

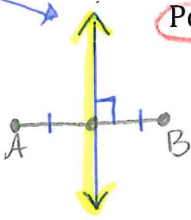
Section 5.2: Perpendicular Bisectors

Essential Question: How do you find the circumcenter of a Δ ?

Vocabulary

Perpendicular bisector

A segment, line or ray that intersects the midpoint of a segment at a $rt.\angle$



Point of concurrency

A point of intersection of 3 segments, lines or rays

Equidistant

The same (equal) distance away (\perp bisector Thm)

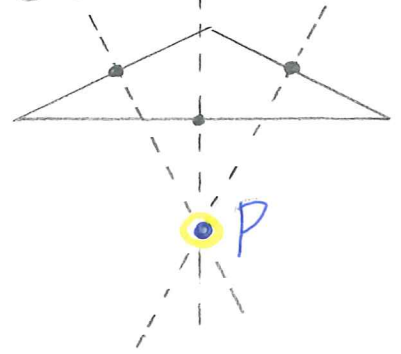
Circumscribed circle (inscribed triangle)

A circle that intersects every vertex of a Δ



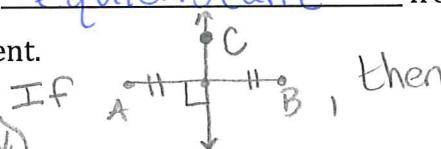
Circumcenter

The point of concurrency for a Δ 's \perp bisectors



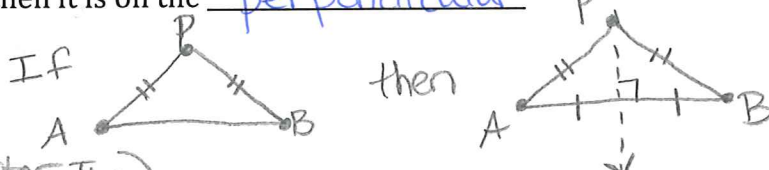
Theorem 5.2: Perpendicular Bisector Theorem

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

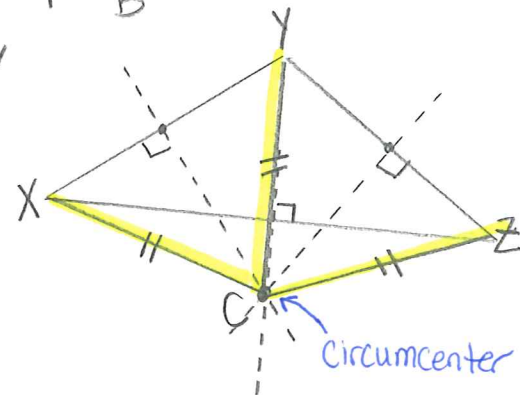
In a plane, if a point is equidistant from the endpoints of a segment, then it is on the perpendicular bisector of the segment.



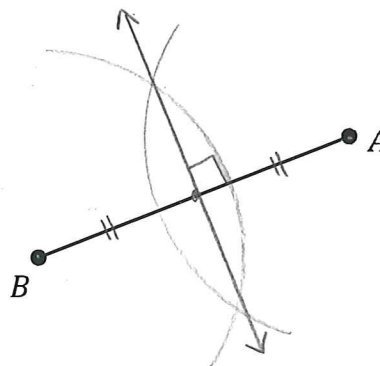
Theorem 5.4: Concurrency of \perp Bisectors of a Triangle Theorem

The perpendicular bisectors of a triangle intersect at a point called the circumcenter that is equidistant from each vert of the triangle.

$XC = YC = ZC$



- 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} .

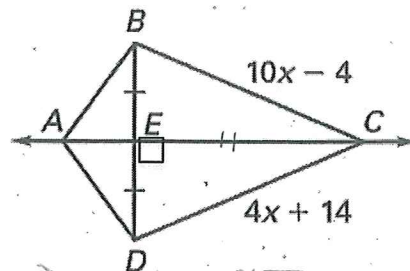
$CB = CD$ (Thm 5.2: \perp bisector Thm)

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

$6x = 18$

$x = 3$

In the past...
 $\triangle CEB \cong \triangle CED$ (SAS) thus $\overline{CB} \cong \overline{CD}$
 Now... \perp bisector Thm



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

(Thm 5.4) a. MO

26.8

b. MP

$22 + 22$
 $MP = 44$

c. $PR = 20$

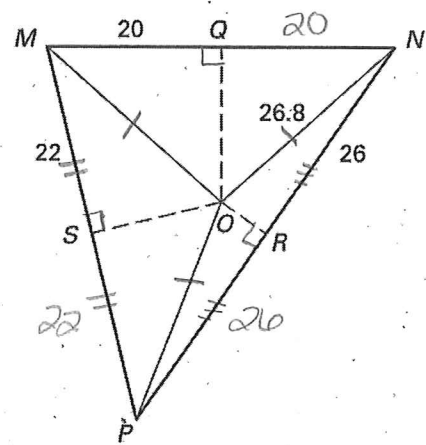
d. OP

26.8

e. Perimeter of $\triangle MNP$

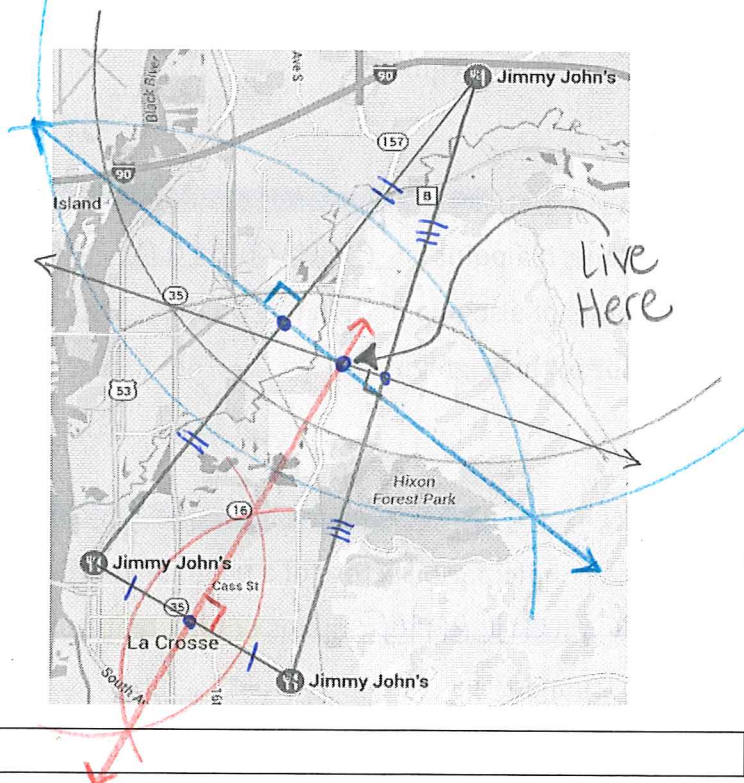
$2(20) = 40$
 $2(22) = 44$
 $2(26) = 52$

136 units



- A4. 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 about the same distance from each of the locations. Use the map to find where she should start looking for a place to live.

Find the circumcenter it is equidistant to each vertex (Jimmy John's) location



Section 5.2 Summary:

To find the circumcenter of a \triangle construct or draw the perpendicular bisectors of each side of the \triangle . Where the \perp bisectors intersect is where the circumcenter is located. (see example #4)