Name ______________________ Date ____________

LESSON 5.2

Study Guide

For use with pages 303–309

GOAL **Use perpendicular bisectors to solve problems.**

Vocabulary

A segment, ray, line, or plane that is perpendicular to a segment at its midpoint is called a **perpendicular bisector.**

A point is **equidistant** from two figures if the point is the *same distance* from each figure.

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 the 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.

When three or more lines, rays, or segments intersect in the same point, they are called **concurrent** lines, rays, or segments. The point of intersection of the lines, rays, or segments is called the **point of concurrency.**

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.

The point of concurrency of the three perpendicular bisectors of a triangle is called the **circumcenter** of the triangle.

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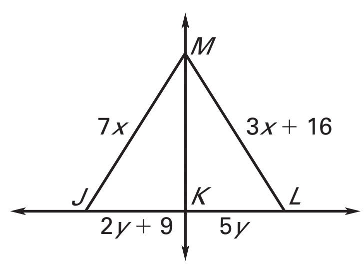
EXAMPLE 1
Use the Perpendicular Bisector Theorem

$\overleftrightarrow{KM}$ is the perpendicular bisector of $\overline{JL}$. Find JK.

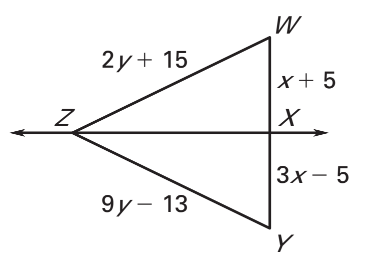


Solution

$JK = KL$	Perpendicular Bisector Theorem
$5y = 2y + 9$	Substitute.
$y = 3$	Solve for y.
$JK = 2(3) + 9 = 15$	

Exercises for Example 1

In the diagram $\overleftrightarrow{XZ}$, is the perpendicular bisector of $\overline{WY}$.



1. Find WZ.

2. Find XY.

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Study Guide *continued*

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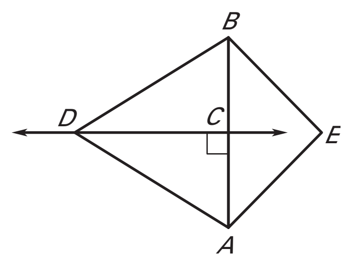
EXAMPLE 2 Use perpendicular bisectors

In the diagram shown, $\overleftrightarrow{DC}$ is the perpendicular bisector of $\overline{AB}$ and $\overline{AE} \cong \overline{BE}$.



a. What segment lengths in the diagram are equal?

b. Is E on $\overleftrightarrow{DC}$?

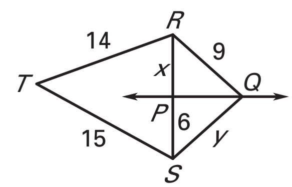
Solution

a. $\overleftrightarrow{DC}$ bisects $\overline{AB}$, so $CA = CB$. Because D is on the perpendicular bisector of $\overline{AB}$, $DA = DB$ by Theorem 5.2. Because $\overline{AE} \cong \overline{BE}$, $AE = BE$ by definition of congruence.

b. Because $AE = BE$, E is equidistant from A and B. So, by the Converse of the Perpendicular Bisector Theorem, E is on the perpendicular bisector of $\overline{AB}$, which is $\overleftrightarrow{DC}$.

Exercises for Example 2

In the diagram, $\overleftrightarrow{PQ}$ is the perpendicular bisector of $\overline{RS}$.

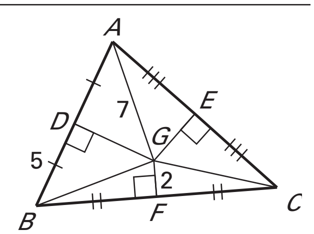


3. What segment lengths in the diagram are equal? *Explain* your reasoning.

4. Is T on $\overleftrightarrow{PQ}$? *Explain*.

EXAMPLE 3 Use the concurrency of perpendicular bisectors

The perpendicular bisectors of $\triangle ABC$ meet at point G. Find GB.



Solution

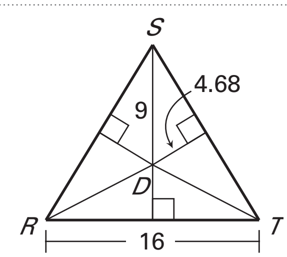
Using Theorem 5.4, you know that point G is equidistant from the vertices of the triangle. So, $GA = GB = GC$.

$GB = GA$ Theorem 5.4.

$GB = 7$ Substitute.

Exercise for Example 3

5. The perpendicular bisectos of $\triangle RST$ meet at point D. Find DR.



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