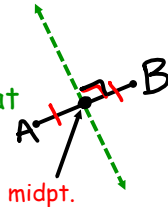


Section 5.2: Using Perpendicular Bisectors

EQ: How do you find the circumcenter of a triangle?

**perpendicular bisector**

A segment, line, or ray that intersects the midpt. of a segment at a right angle



**point of concurrency**

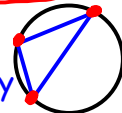
A point of intersection of 3 segments, lines, or rays

**equidistant**

The same distance away

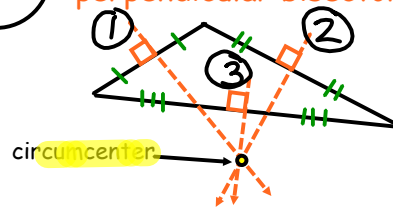
**circumscribed circle (inscribed triangle)**

A circle that intersects every vertex of a triangle



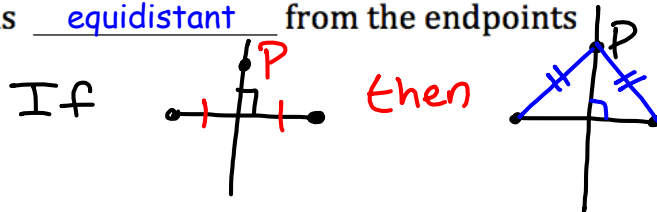
**circumcenter**

The pt. of concurrency for a triangle's perpendicular bisectors



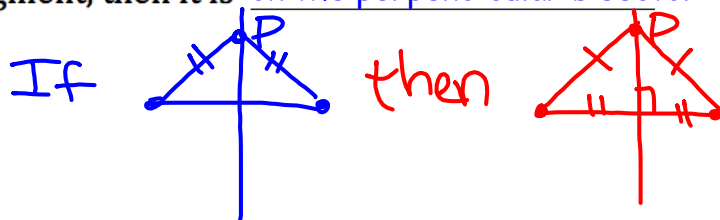
**Theorem 5.2: Perpendicular Bisector Theorem**

In a plane, if a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.



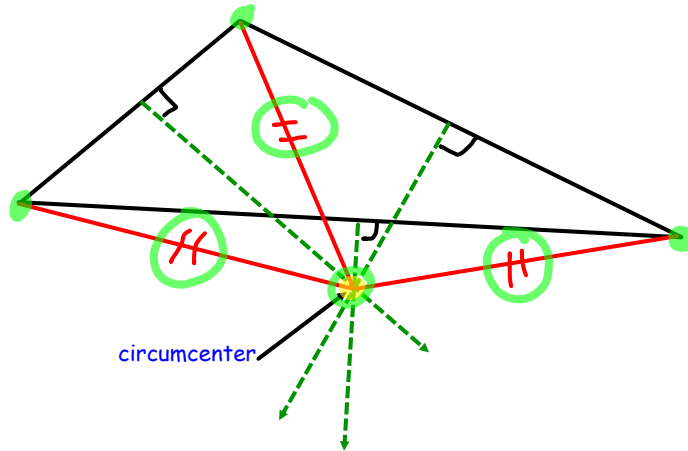
**Theorem 5.3: Converse of Perpendicular Bisector Theorem**

In a plane, if a point is equidistant from the endpoints of a segment, then it is on the perpendicular bisector of the segment.

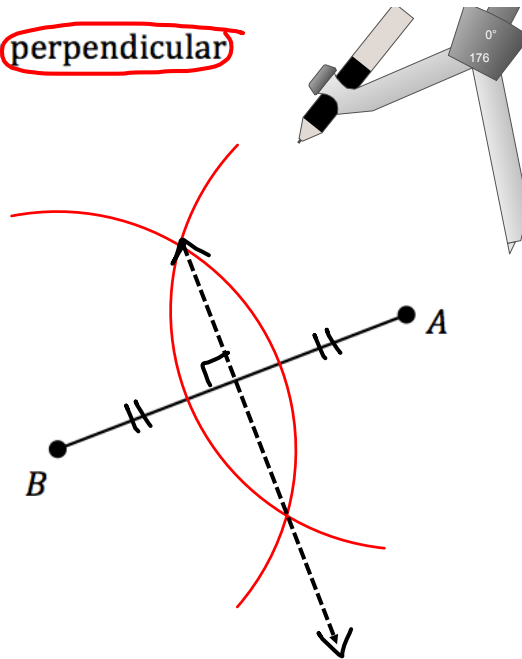


**Theorem 5.4: Concurrency of  $\perp$  Bisectors of a Triangle Theorem**

The perpendicular bisectors of a triangle intersect at a point ( circumcenter ) that is equally distant from each vertex \_\_\_\_\_ of the triangle.



