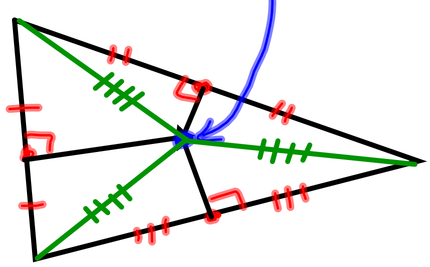
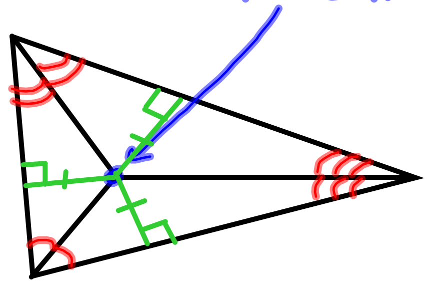
5.2 $\perp$ Bisector

"Circumcenter"



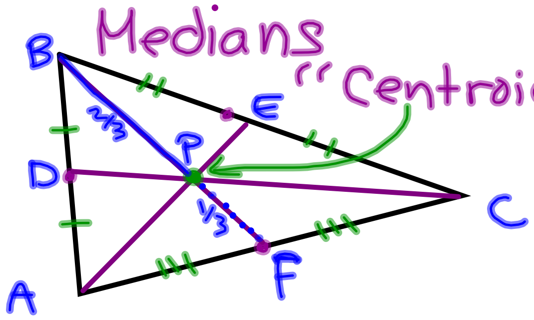
5.3 $\angle$ Bisector

"Incenter"



5.4 Medians

"Centroid"



5.4 Use Medians and Altitudes

Before You used perpendicular bisectors and angle bisectors of triangles

Now You will use medians and altitudes of triangles.

Why? So you can find the balancing point of a triangle, as in Ex. 37.

Balancing Point of a Triangle - The intersection of the Medians.

Median of a Triangle - A segment from a Vertex to the midpoint of the opposite side.

The three medians of the triangle are concurrent.

Centroid - The Point of concurrency.

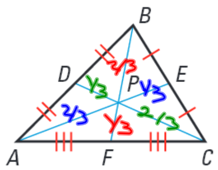
Three medians meet at the centroid.

THEOREM *For Your Notebook*

THEOREM 5.8 Concurrency of Medians of a Triangle

The medians of a triangle intersect at a point that is two thirds of the distance from each vertex to the midpoint of the opposite side.

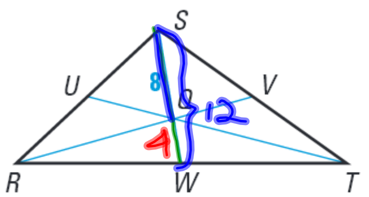
The medians of $\triangle ABC$ meet at P and $AP = \frac{2}{3}AE$, $BP = \frac{2}{3}BF$, and $CP = \frac{2}{3}CD$.



EXAMPLE 1: Use the CENTROID of a triangle

In ΔRST, Q is the centroid and SQ = 8.

Find QW and SW.



$\cancel{\frac{3}{2}} \cdot \cancel{\frac{2}{3}} SW = 8 \cdot \frac{3}{2}$

$\boxed{SW = 12}$

$\cancel{3} \cdot \frac{2}{3} SW = 8 \cdot 3$

$\frac{\cancel{2}SW}{\cancel{2}} = \frac{24}{2}$

$\boxed{SW = 12}$

$\frac{1}{3} \cdot SW = QW$

$\frac{1}{3} \cdot 12 = QW$

$4 = QW$

There are three paths through a triangular park. Each path goes from the midpoint of one edge to the opposite corner. The paths meet at point P.

1. If SC = 2100 ft, find PS and PC.

   PS : $\frac{1}{3}2100 = PS$

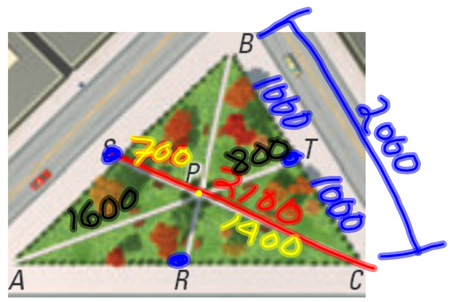
   $700 = PS$

2. If BT = 1000 ft, find TC and BC.

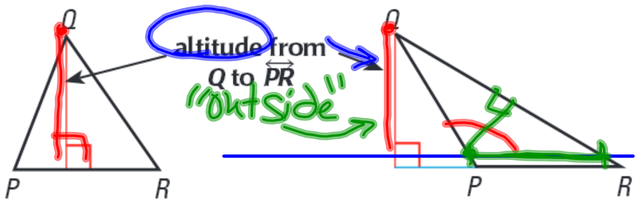
   1000 2000

3. If PT = 800 ft, find PA and TA.

   1600 2400



Altitude of a Triangle - The ___$\perp$___ segment from a vertex to the opposite side or to the line that contains the opposite side.

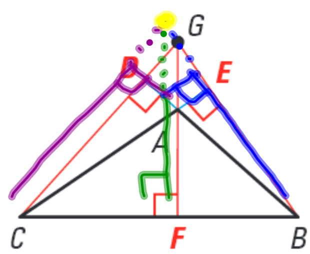


THEOREM *For Your Notebook*

THEOREM 5.9 Concurrency of Altitudes of a Triangle

The lines containing the altitudes of a triangle are concurrent.

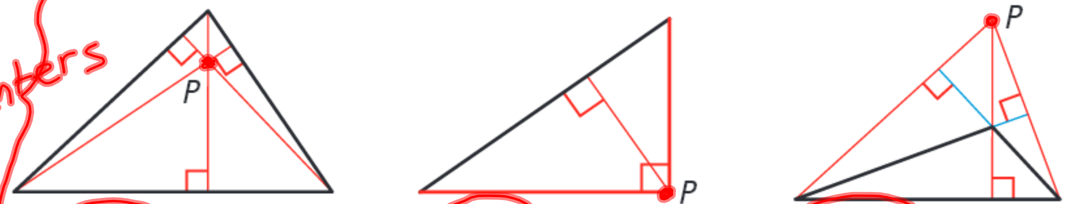
The lines containing $\overline{AF}$, $\overline{BE}$, and $\overline{CD}$ meet at G.



Orthocenter - The Point of Concurrency of the three altitudes of a triangle.

Orthocenter locations:

Same for circumcenters



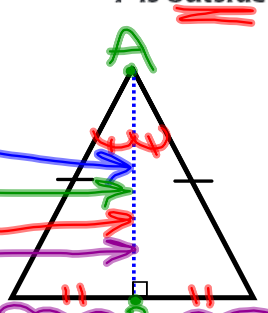
Acute triangle
P is inside triangle.

Right triangle
P is on triangle.

Obtuse triangle
P is outside triangle.

Find:

1. **A Perpendicular Bisector**
2. **An Angle Bisector**
3. **A Median**
4. **An Altitude**



onlyish

Isosceles Triangle

When is this true for an Equilateral Triangle?

~~RECAP:~~

POINT OF CONCURRENCY - ______________________________

CIRCUMCENTER - ______________________________

INCENTER - ______________________________

CENTROID - ______________________________

ORTHOCENTER - ______________________________