

Chapter 6

Relationships Within Triangles

6.1 Perpendicular and Angle Bisectors

6.2 Bisectors of Triangles

6.3 Medians and Altitudes of Triangles

6.4 The Triangle Midsegment Theorem

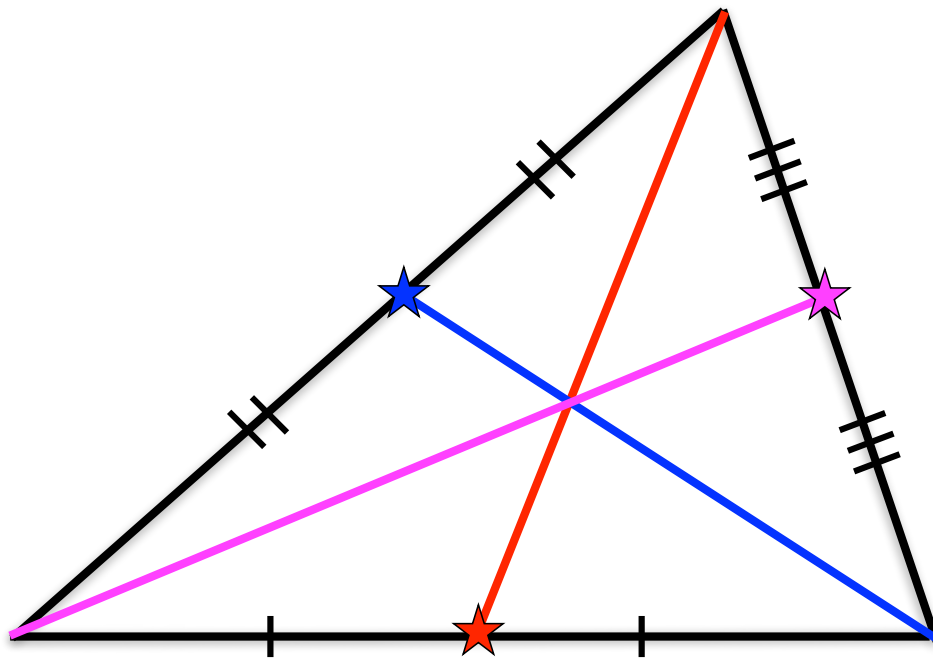
6.5 Indirect Proof and Inequalities in One Triangle

