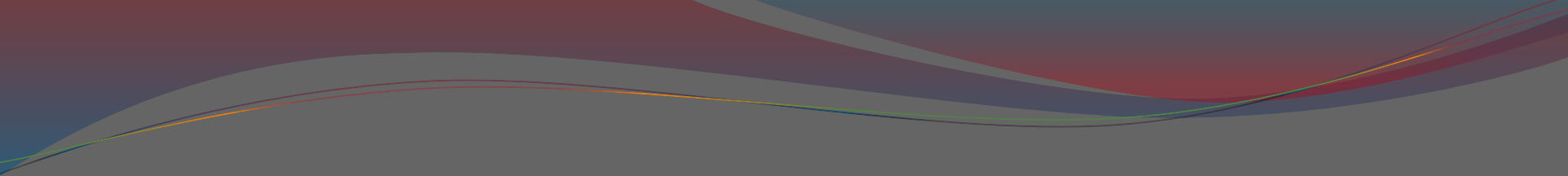


5-3

Medians and Altitudes

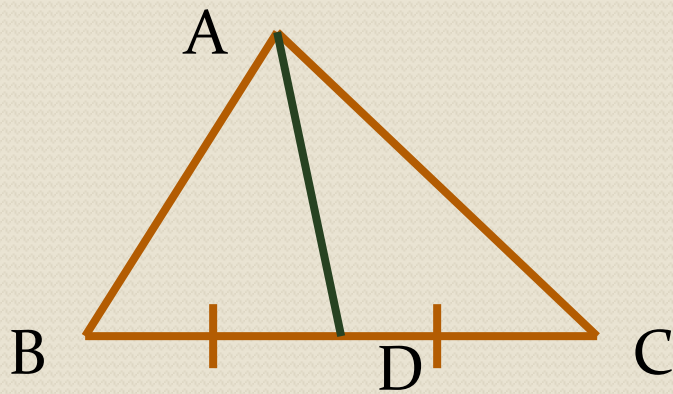


To apply the properties
of medians and
altitudes in a triangle

OBJECTIVE

KEY CONCEPT

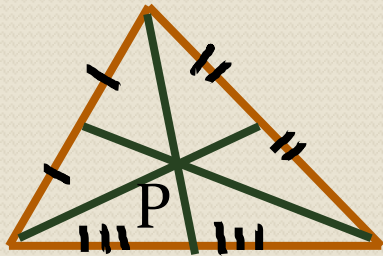
Median of a triangle – a segment whose endpoints are a vertex and the midpoint of the opposite side



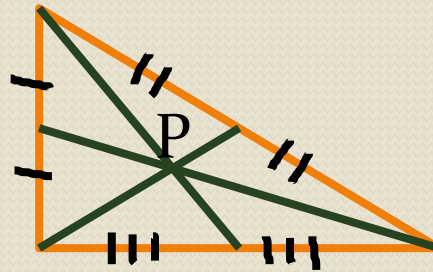
If $\overline{BD} \cong \overline{DC}$, then \overline{AD} is a median of $\triangle ABC$.

KEY CONCEPT

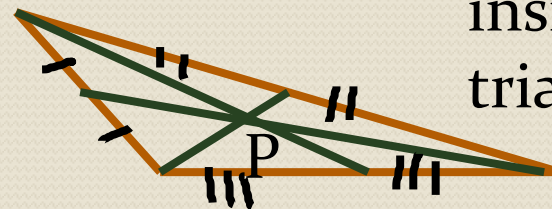
Centroid – the point of concurrency of the medians of a triangle (P).



