Using Perpendicular Bisectors

Homework:

p.298 #3-5, 24-25

p.306 #3-5, 11-14

5.2 Use Perpendicular Bisectors

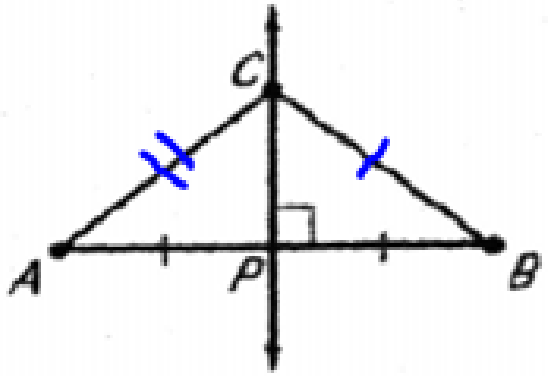
Goal • Use perpendicular bisectors to solve problems.

VOCABULARY

Perpendicular bisector	a segment, ray, line or plane that is perpendicular to a segment at its midpoint
Equidistant	same distance
Concurrent	when three or more lines, rays, or segments intersect in the same point
Point of concurrency	point of intersection
Circumcenter	the point of concurrency of the three perpendicular bisector of a triangle

THEOREM 5.2: PERPENDICULAR BISECTOR THEOREM

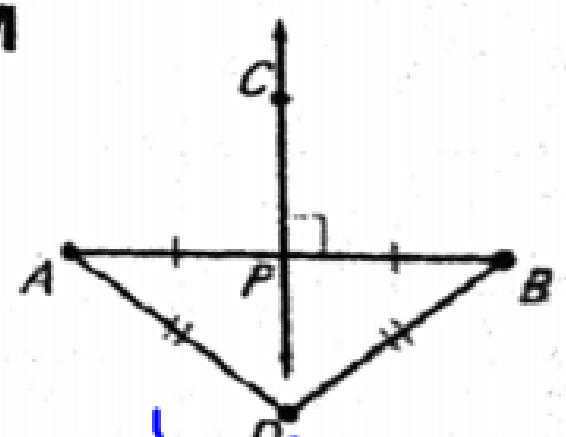
In a plane, if a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.



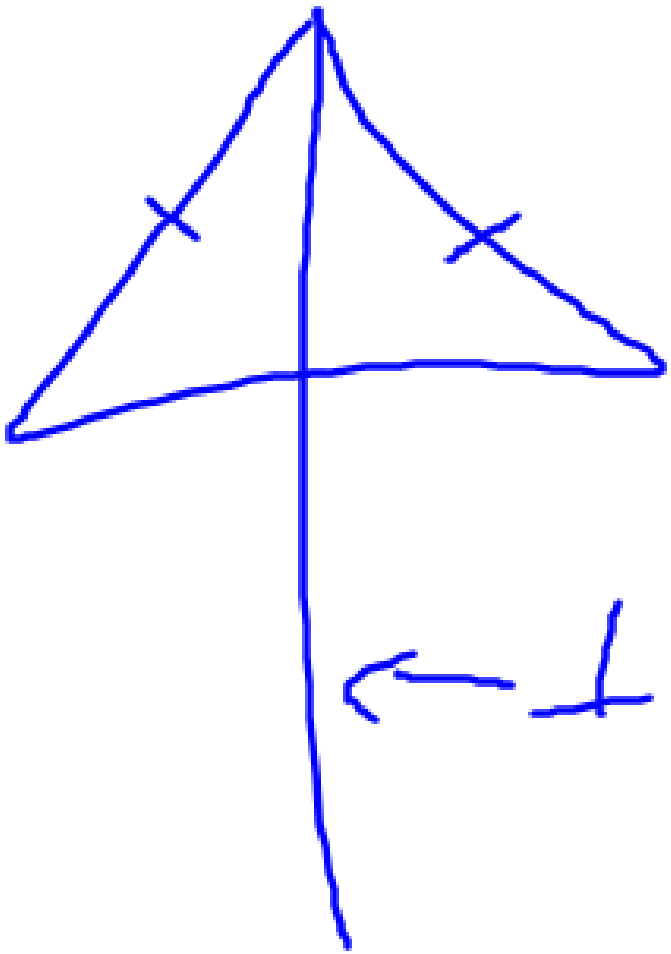
If $\overleftrightarrow{CP}$ is the $\perp$ bisector of $\overline{AB}$, then $CA =$ CB.

