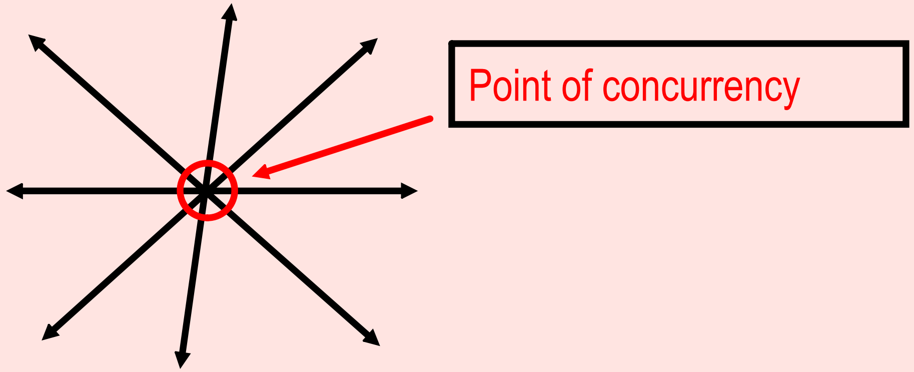
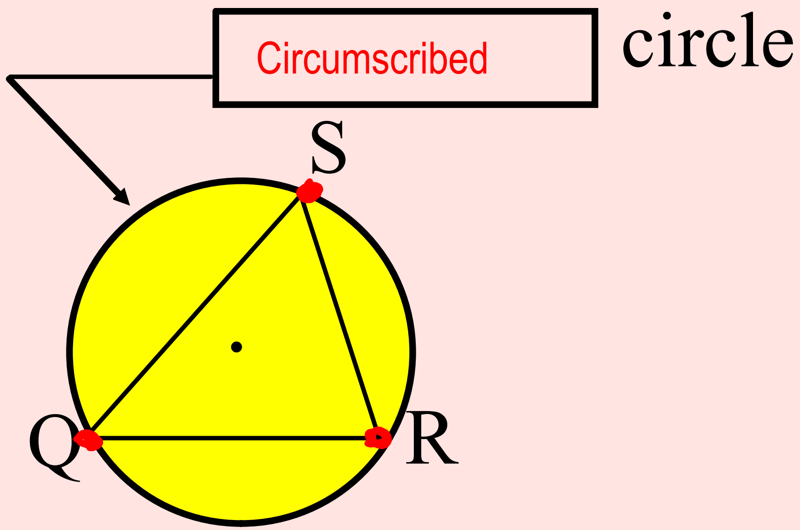
Geometry

Ch. 5 Handout 5.3

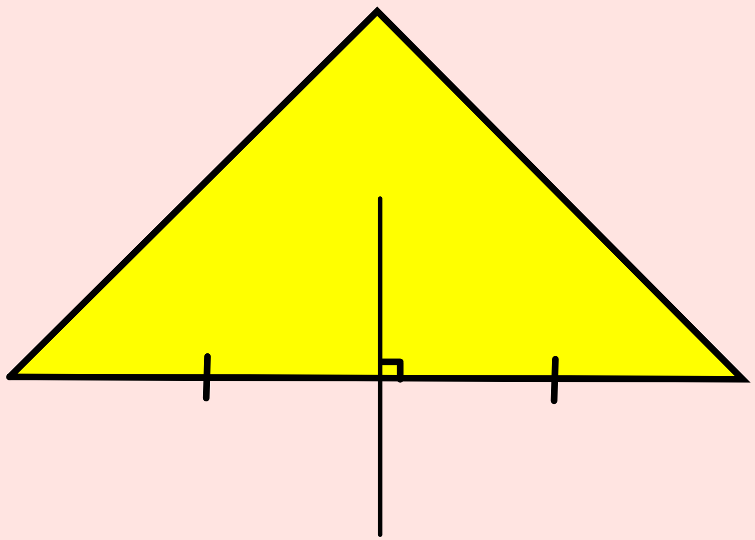
Concurrent Lines, Medians, and Altitudes


