Lesson 5-1
and
Lesson 5-2

Bisectors of Triangles

and

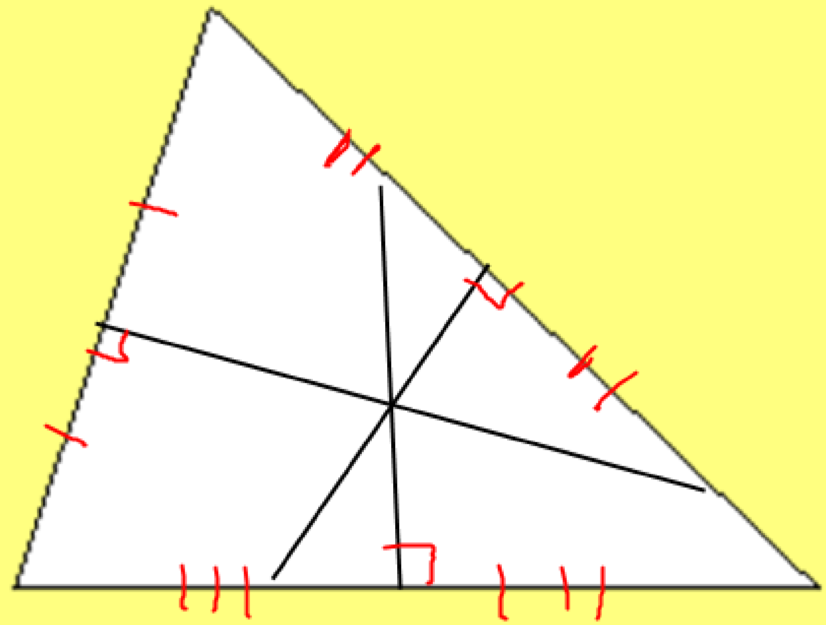
Medians & Altitudes of Triangles

You will identify and use perpendicular bisectors and angle bisectors in triangles

