Cornell Notes

Name:______________________
Class/Period:______________________
Date:______________________

Main Ideas/Questions

Topic/ Objective:

5.3 Concurrent Lines, Medians, and Altitudes

Theorem 5-6

The perpendicular bisectors of the sides of a triangle are concurrent at a point equidistant from the vertices

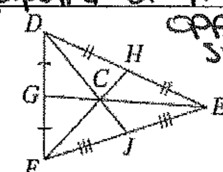
Theorem 5-7

The bisectors of the angles of a triangle are " " from the sides

Theorem 5-8

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

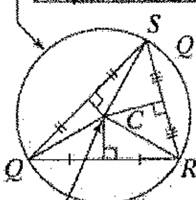
$DC = \frac{\boxed{2}}{\boxed{3}} DJ$ median $EC = \frac{\boxed{2}}{\boxed{3}} EG$ median $FC = \frac{\boxed{2}}{\boxed{3}} FH$ median



Theorem 5-9

The lines that contain the altitudes of a triangle are concurrent

circumscribed circle



$QC = SC = RC$

circumcenter

Definitions:

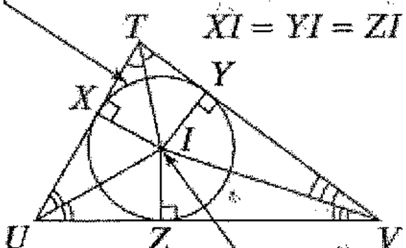
Concurrent: 3 or more lines intersect in one point

Point of concurrency: The point at which the lines intersect

Circumcenter of the triangle: The point of concurrency of the ⊥ bisectors of a triangle (C)

Circumscribed: all points of the Δ touch the circle and are equidistant from the point of concurrency

inscribed circle



$XI = YI = ZI$

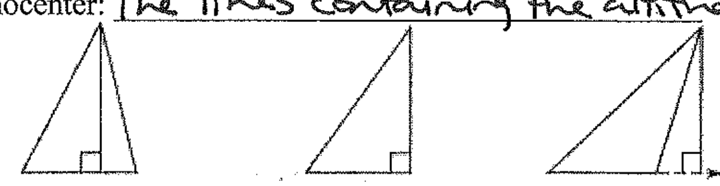
incenter

Inscribed: points X, Y, Z are equidistant from I (circle inside figure)

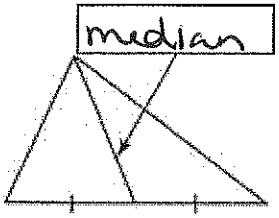
Incenter of the triangle: point of concurrency of the angle bisectors of a Δ (I)

Altitude: ⊥ segment from a vertex to the line containing the opposite side

Orthocenter: The lines containing the altitudes of a Δ are concurrent at this point



Acute Triangle	**Right Triangle**	**Obtuse Triangle**
Altitude is inside.	Altitude is a side.	Altitude is outside

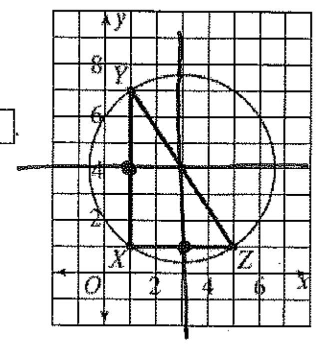


Median: Segment whose endpoints are a vertex and the midpoint of the opposite side

Centroid: The point of concurrency of the medians of a Δ

Example 1

Finding the Circumcenter Find the center of the circle that circumscribes $\triangle XYZ$.



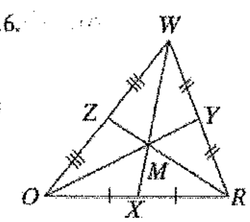
Because X has coordinates (4,1) and Y has coordinates (4,7), $\overline{XY}$ lies on the vertical line $x =$ 1. The perpendicular bisector of $\overline{XY}$ is the horizontal line that passes through $(1, \frac{1+7}{2})$ or (4,4), so the equation of the perpendicular bisector of $\overline{XY}$ is $y =$ 4.

Because X has coordinates (4,1) and Z has coordinates (5,1), $\overline{XZ}$ lies on the horizontal line $y =$ 1. The perpendicular bisector of $\overline{XZ}$ is the vertical line that passes through $\left(\frac{5+1}{2}, \frac{1+1}{2}\right)$ or (3,1), so the equation of the perpendicular bisector of $\overline{XZ}$ is $x =$ 3.

Draw the lines $y =$ 4 and $x =$ 3. They intersect at the point (3,4). This point is the center of the circle that circumscribes $\triangle XYZ$.

Example 2

Finding Lengths of Medians M is the centroid of $\triangle WOR$, and $WM = 16$. Find WX.



The Centroid M is the point of concurrency of the medians of a triangle.

The medians of a triangle are concurrent at a point that is 2/3 the distance from each vertex to the midpoint of the opposite side. (Theorem 5-8)

Because M is the Centroid of $\triangle WOR$, $WM =$ 16.

$WM = \frac{2}{3} WX$ Theorem 5-8

$16 = \frac{2}{3} WX$ Substitute 16 for WM.

$\left(\frac{3}{2}\right) 16 = \frac{2}{3} WX \left(\frac{3}{2}\right)$

$24 = WX$ Multiply each side by $\frac{3}{2}$.

Example 3

Find the center of the circle that you can circumscribe about the triangle with vertices (0, 0), (−8, 0), and (0, 6).

(−4, 3)