Point of concurrency

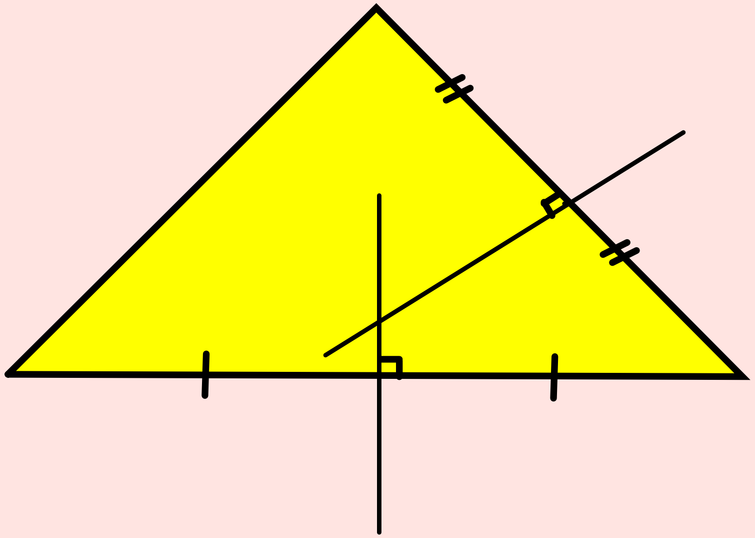

Circumscribed
circle
S
Q
R

Theorem 5.6

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



Theorem 5.6
The perpendicular bisectors of the sides of a triangle are concurrent at a point equidistant from the vertex.



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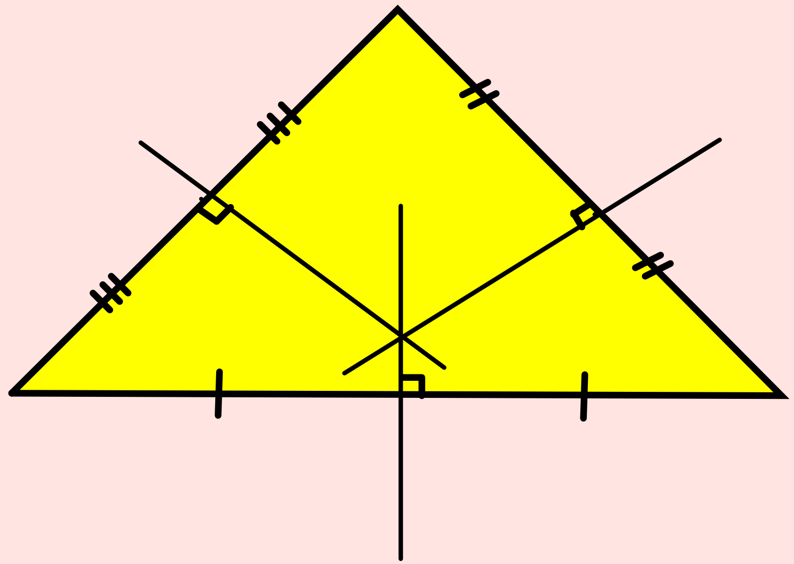
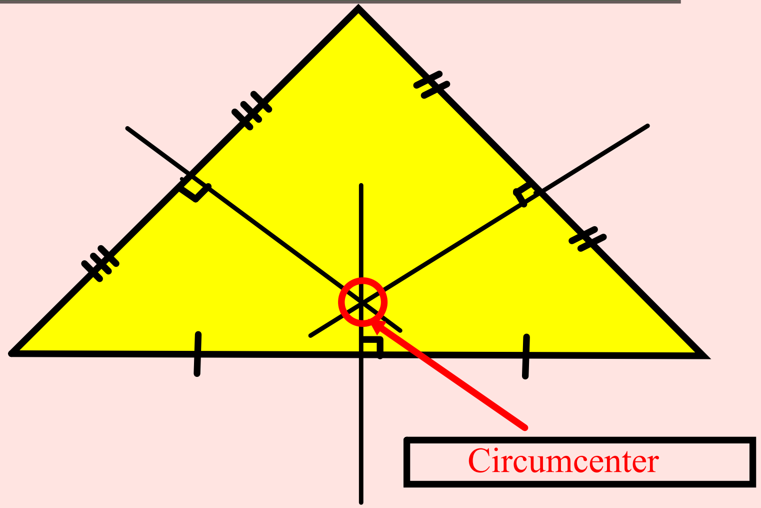


