# Section Overview

Professional Development

## Perpendicular and Angle Bisectors

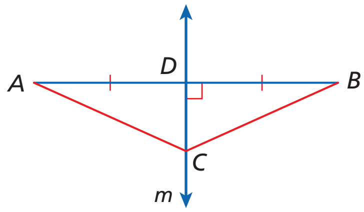
*Lesson 5-1*

**Why?** Properties of perpendicular and angle bisectors are used to solve problems involving distance.

### Points on a Perpendicular Bisector

Given that $m$ is the perpendicular bisector of $\overline{AB}$,

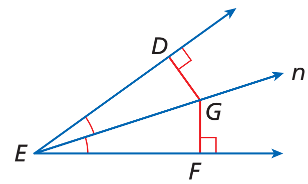
**$C$ is on $m$ $\leftrightarrow$ $CA = CB$.**




### Points on an Angle Bisector

Given that $G$ is in the interior of $\angle DEF$, $n$ bisects $\angle DEF$, $\overline{DG} \perp \overline{ED}$, and $\overline{FG} \perp \overline{EF}$,

**$G$ is on $n$ $\leftrightarrow$ $GD = GF$.**

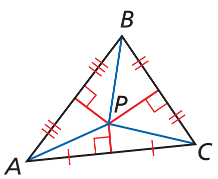



## Bisectors, Medians, and Altitudes of Triangles

*Lessons 5-2, 5-3*

**Why?** A triangle's points of concurrency can be used to locate points equidistant from the vertices, points equidistant from the sides, and the center of gravity.

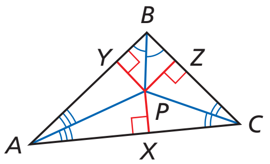
Perpendicular bisectors intersect at the **circumcenter** $P$.




**Circumcenter Theorem**

$PA = PB = PC$

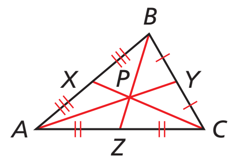
Angle bisectors intersect at the **incenter** $P$.




**Incenter Theorem**

$PX = PY = PZ$

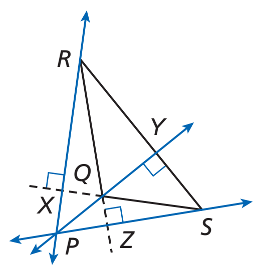
Medians intersect at the **centroid** $P$.




**Centroid Theorem**

$AP = \frac{2}{3}AY$, $BP = \frac{2}{3}BZ$, and $CP = \frac{2}{3}CX$

Altitudes intersect at the **orthocenter** $P$.

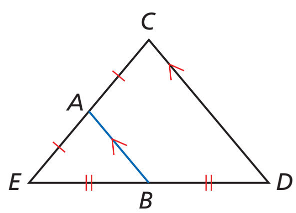



## The Triangle Midsegment Theorem

*Lesson 5-4*

**Why?** Triangle midsegments can be used to make indirect measurements.

Midsegment $\overline{AB}$ $\leftrightarrow$ $AE = AC$ and $BE = BD$




**Triangle Midsegment Theorem**

If $\overline{AB}$ is a midsegment, then $\overline{AB} \parallel \overline{CD}$ and $AB = \frac{1}{2}CD$.