You will identify and use medians and altitudes in triangles

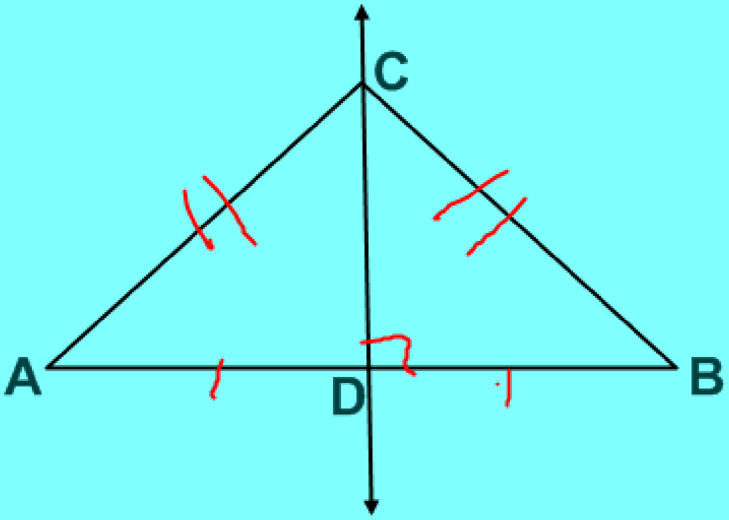
Perpendicular Bisector

Bisects a side
and is ⊥ with side

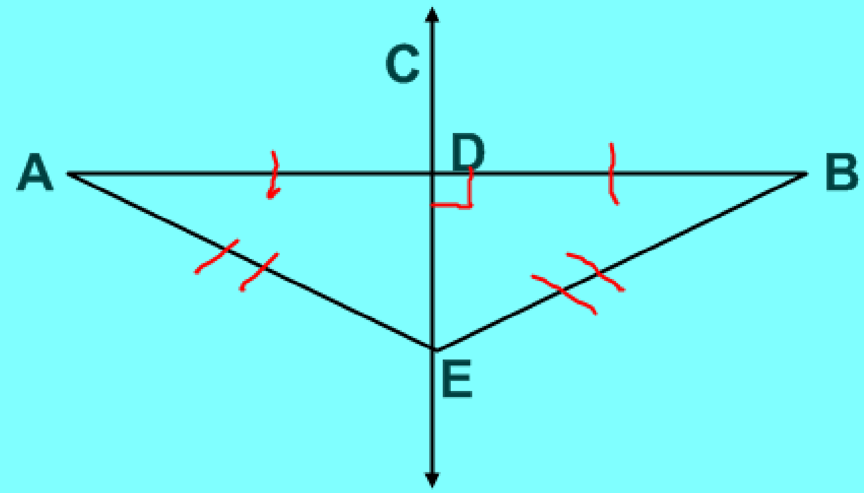


Name the point of concurrency Circumcenter

Perpendicular Bisector Theorem and Converse



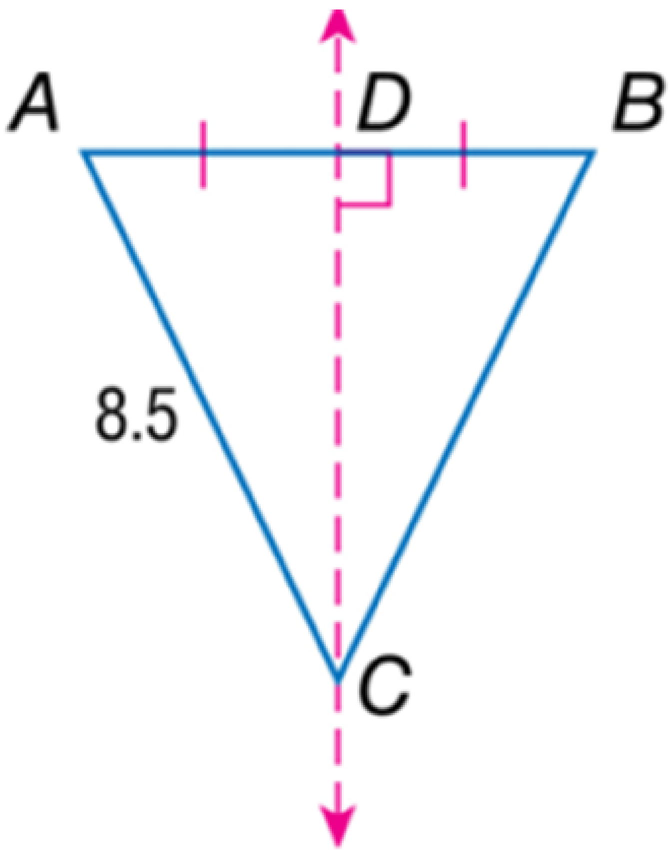
If $\overline{CD}$ is a $\perp$ bisector of $\overline{AB}$,
Then AC = CB



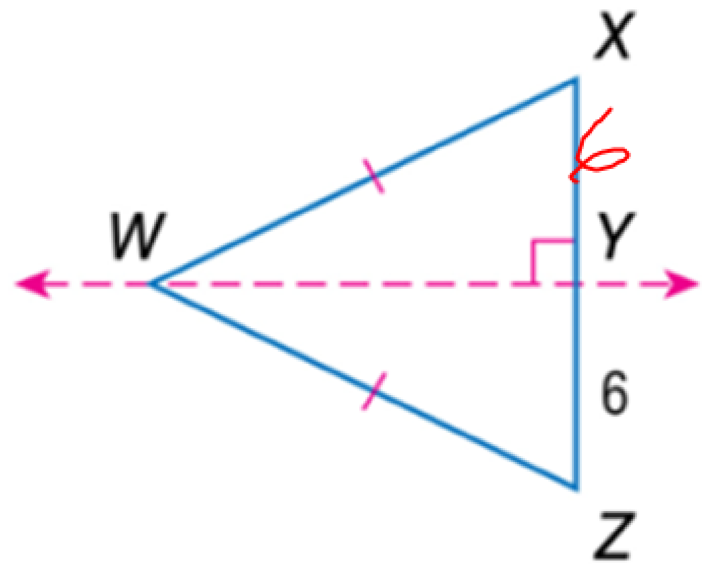
If $\overline{AE} = \overline{BE}$, then E lies on CD,
the $\perp$ bisector of $\overline{AB}$.