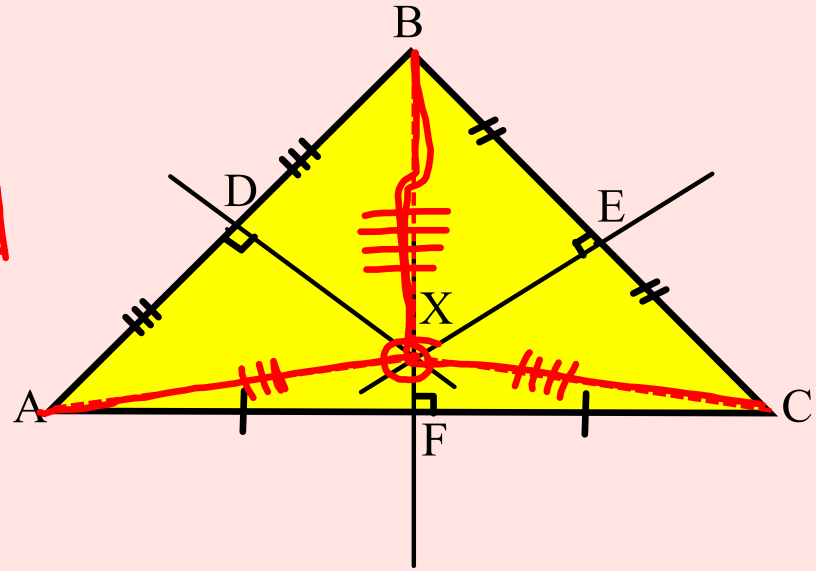
Theorem 5.6
The perpendicular bisectors of the sides of a triangle are concurrent at a point equidistant from the vertex.

Circumcenter -- the point of concurrency of the three perpendicular bisectors of each side of the triangle.



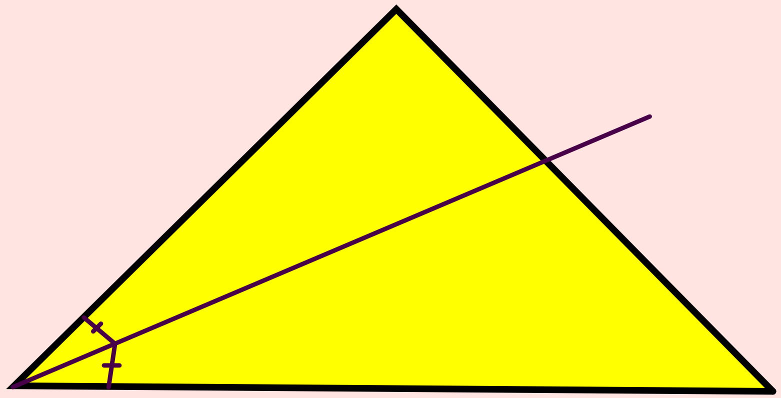
Theorem 5.6
The perpendicular bisectors of the sides of a triangle are concurrent at a point equidistant from the vertex.

AX =CX = BX

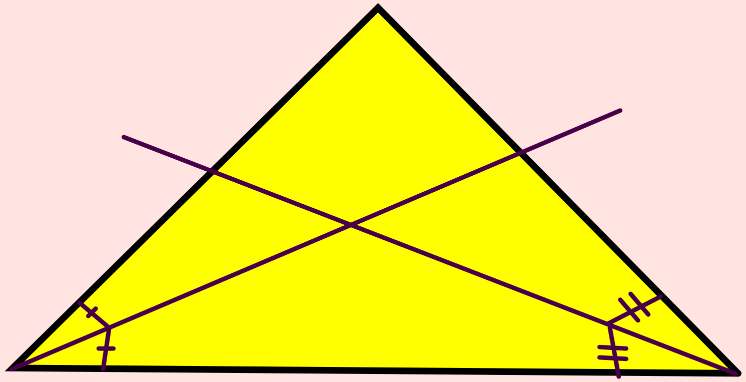


Theorem 5.7

The bisectors of the angles of a triangle are concurrent at a point equidistant from the sides.