Acute – inside the triangle



Right – inside the triangle



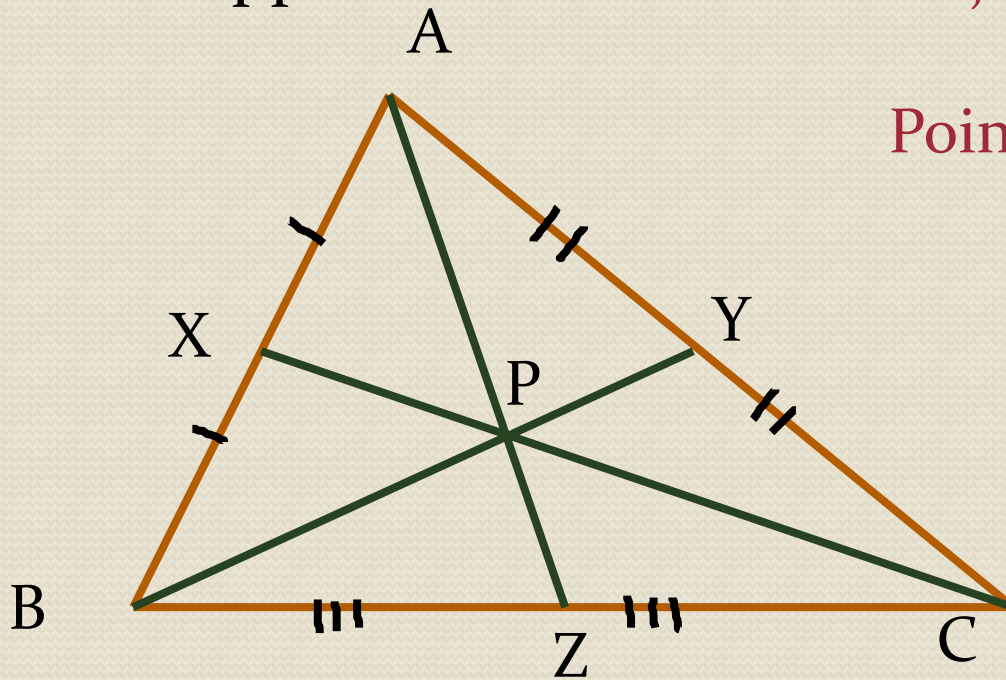
Obtuse – inside the triangle

KEY CONCEPT

Centroid Theorem– The centroid of a triangle is two-thirds the distance from each vertex to the midpoint of the opposite side.

\overline{AZ} , \overline{BY} , and \overline{CX} are the medians.

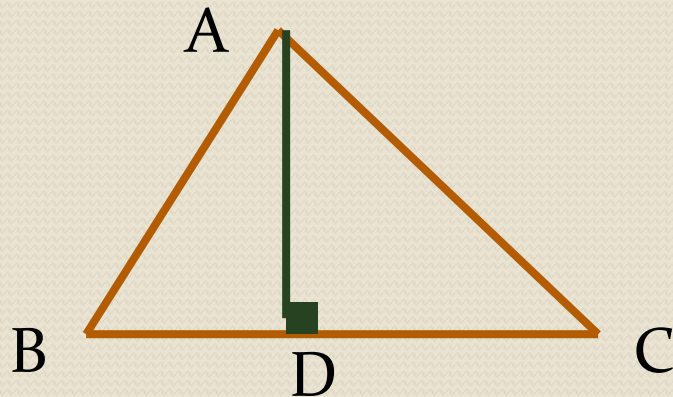
Point P is the centroid.



$$AP = \frac{2}{3}AZ$$
$$BP = \frac{2}{3}BY$$
$$CP = \frac{2}{3}CX$$

KEY CONCEPT

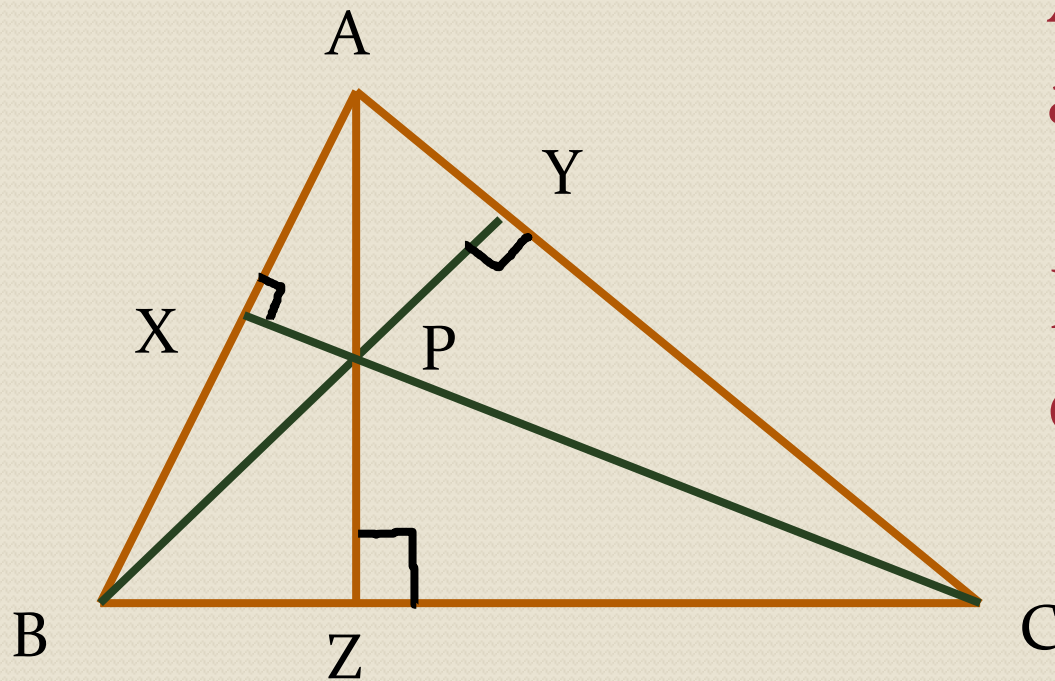
Altitude of a triangle – the perpendicular segment from a vertex of the triangle to the line containing the opposite side