Use the Perpendicular Bisector Theorems

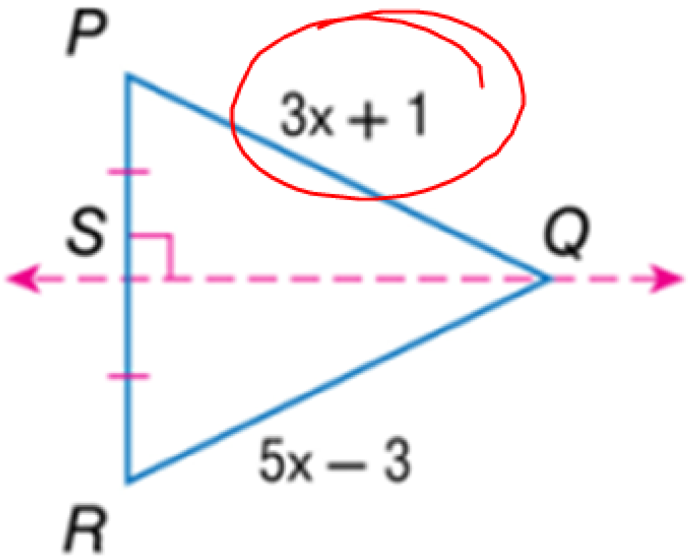
A. Find *BC*. 8.5



B. Find *XY*.



C. Find *PQ*.



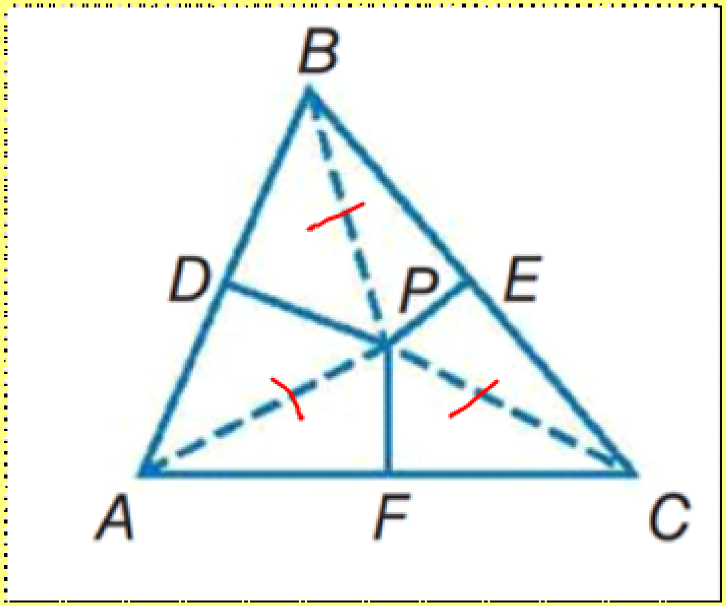
$$3x+1=5\cancel{x}-3$$
$$-5x \qquad -\cancel{5}x$$
$$-2x+1=-3$$
$$-1 \qquad -1$$
$$-2x=-4$$
$$\frac{-2x}{-2}=\frac{-4}{-2}$$
$$x=2$$