A1. Construct and mark the perpendicular bisector of  $\overline{AB}$ .



A2. Find the value of  $x$  and tell what theorem was used to set up the equation if  $\overline{CA}$  is the perpendicular bisector of  $\overline{DB}$ .

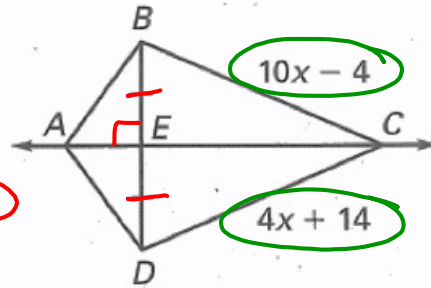
Thm 5.2  
 pt. C is on the  
 $\perp$  bisector  $\therefore CB = CD$

$$10x - 4 = 4x + 14$$

$$\begin{array}{r} -4x \\ \hline 6x - 4 = 14 \\ +4 \\ \hline 6x = 18 \end{array}$$

$$6x = 18$$

$$x = 3$$



A3. The circumcenter of  $\triangle MNP$  is point O.  
 Find...

a.  $MO$

26.8

b.  $MP$

44

c.  $PR$

26

d.  $OP$

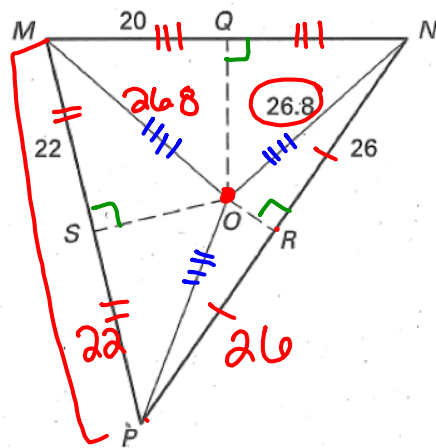
26.8

e. Perimeter of  $\triangle MNP$

$$MP + PN + NM$$

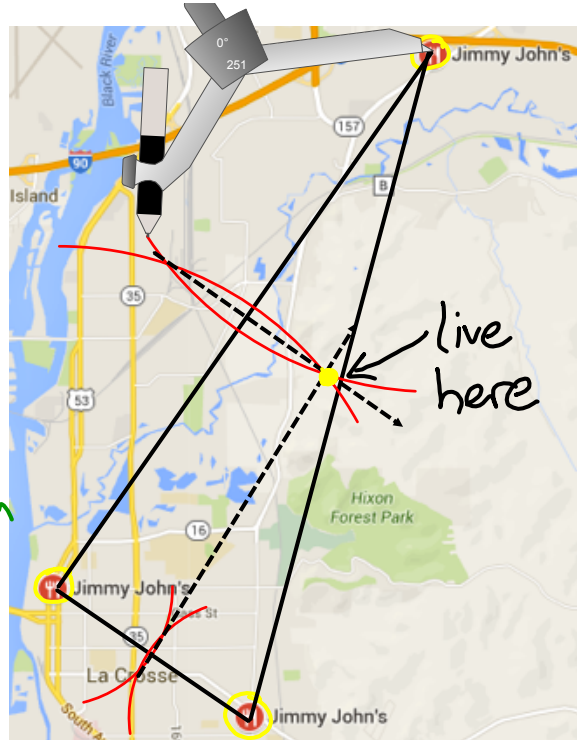
$$44 + 52 + 40$$

$$136 \text{ units}$$



A6. The new manager of the La Crosse Area Jimmy John's is trying to find the best place to rent a house. She wants to be about the same distance from each of the locations. Use the map to find where she should start looking for a place to live.

→ 3 Jimmy Johns are  $\triangle$  vertices  
 → Find the circumcenter, which is equidistant to all vertices (Thm 5.4)



## Summary 5.2:

- To find the circumcenter:
- 1) Construct the  $\perp$  bisector of each side of the  $\triangle$
  - 2) Extend the  $\perp$  bisectors to find the point where they intersect (this pt. is the circumcenter)
- \* Circumcenter is the pt. of concurrency and is equidistant to all 3 vertices