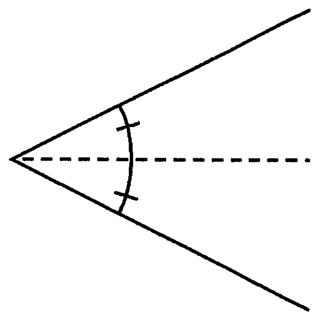
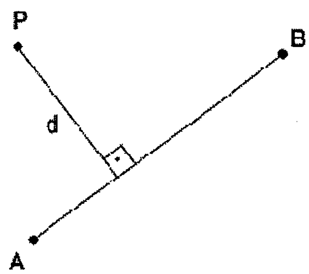
Geometry
Points of Concurrency Notes
Incenter and Circumcenter

Essential Question: What are the properties of an angle bisector?

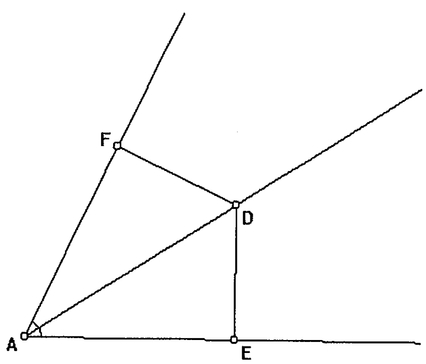
- An ________________ ___________________ is a segment, ray, line or plane that intersects an angle to form two adjacent ____________________ angles.



- The **distance from a point to a line** is the length of the ______________________________ segment from the point to the line.



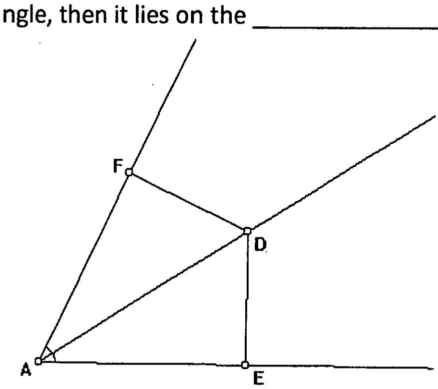
Angle Bisector Theorem: If a point is on the bisector of an angle, then it is _________________________ from the two sides of the angle.



In other words:

If ∠FAD ≅ ∠EAD, then _________________.

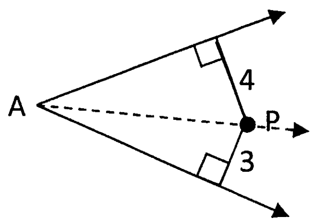
Converse of the Angle Bisector Theorem: If a point is in the interior of an angle and is equidistant from the sides of the angle, then it lies on the __________________ of the angle.



In other words:

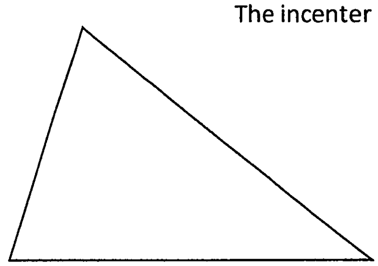
If FD = ED, then ___________________________.

Example 1: Can you conclude that P is on the bisector of $\angle A$? Explain.



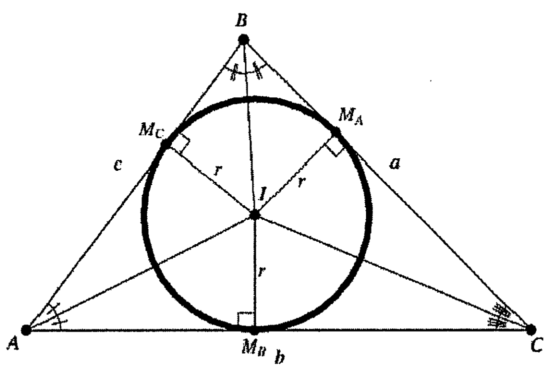
- When three or more lines (or rays or segments) __________________ in the same point, they are called **concurrent lines**. The point of intersection of the lines is called the ______________ _____ ____________________________.
- The point of concurrency of the **angle bisectors** of a triangle is called the ______________________________ of the triangle.

Sketch a picture of the incenter.



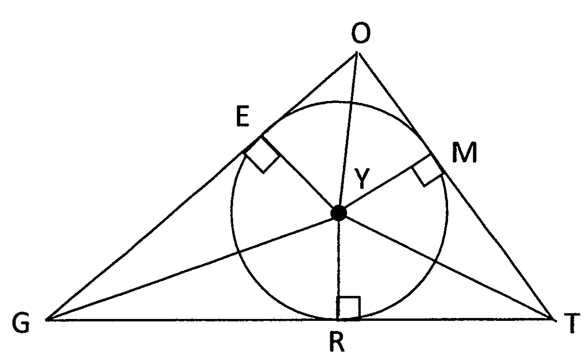
The incenter is always _______________ a triangle.

Theorem: The angle bisectors of a triangle intersect at a point that is _________________________ from the ______________ of the triangle.