If $\overline{AD} \perp \overline{BC}$, then \overline{AD} is an altitude of $\triangle ABC$.

KEY CONCEPT

Orthocenter:

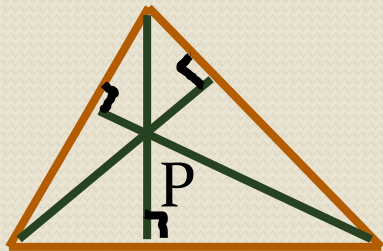


\overline{AZ} , \overline{BY} , and \overline{CX}
are the altitudes.

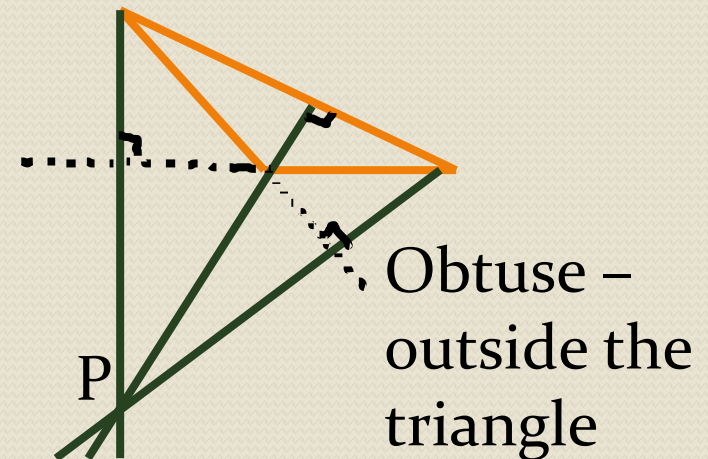
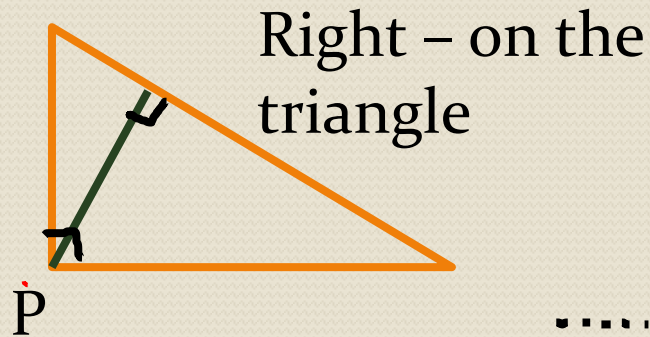
Point P is the
orthocenter.

KEY CONCEPT

Orthocenter – the point of concurrency of the altitudes of a triangle (P).