6.6 Inequalities in Two Triangles



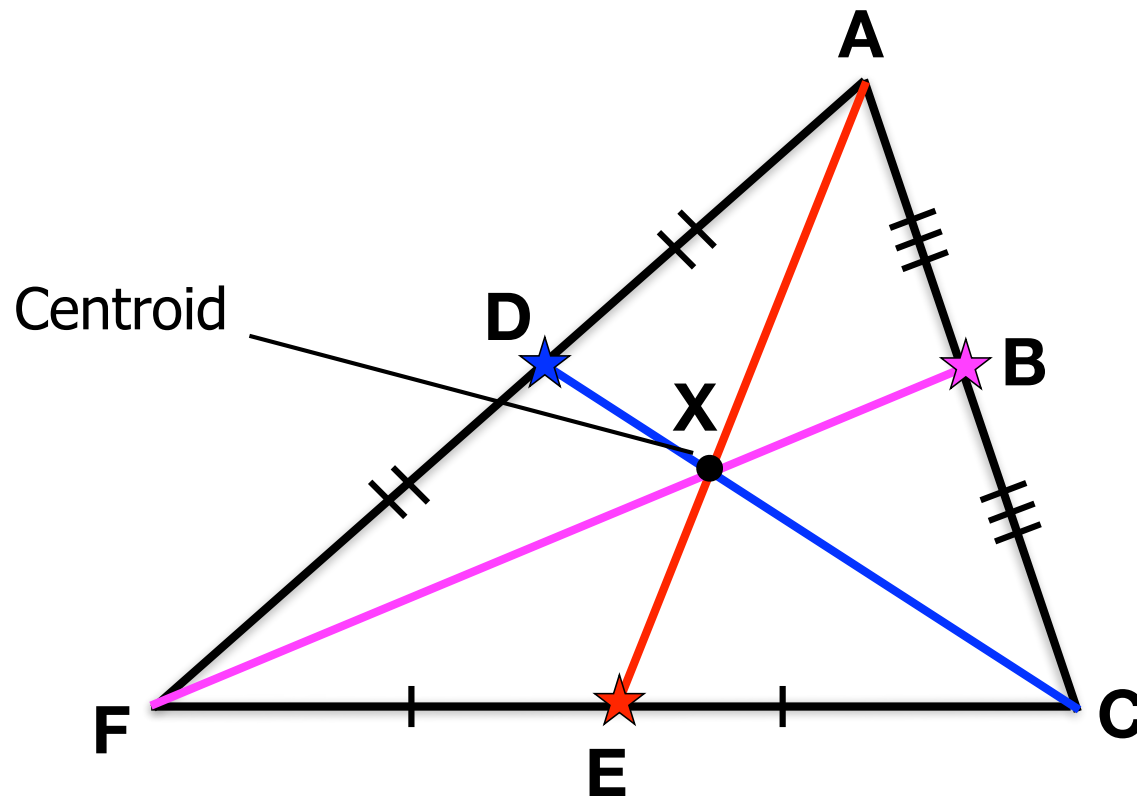
6.3 Medians and Altitudes of Triangles

Median: a segment from a vertex to the midpoint of the opposite side.



6.3 Medians and Altitudes of Triangles

Centroid: the intersection of all the medians.