$$PQ=3(2)+1$$
$$PQ=7$$

Circumcenter Theorem

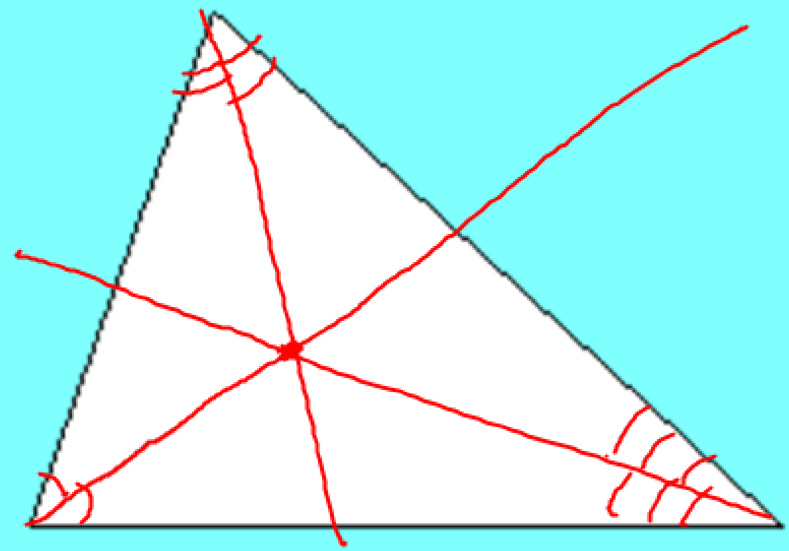
→ ⊥ bisectors

If P is the circumcenter of ΔABC,
then PB = PA = PC



Angle Bisector

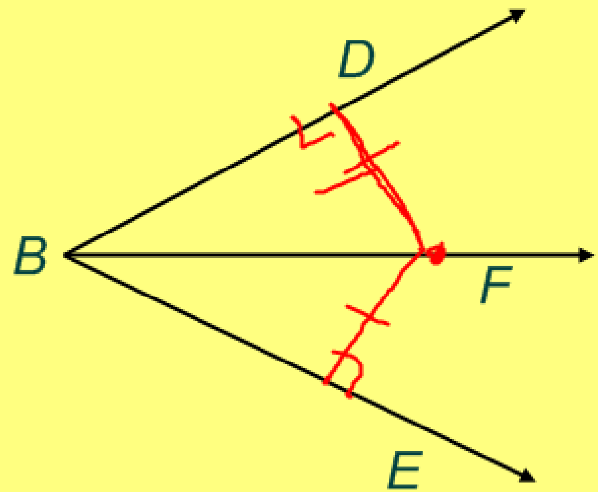
→ cuts each angle in half



Name the point of concurrency incenter

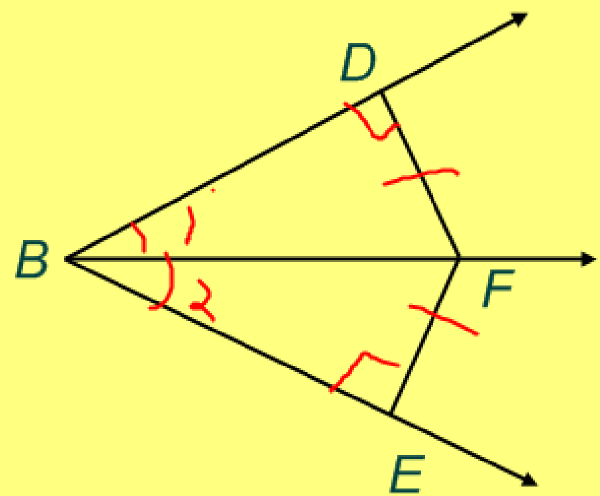
Angle Bisector Theorem and Converse

If $\overrightarrow{BF}$ bisects $<DBE$, $\overline{FD} \perp \overrightarrow{BD}$, and $\overline{FE} \perp \overrightarrow{BE}$, then $\underline{FD}$ = $\underline{EF}$



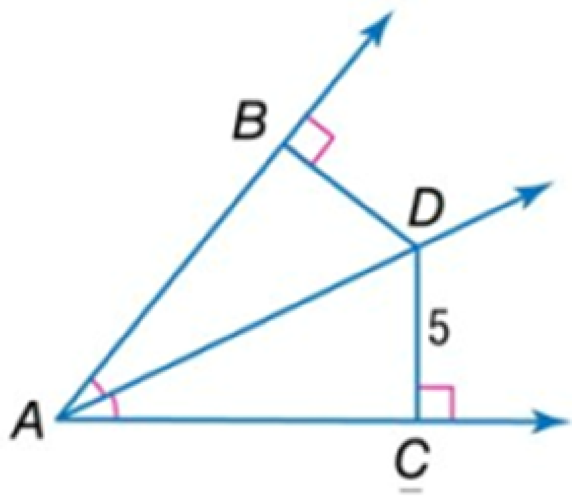
If $\overline{FD} \perp \overrightarrow{BD}$, $\overline{FE} \perp \overrightarrow{BE}$, and $\overline{DF} = \overline{FE}$, then $\underline{\overrightarrow{BF}}$ bisects $\underline{\angle DBE}$