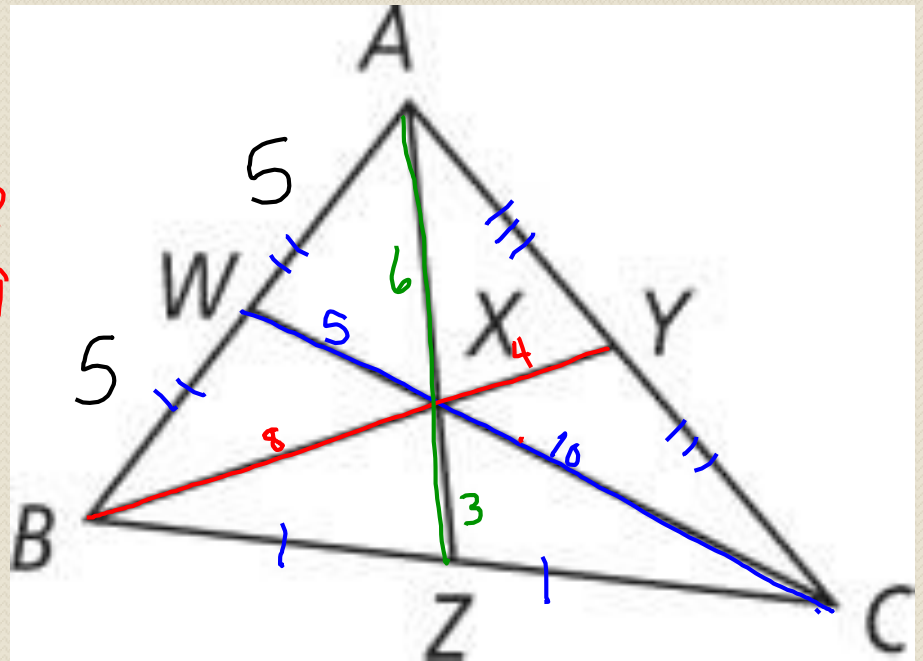
Acute – inside the triangle



CLASS WORK

In $\triangle ABC$, X is the centroid.

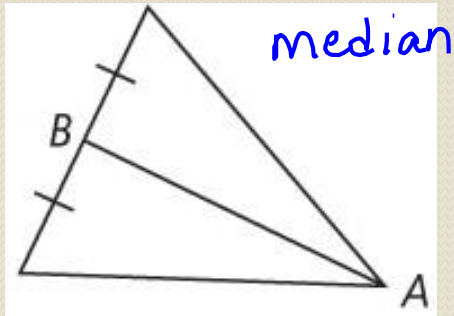
1. If $CW = 15$, find CX and XW .
2. If $BX = 8$, find BY and XY . $BY = 12$
3. If $XZ = 3$, find AX and AZ . $AZ = 9$
4. If $AW = 5$, find WB .



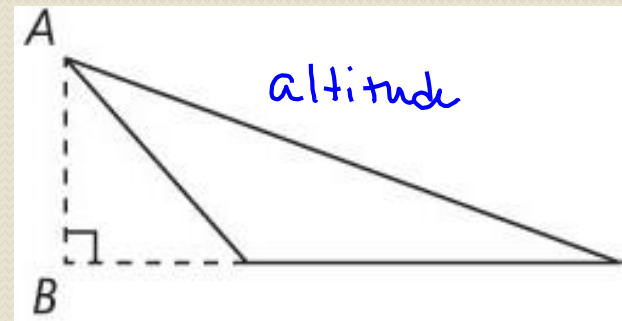
CLASS WORK

Is \overline{AB} a *median*, an *altitude*, or *neither*? Explain.

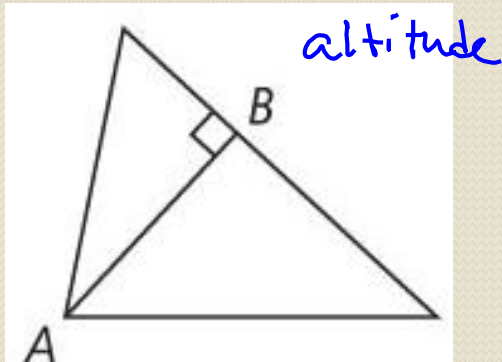
5.



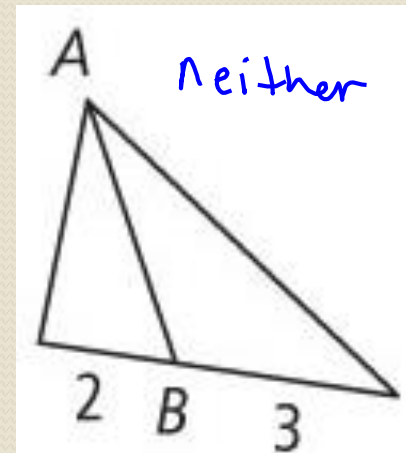
6.