$$FX = \frac{2}{3}FB$$

$$AX = \frac{2}{3}AE$$

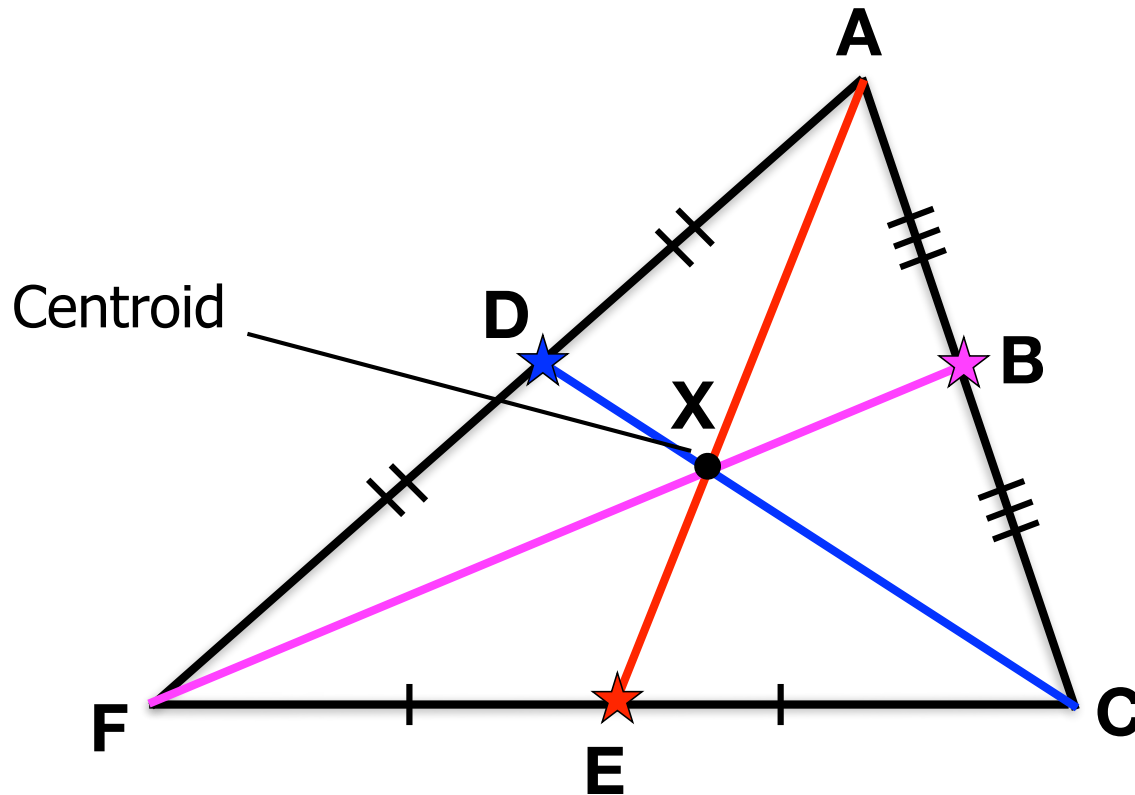
$$CX = \frac{2}{3}CD$$

6.3 Medians and Altitudes of Triangles

Theorem

Centroid Theorem

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



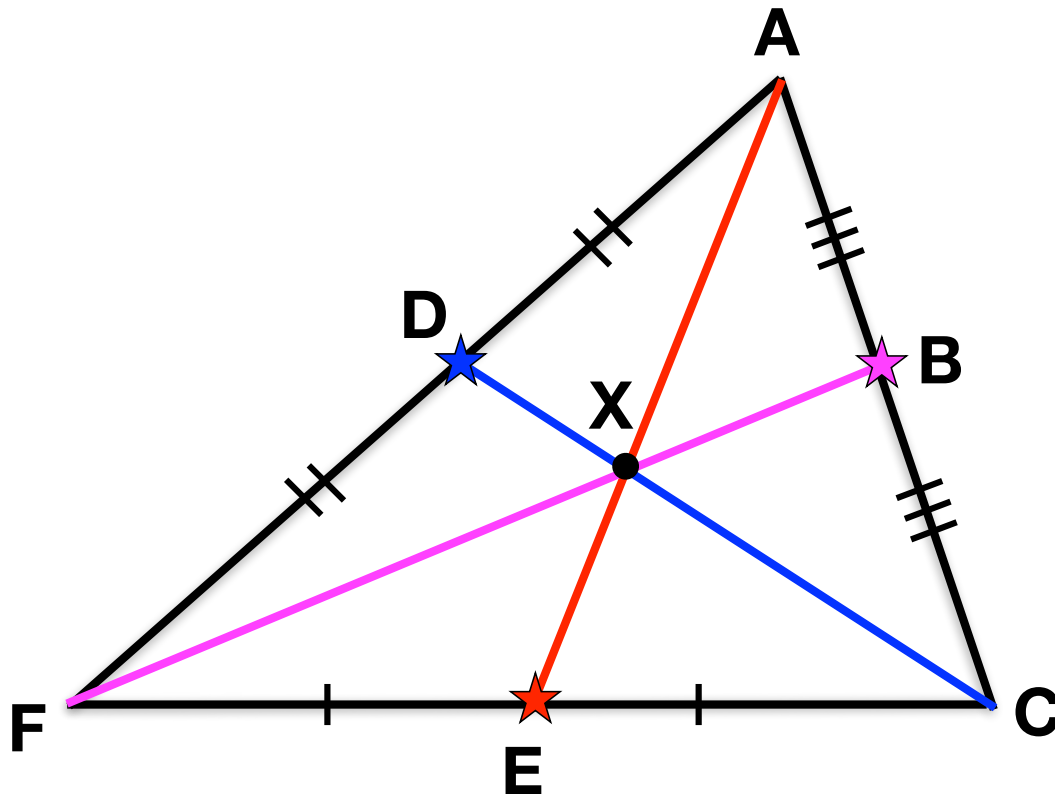
$$FX = \left(\frac{2}{3}\right)FB$$

$$AX = \left(\frac{2}{3}\right)AE$$

$$CX = \left(\frac{2}{3}\right)CD$$

6.3 Medians and Altitudes of Triangles

Practice: If $DC = 21$, and $XE = 4$,
solve for the length of CX and AE .