$\angle 1 \cong \angle 2$

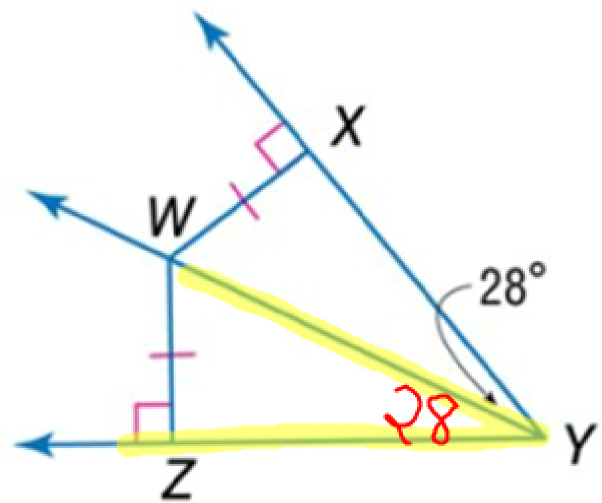


Use the Angle Bisector Theorems

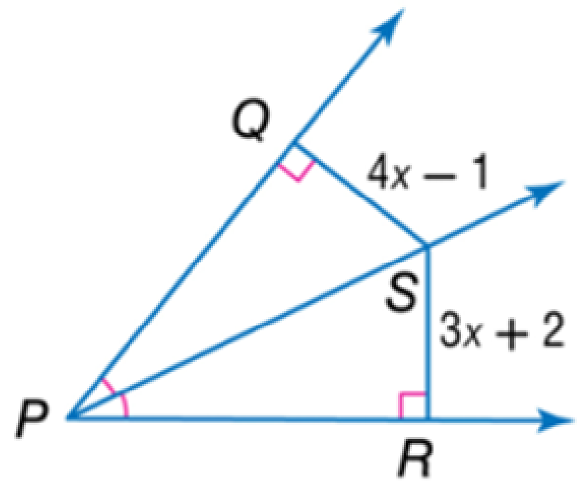
A. Find *DB*. 5



B. Find $m\angle WYZ$.



C. Find QS.



$4x-1=3x+2$

$\quad +1 \qquad\quad +1$

$4x=3x+3$

$-3x \qquad -3x$

$x=3$

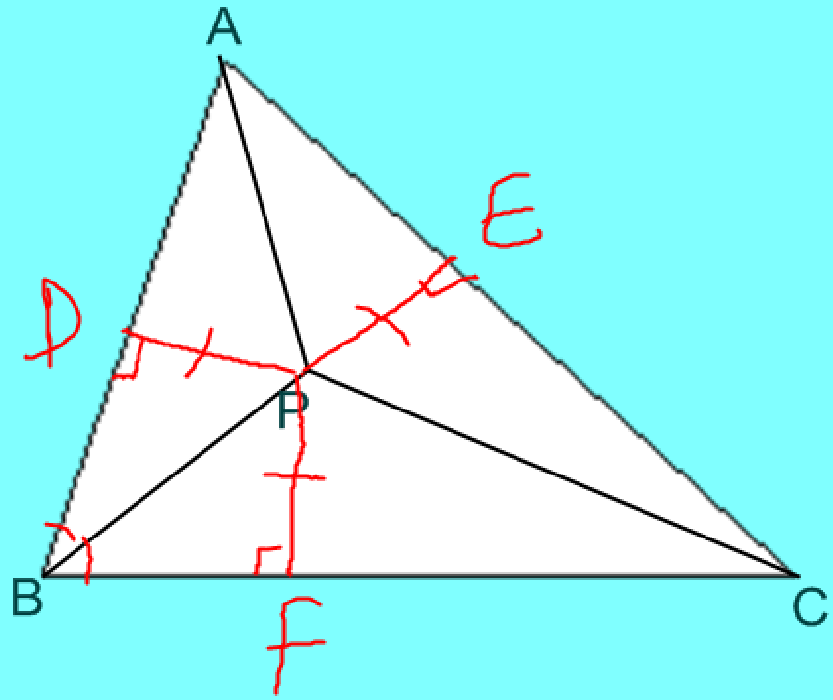
$QS=4(3)-1$

$QS=11$

Incenter Theorem

↳ Angle Bisector

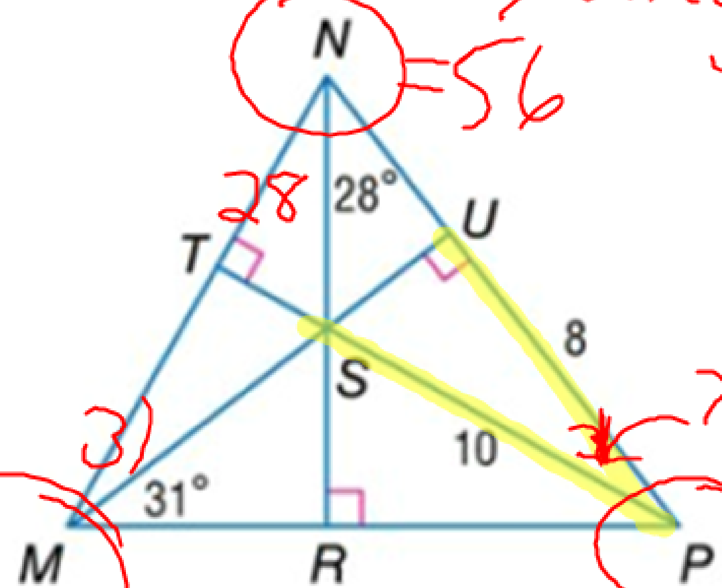
If P is the incenter of ΔABC,
then <u>DP</u> = <u>PF</u> = <u>PE</u>



Use the Incenter Theorem

B. Find $m\angle SPU$ if S is the incenter of ΔMNP.

↳ angle bisectors



$N = 56$

28

31

$62 = M$

P ?