7.

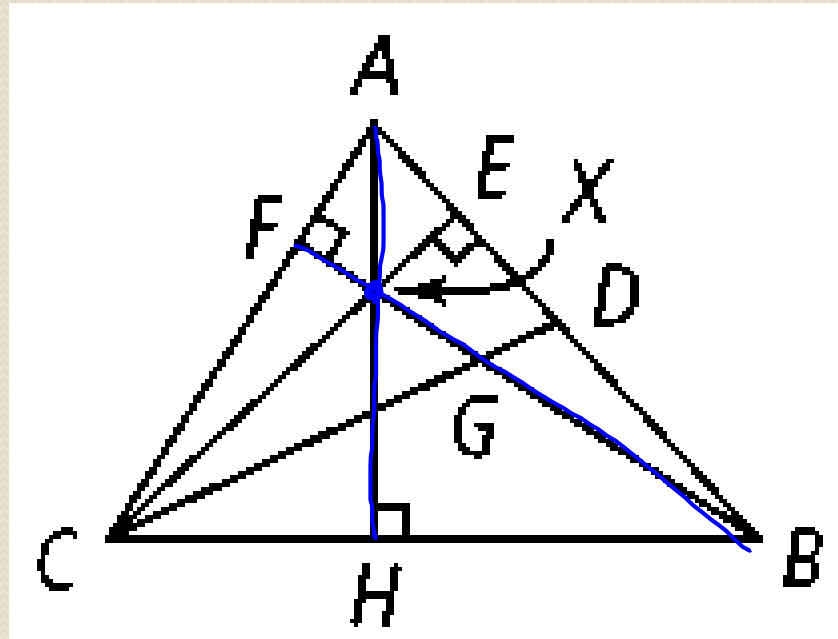


8.