6.3 Medians and Altitudes of Triangles

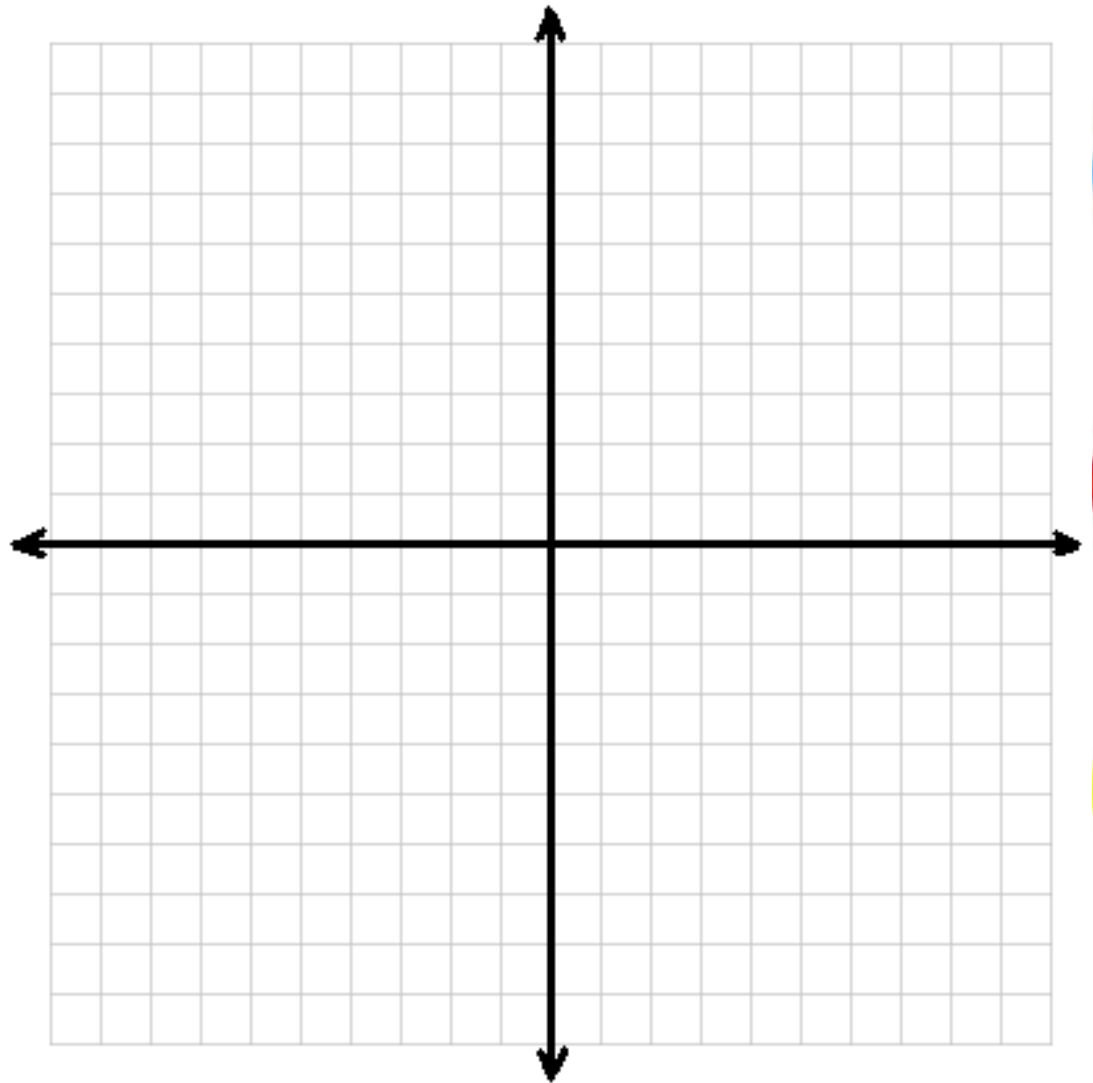
Practice:

Find the coordinates of the centroid of $\triangle RST$ with vertices:

$$R(2,1)$$

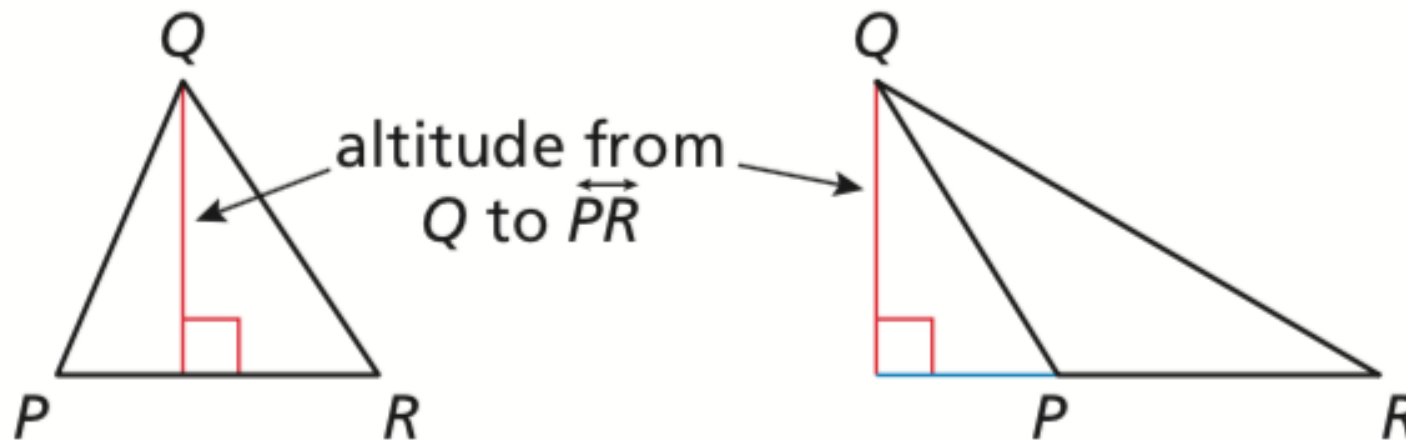
$$S(5,8)$$

$$T(8,3)$$



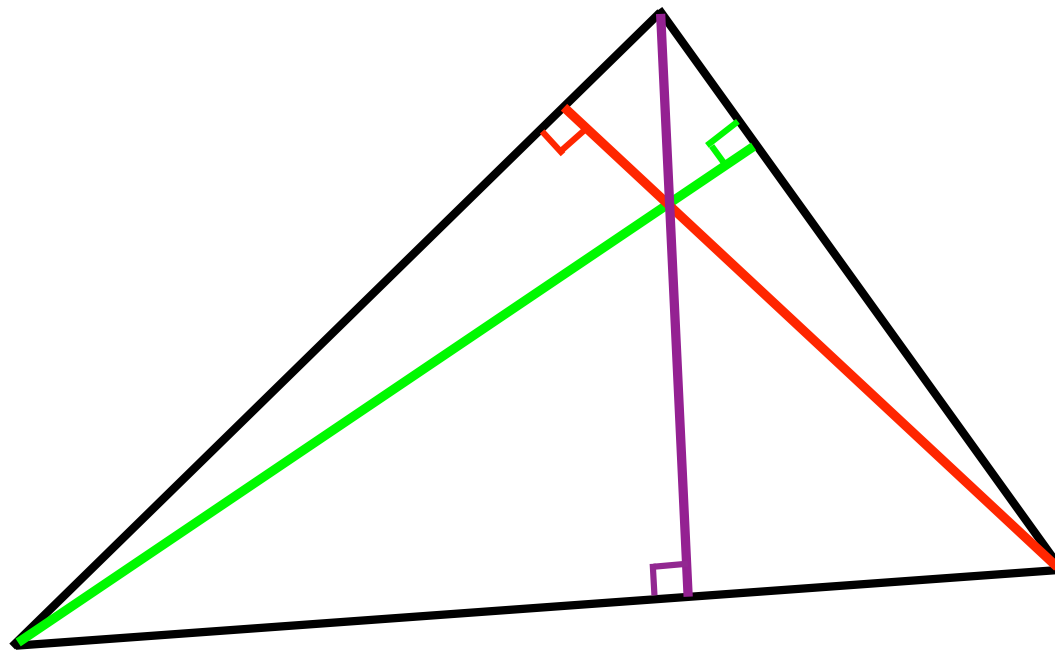
6.3 Medians and Altitudes of Triangles

Altitude (height) of a triangle is the perpendicular segment from a vertex to the line containing the opposite side.