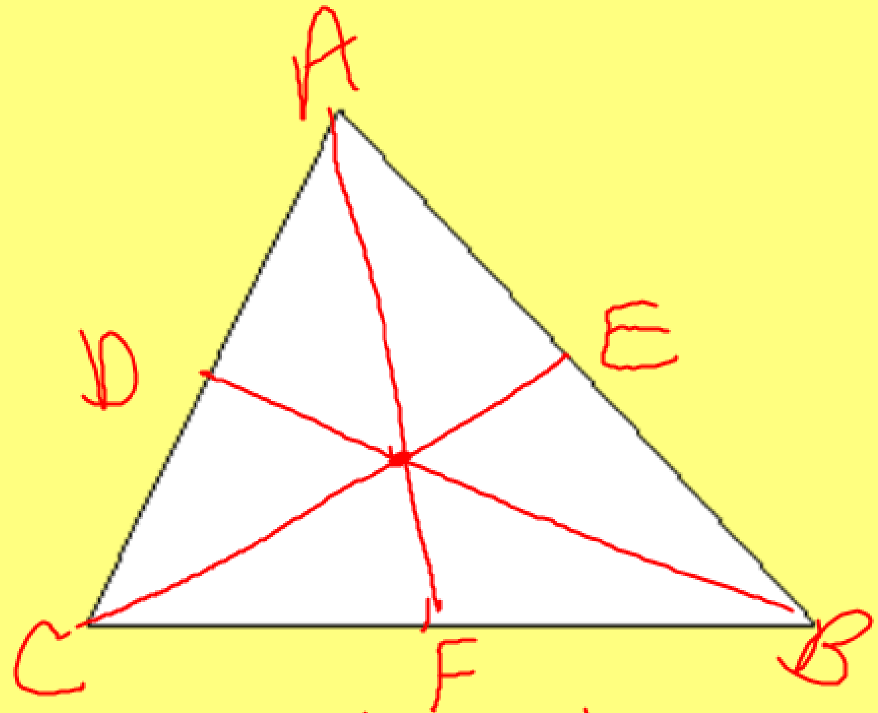
?