CLASS WORK

9. Name the orthocenter.

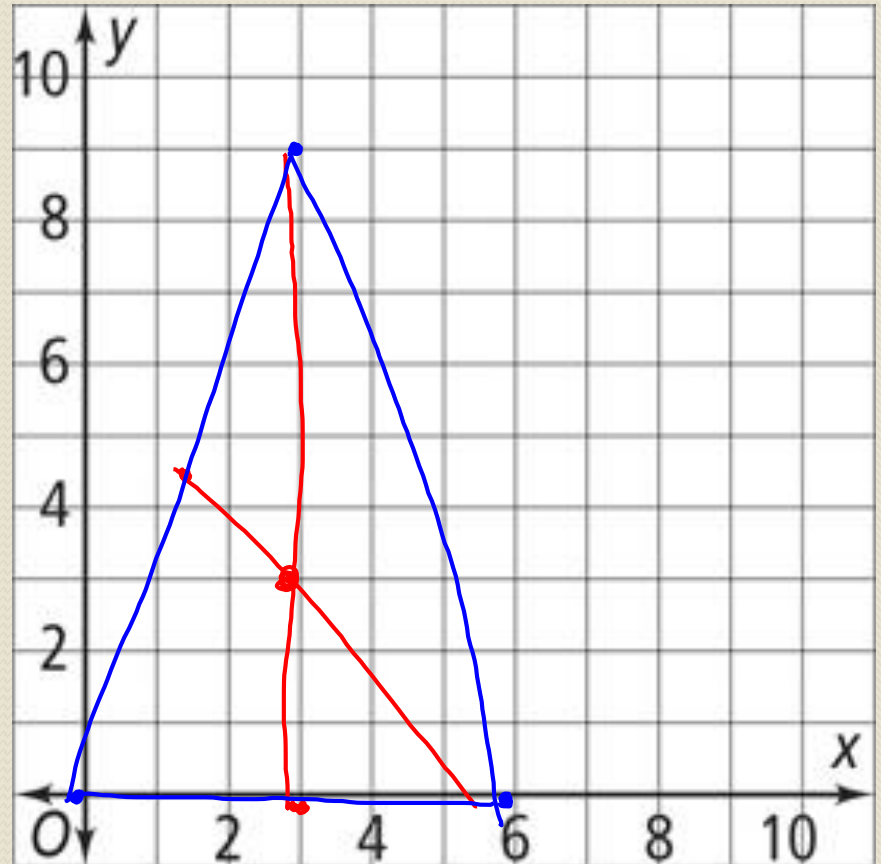


CLASS WORK

10. Find the centroid of a triangle with the following vertices: A(0,0); B(6,0); C(3,9)

$$\left(\frac{0+6+3}{3}, \frac{0+0+9}{3} \right)$$

$$(3, 3)$$



CLASS WORK

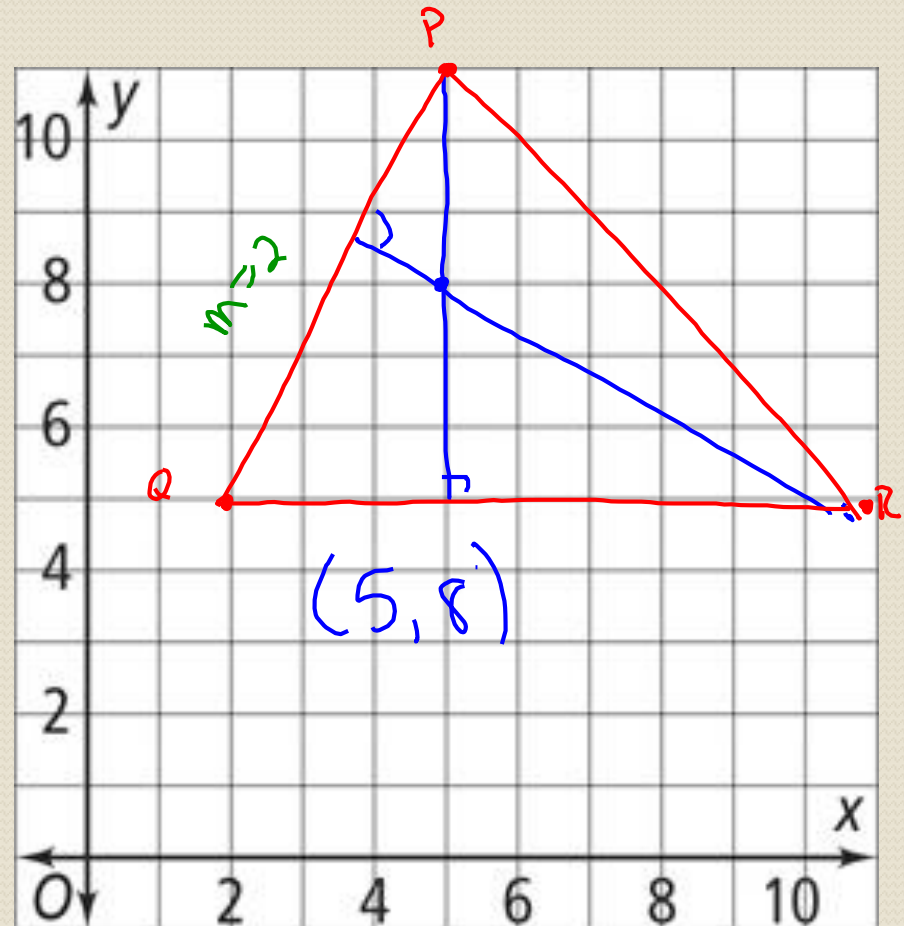
11. Find the coordinates of the orthocenter of $\triangle PQR$.

$P(5, 11)$, $Q(2, 5)$, $R(11, 5)$

Step 1: Graph the points.

Step 2: Draw one altitude.

Step 3: Repeat to find the orthocenter.