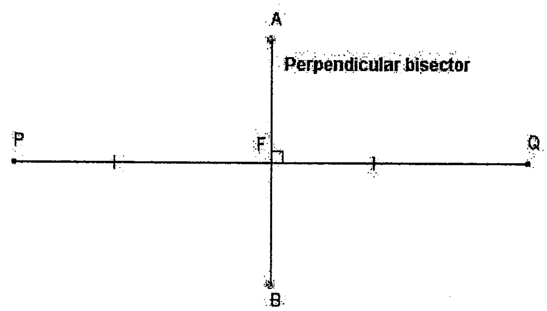
Since the incenter is equidistant from the sides of a triangle, then an ______________________ circle can be drawn. An inscribed circle is a circle with a center at the incenter and a radius that is the distance to the sides

Example 2: If point Y is the incenter, find YR and MT if TY = 26 and RT = 24.

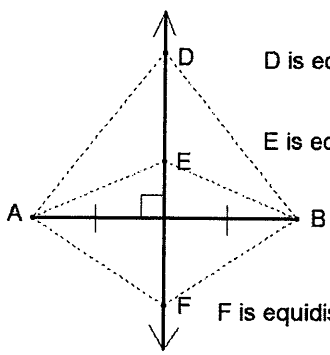


Essential Question: What are the properties of a perpendicular bisector?

- A **perpendicular bisector** is a segment, ray, line or plane that is ______________________ to a segment at its ____________________.



Perpendicular Bisector Theorem: If a point is on the perpendicular bisector of a segment, then it is ________________________ from the endpoints of the segment.



D is equidistant to A and B

E is equidistant to A and B

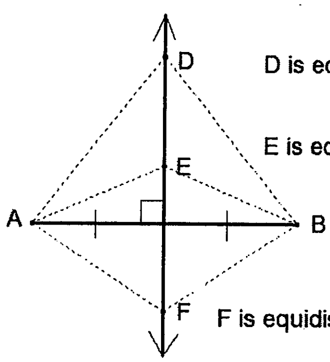
F is equidistant to A and B

In other words:

If $\overleftrightarrow{DF}$ is the perpendicular bisector of $\overline{AB}$, then AD = BD, AE = BE, and AF = BF.

Converse of the Perpendicular Bisector Theorem: If a point is equidistant from the endpoints of a segment, then it is on the ____________________________ ____________________

of the segment.



D is equidistant to A and B

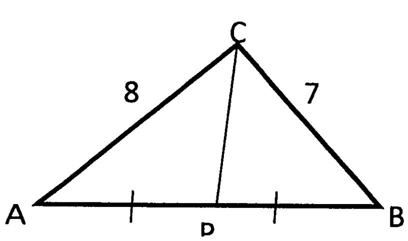
E is equidistant to A and B

F is equidistant to A and B

In other words:

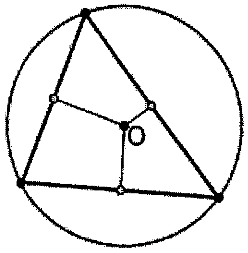
If AD = BD, AE = BE, and AF = BF, then, $\overleftrightarrow{DF}$ is the perpendicular bisector of $\overline{AB}$.

Example 1: Can you conclude that C is on the perpendicular bisector of $\overline{AB}$? Explain.

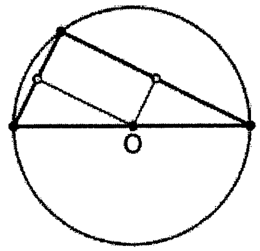


- A **perpendicular bisector of a triangle** is a segment, ray, or line that is ________________________ to a side of the triangle at the __________________ of the side.

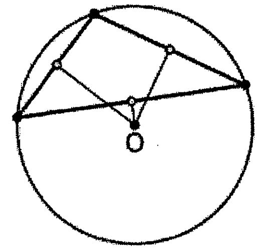
- The point of concurrency of the **perpendicular bisectors** of a triangle is called the ________________________________ of the triangle.



the circumcenter of an acute triangle is inside the triangle

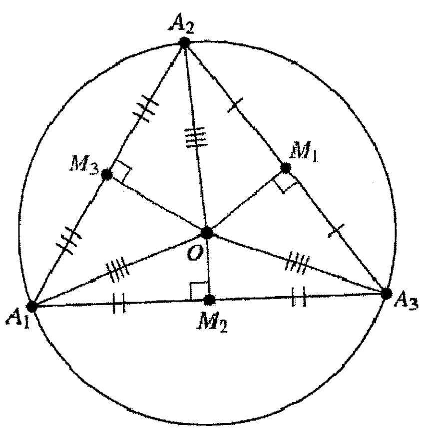


the circumcenter of a right triangle is on the hypotenuse

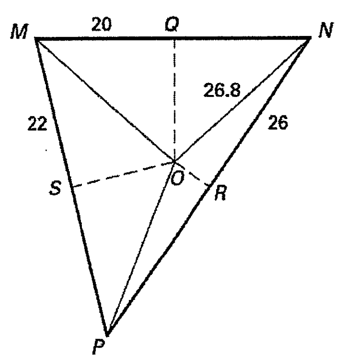


the circumcenter of an obtuse triangle is outside the triangle

Theorem: The perpendicular bisectors of a triangle intersect at a point that is ________________________ from the __________________ of the triangle.



Example 2: If point O is the circumcenter, find MO, PO, PS, PR, and MN.



Example 3: Cassie, Jim, and Sal are old college buddies that have moved apart. They want to get together. To be fair, they want to find a location that is the same distance for each of them to travel. How could they locate that spot?