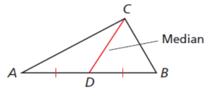
Lesson 24.3: Medians and Centroids

A **median of a triangle** is a segment whose endpoints are a vertex of the triangle and the midpoint of the opposite side.

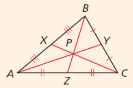


Every triangle has three medians, and the medians are concurrent

Theorem 6-3-1 Centroid Theorem

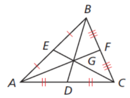
The centroid of a triangle is located $\frac{2}{3}$ of the distance from each vertex to the midpoint of the opposite side.

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



[Ex. 1] **Using the Centroid to Find Segment Lengths**

In $\triangle ABC$, $AF = 9$, and $GE = 2.4$. Find each length.



A AG

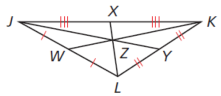
B CE

YOUR TURN

In $\triangle JKL$, $ZW = 7$, and $LX = 8.1$. Find each length.

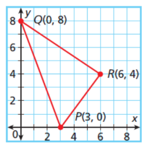
1a. KW

1b. LZ



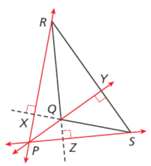
[Ex. 2] ***Problem-Solving Application***

The diagram shows the plan for a triangular piece of a mobile. Where should the sculptor attach the support so that the triangle is balanced?



An **altitude of a triangle** is a perpendicular segment from a vertex to the line containing the opposite side. Every triangle has three altitudes. An altitude can be inside, outside, or on the triangle.

In $\triangle QRS$, altitude $\overline{QY}$ is inside the triangle, but $\overline{RX}$ and $\overline{SZ}$ are not. Notice that the lines containing the altitudes are concurrent at P. This point of concurrency is the **orthocenter of the triangle**.



[Ex. 3] **Finding the Orthocenter**

Find the orthocenter of $\triangle JKL$ with vertices $J(-4, 2)$, $K(-2, 6)$, and $L(2, 2)$.