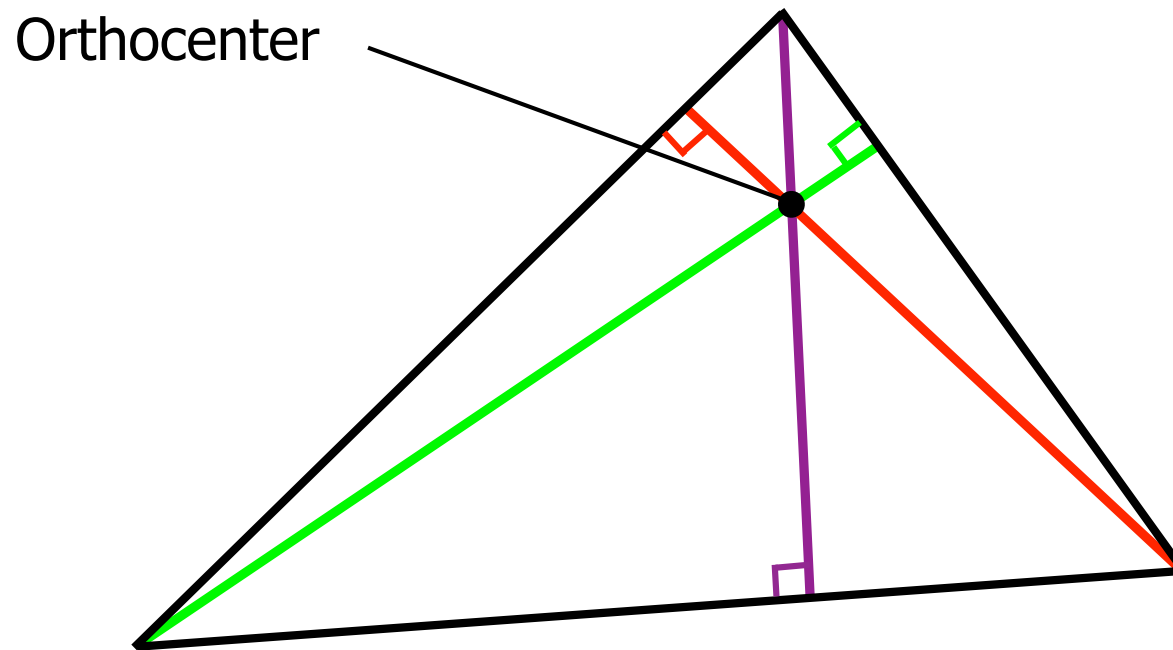
6.3 Medians and Altitudes of Triangles

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6.3 Medians and Altitudes of Triangles

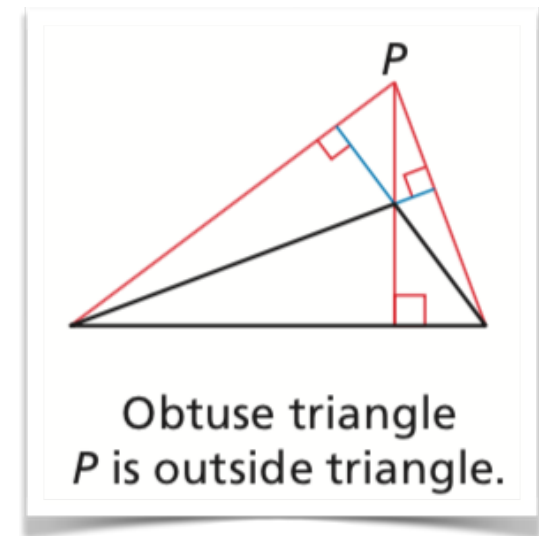
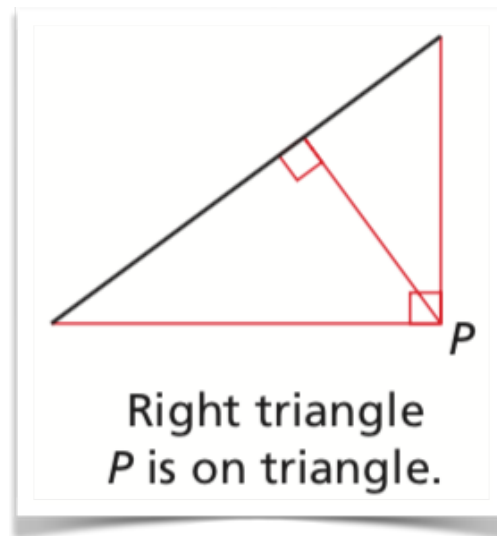
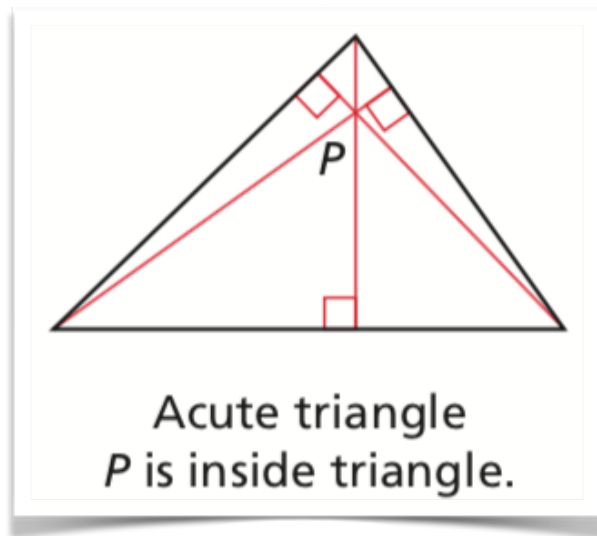
Orthocenter: the intersection of the altitudes of a triangle.