$$\begin{array}{r} 62 \\ +\ 56 \\ \hline 118 \end{array}$$

$$\begin{array}{r} 180 \\ -\ 118 \\ \hline 62 \end{array} \div 2$$

Median

vertex to
midpoint of
opp side



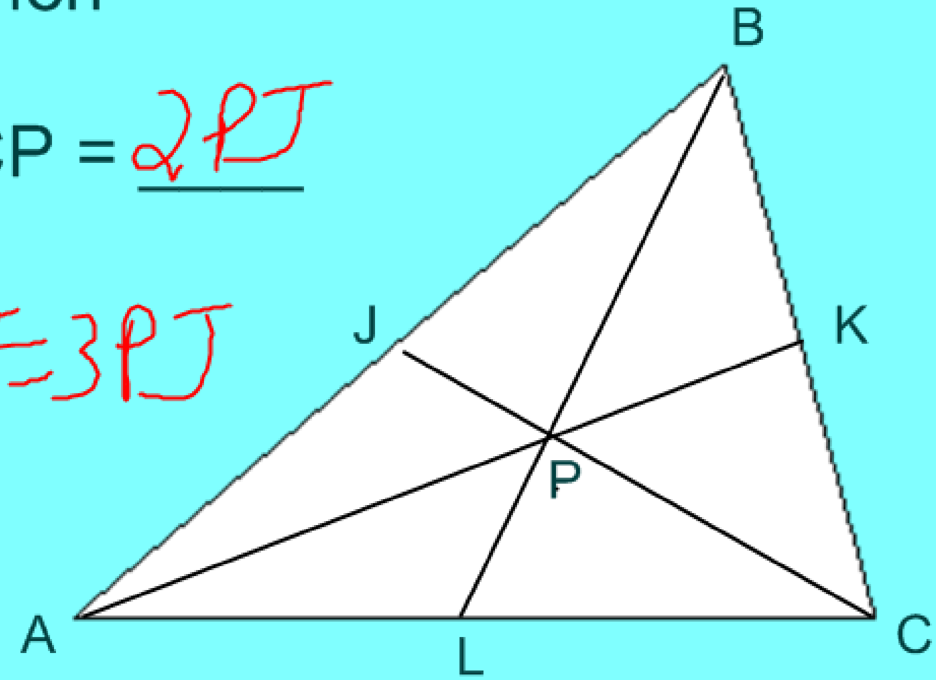
Name the point of concurrency Centroid

Centroid Theorem

If P is the centroid of ΔABC, then

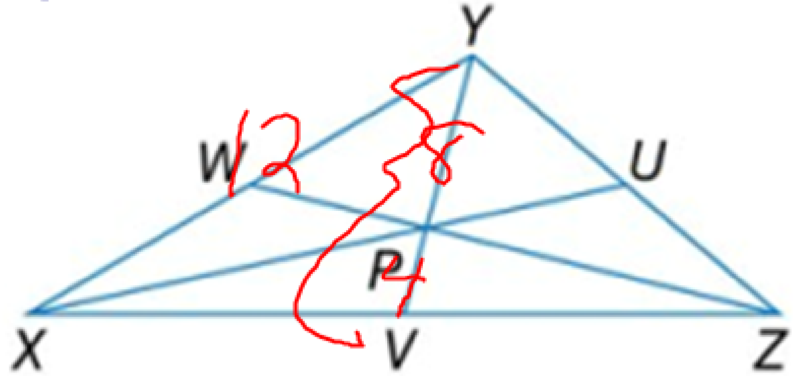
AP = $\underline{2PK}$, BP = $\underline{2PL}$, and CP = $\underline{2PJ}$

$AK = 3PK$, $BL = 3PL$, $CJ = 3PJ$

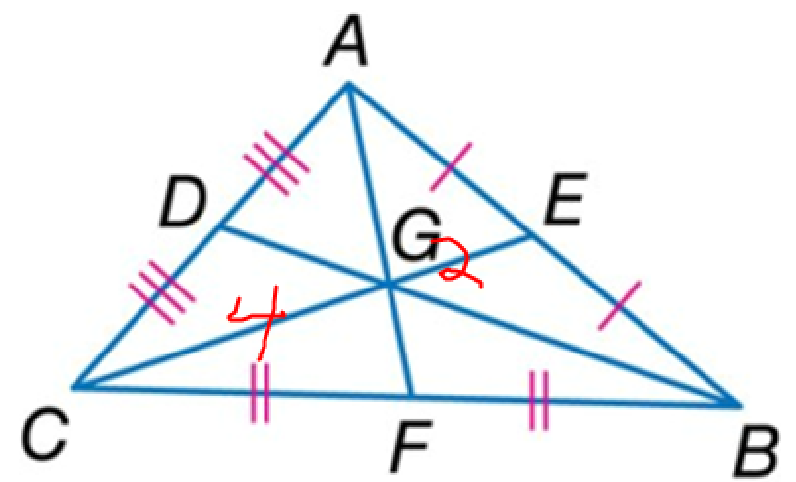


Use the Centroid Theorem

In ΔXYZ, P is the centroid Median and YV = 12. Find YP and PV

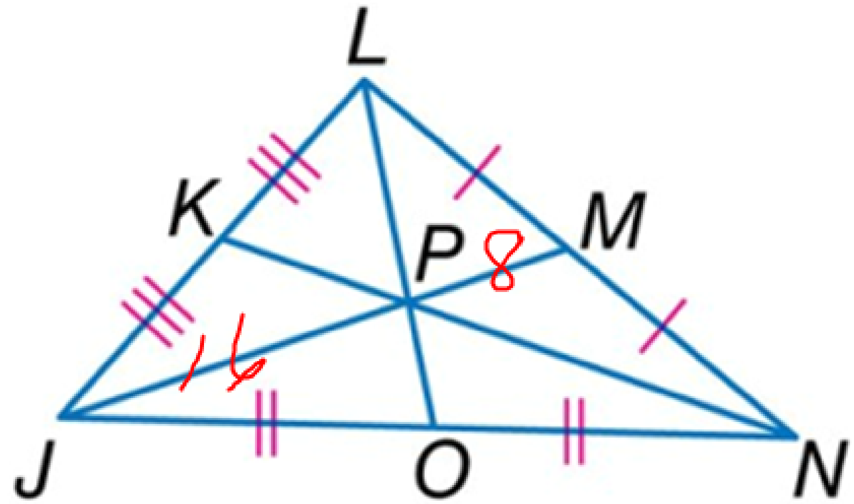


In Δ*ABC*, *CG* = 4. Find *GE*.