THEOREM 5.3: CONVERSE OF THE PERPENDICULAR BISECTOR THEOREM

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



If $DA = DB$, then D lies on the $\perp$ bisector of $\overline{AB}$.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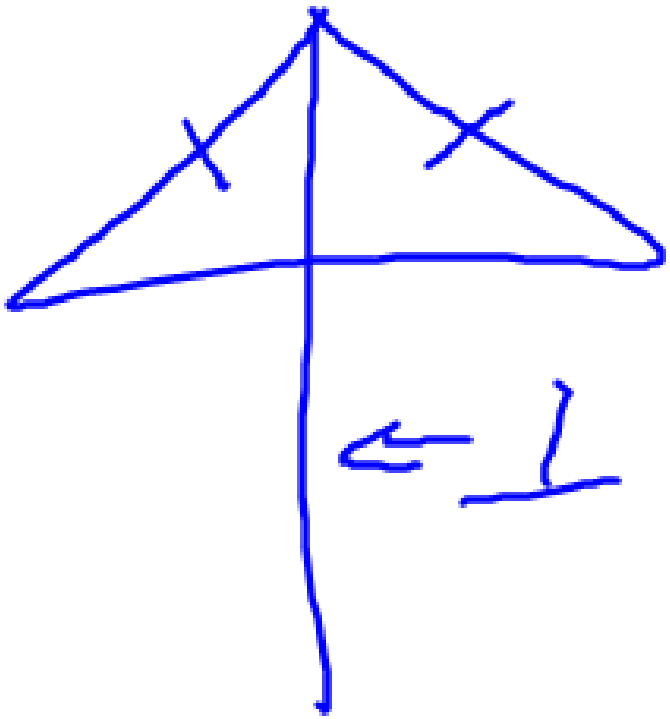
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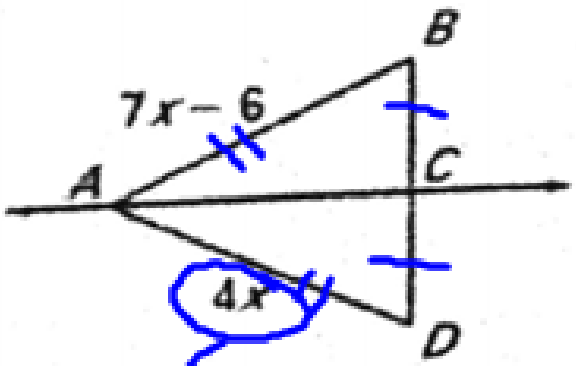
Example 1 Use the Perpendicular Bisector Theorem

$\overleftrightarrow{AC}$ is the perpendicular bisector of $\overline{BD}$. Find AD.



Solution

$7x - 6 = 4x$

$-7x \quad -4x$

$-6 = -3x$

$+6 \quad +6$

$0 = 3x$

$x = 2$

$4x = AD$

$4(2) = AD$

$8 = AD$

Example 2 *Use perpendicular bisectors*

In the diagram, $\overleftrightarrow{KN}$ is the perpendicular bisector of $\overline{JL}$.