6.3 Medians and Altitudes of Triangles

Orthocenter: the intersection of the altitudes of a triangle.

Locations of orthocenter P :



6.3 Medians and Altitudes of Triangles

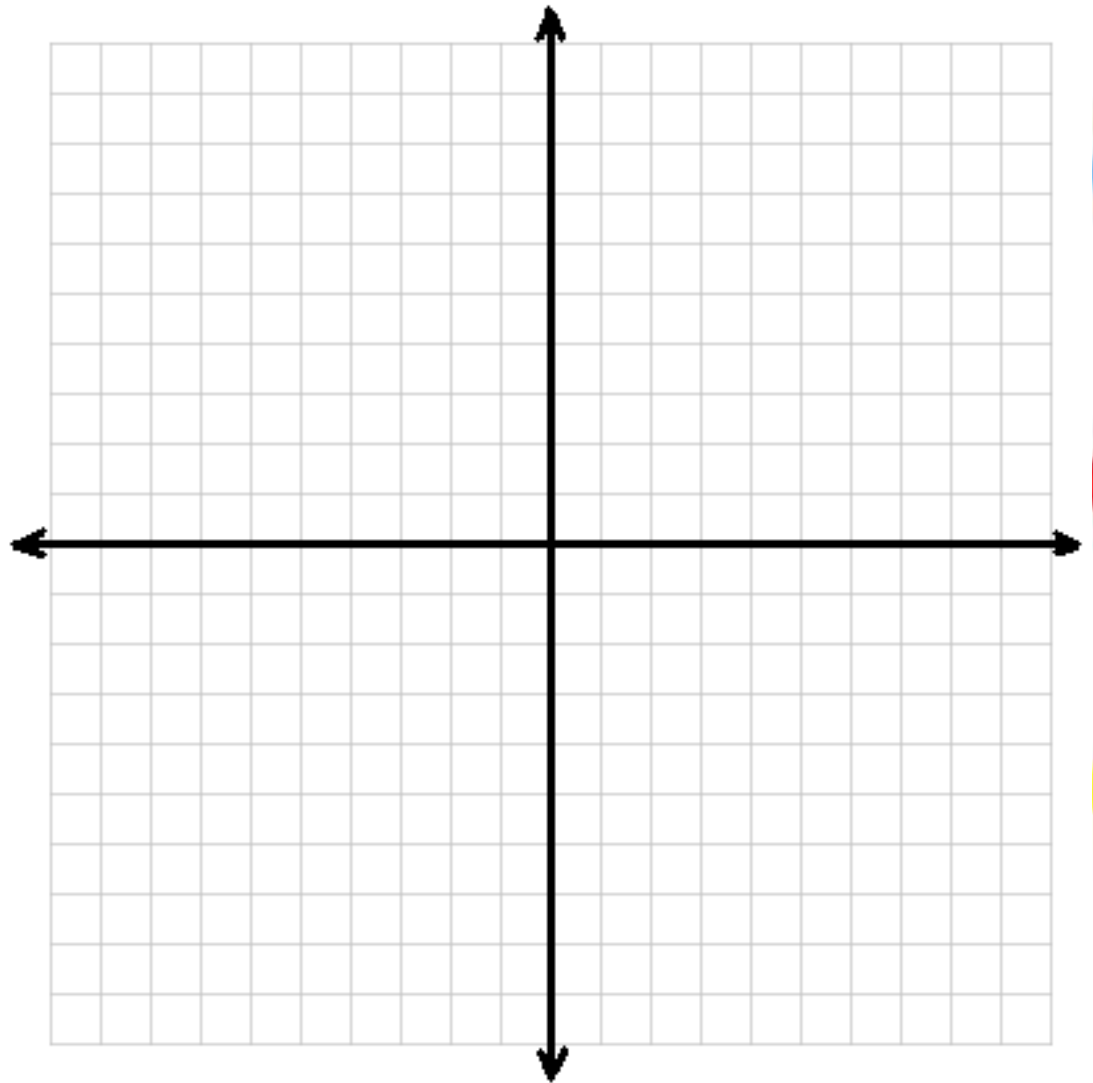
Practice:

Find the coordinates of the orthocenter of $\triangle XYZ$ with vertices:

$$X(-5, -1)$$

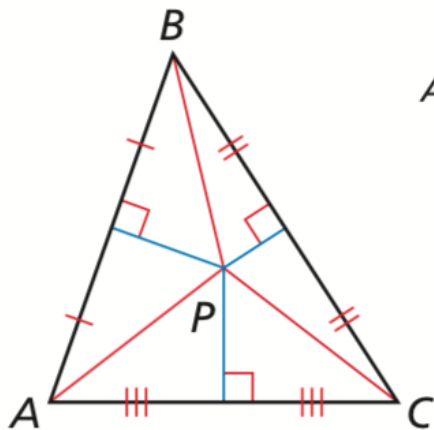
$$Y(-2, 4)$$

$$Z(3, -1)$$

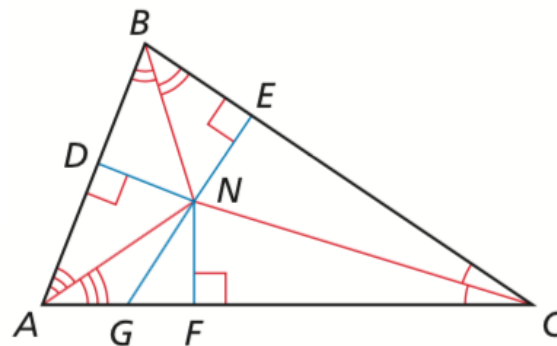


6.3 Medians and Altitudes of Triangles

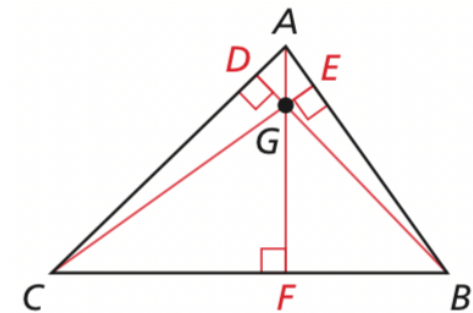
- The coincident points you should know right now ... and how to find each of these:



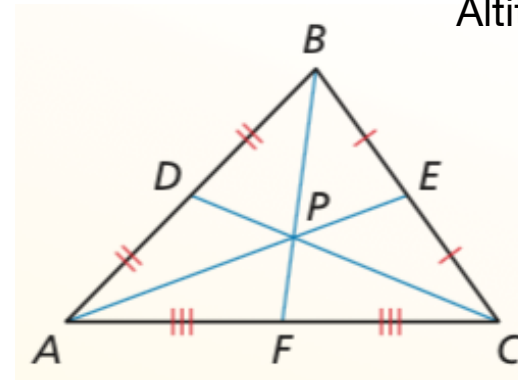
Circumcenter
Perpendicular
bisectors



Incenter
Angle
bisectors



Orthocenter
Altitudes



Centroid
Medians