CLASS WORK

1. Find the coordinates of the orthocenter of ΔPQR .

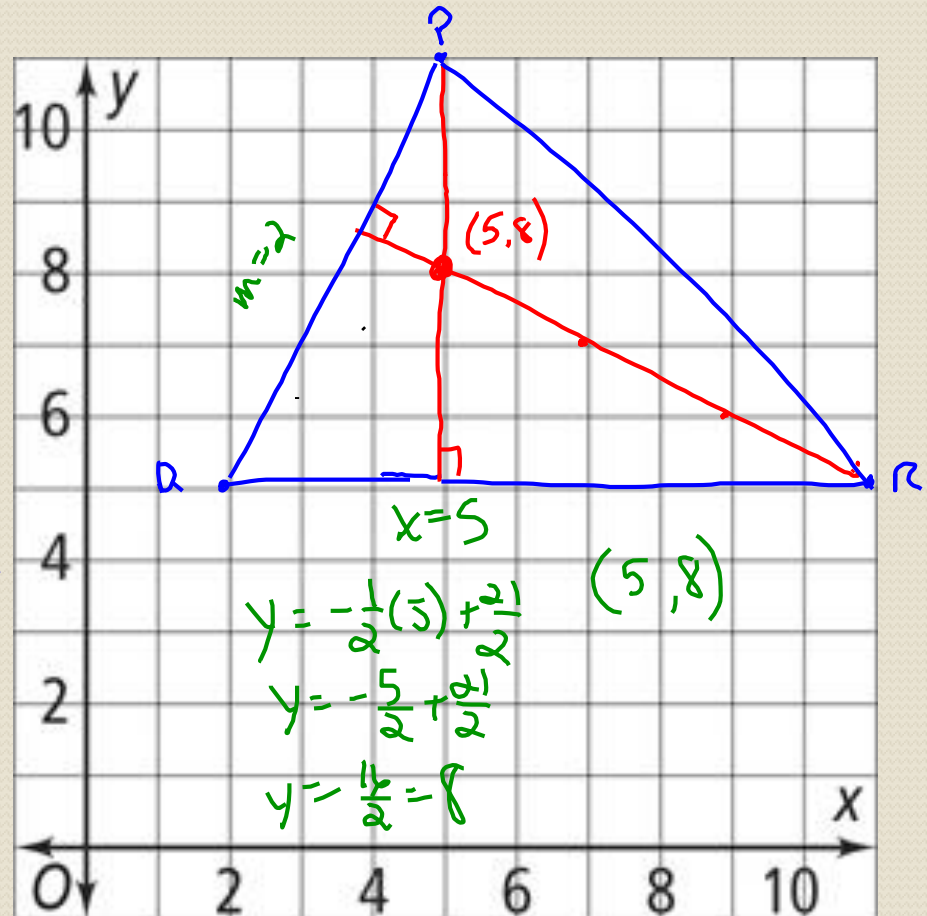
$P(5, 11)$, $Q(2, 5)$, $R(11, 5)$

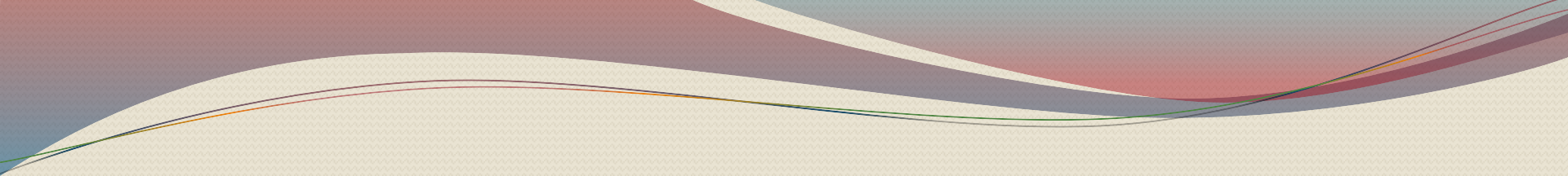
Step 1: Graph the points.

Step 2: Draw one altitude.

Step 3: Repeat to find the orthocenter.

$$\begin{aligned} \text{2nd Alt. } (11, 5) m &= -\frac{1}{2} \\ y - 5 &= -\frac{1}{2}(x - 11) \\ 2y - 10 &= -x + 11 \\ 2y &= -x + 21 \\ y &= -\frac{1}{2}x + \frac{21}{2} \end{aligned}$$



- 
- The point of concurrency of the medians is the centroid of the triangle.
 - The point of concurrency of the altitudes is the orthocenter of the triangle.

SUMMARY

1. $CX = 10$; $XW = 5$
2. $BY = 12$; $XY = 4$
3. $AX = 6$; $AZ = 9$
4. $WB = 5$
5. Median
6. Altitude
7. Altitude
8. Neither
9. Point X

ANSWER SLIDE



Pages 330 – 331

12 – 36 even; 40, 42

HOMework