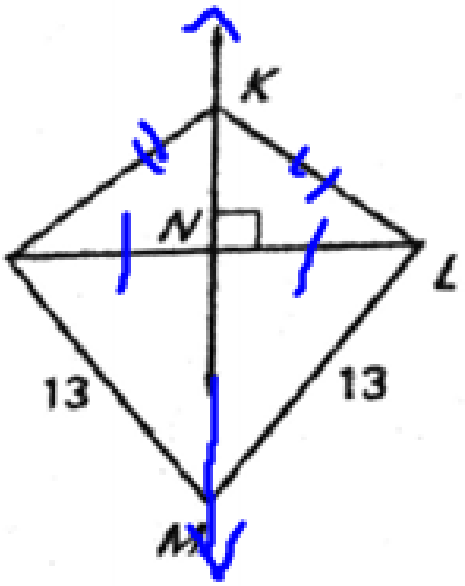
a. What segment lengths in the diagram are equal?

$JN \cong NL$

$JK \cong KL$

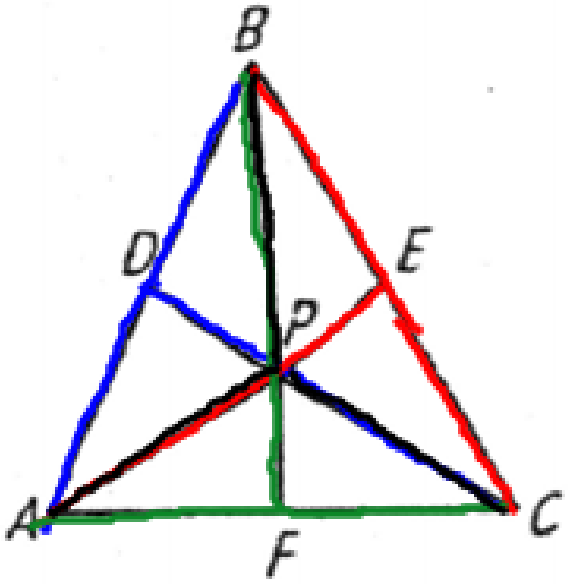
b. Is M on $\overleftrightarrow{KN}$?

yes.



THEOREM 5.4: CONCURRENCY OF PERPENDICULAR BISECTORS OF A TRIANGLE

The perpendicular bisectors of a triangle intersect at a point that is equidistant from the vertices of the triangle.

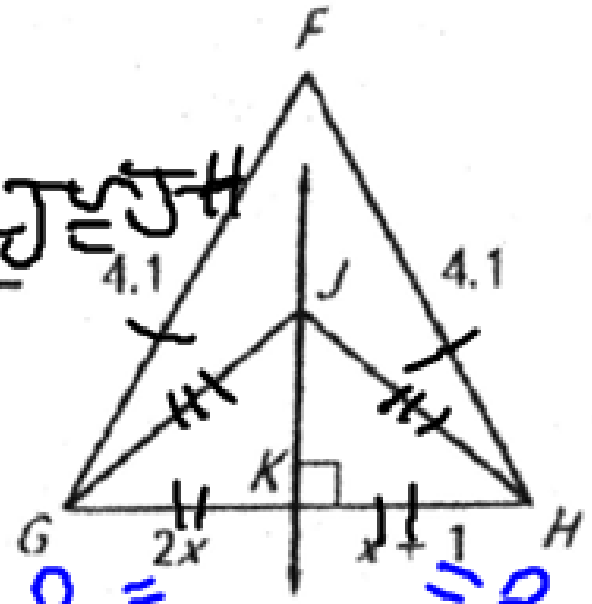


If $\overline{PD}$, $\overline{PE}$, and $\overline{PF}$ are perpendicular bisectors, then $PA = PC = PB$

Checkpoint In the diagram, $\overleftrightarrow{JK}$ is the perpendicular bisector of $\overline{GH}$.

1. What segment lengths are equal?

$FG \cong FH$, $GK \cong KH$, $GJ \cong JH$



2. Find GH.

$2x = x + 1$

$-x \quad -x$

$x = 1$

$2 = 2$

$2x + x + 1 = GH$

$4 = GH$