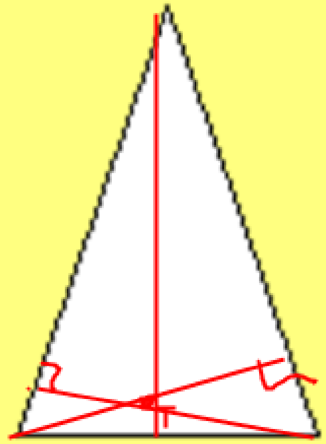
In Δ*JLN*, *JP* = 16. Find *PM*.

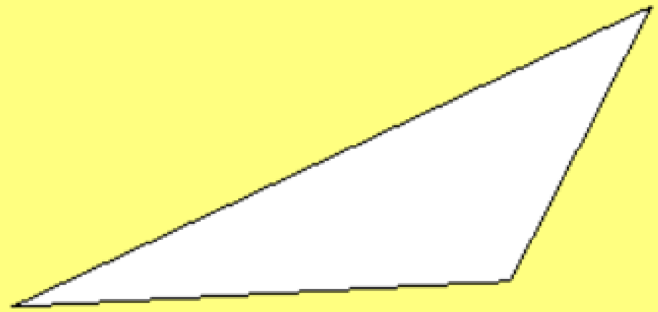
JM = 24



Altitude

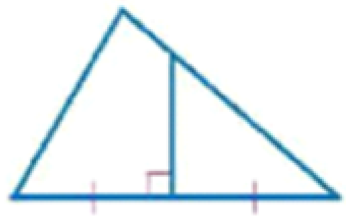
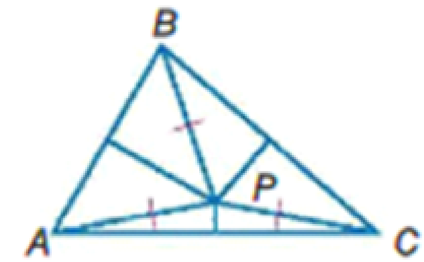
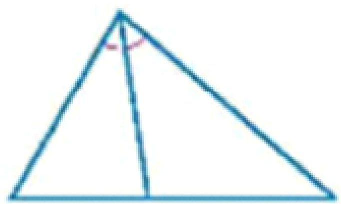
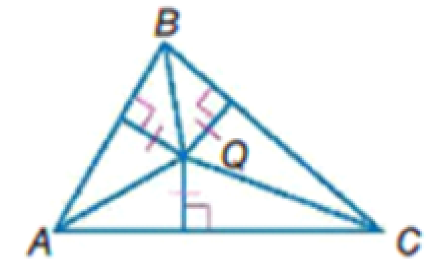
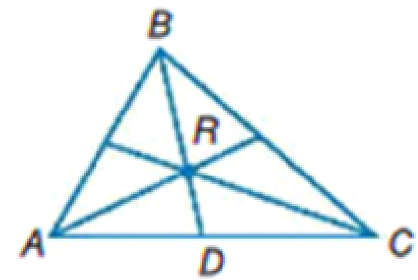
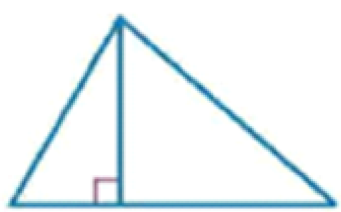
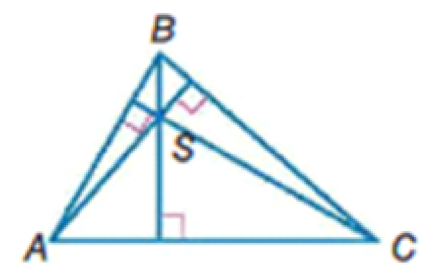
from a vertex
⊥ to the
line containing
the opposite side





Name the point of concurrency orthocenter

ConceptSummary Special Segments and Points in Triangles

Name	Example	Point of Concurrency	Special Property	Example
perpendicular bisector		circumcenter	The circumcenter P of $\triangle ABC$ is equidistant from each vertex.	
angle bisector		incenter	The incenter Q of $\triangle ABC$ is equidistant from each side of the triangle.	
median		centroid	The centroid R of $\triangle ABC$ is two thirds of the distance from each vertex to the midpoint of the opposite side.	
altitude		orthocenter	The lines containing the altitudes of $\triangle ABC$ are concurrent at the orthocenter S.	

Assignment

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