicular Line” f. Repeat b ~ e for other sides g. Find the intersection of three perpendicular bisectors, and this is the “Circumcenter” of your triangle

<p>GSP</p>	 <p>A diagram showing a purple triangle with vertices A, B, and C. Three dashed green lines represent the perpendicular bisectors of the sides: one vertical line through base BC at point D, one diagonal line through side AC at point E, and one diagonal line through side AB at point F. The intersection of these three lines is marked with a red dot and labeled "Circumcenter" in purple. A red arrow points from the word "CIRCUMCENTER" in red text to this intersection point.</p>
<p>Properties</p>	<ul style="list-style-type: none"> ▪ Equidistance from each vertex (→ “Perpendicular Bisector Theorem”) ▪ Can exist outside of the triangle ▪ Always be on the perpendicular bisector of the base (→ moves “up & down”)
<p>References</p>	 <p>A diagram showing the same purple triangle with vertices A, B, and C. A large orange circle, labeled "Circumcircle" in orange text, is drawn such that it passes through all three vertices. The circumcenter, marked with a red dot and labeled "Circumcenter" in purple, is located at the intersection of the perpendicular bisectors (dashed green lines). A red arrow points from the word "CIRCUMCENTER" in red text to this intersection point.</p>

Animation [Circumcenter Ani.gsp](#)

✚ Questions

- “Why do these three line segments intersect?”
- “When are all the centers same?”
 - Equilateral triangles since it is symmetric
 - Isosceles triangles also have special property → INCENTER and CENTROID are collinear
- “Why does CENTROID move along the parallel line to the base?”
- “Why does CIRCUMCENTER move along the perpendicular bisector to the base?”