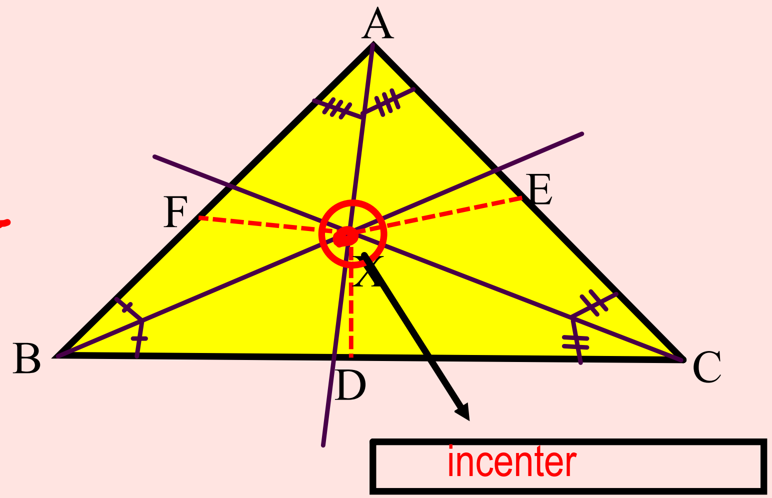


Theorem 5.7
The bisectors of the angles of a triangle are concurrent at a point equidistant from the sides.



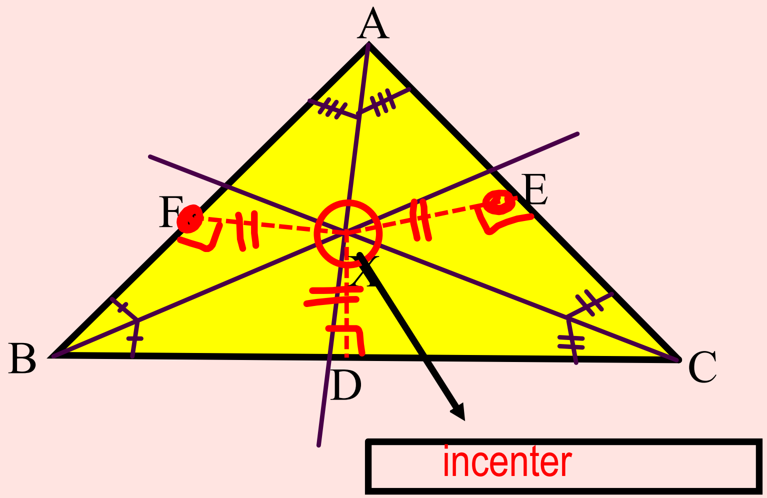
Theorem 5.7
The bisectors of the angles of a triangle are concurrent at a point equidistant from the sides.

Incenter of a triangle -- is the point of concurrency of the angle bisectors.

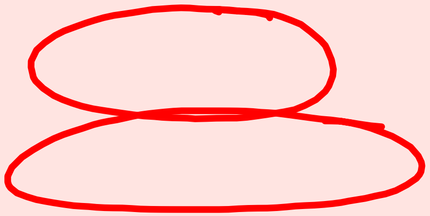


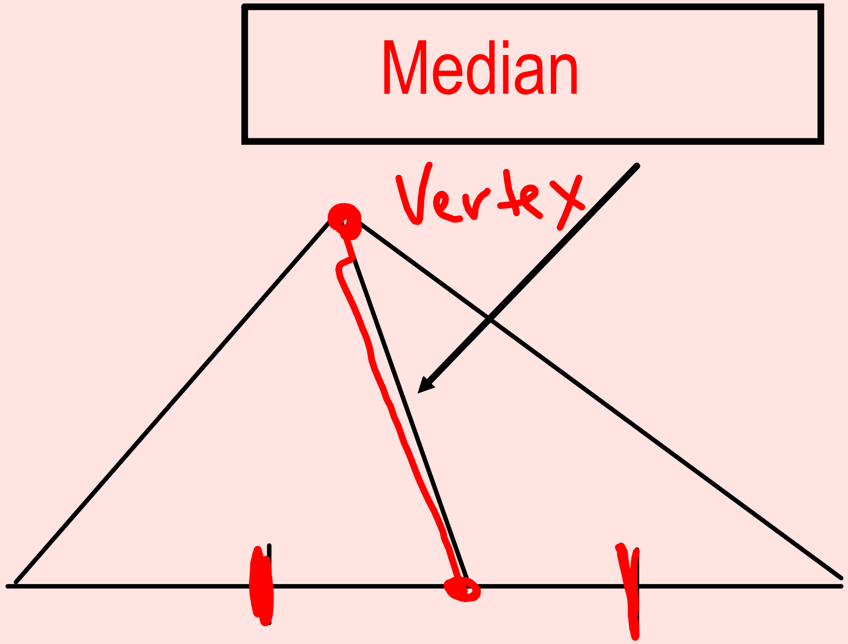
Theorem 5.7
The bisectors of the angles of a triangle are concurrent at a point equidistant from the sides.

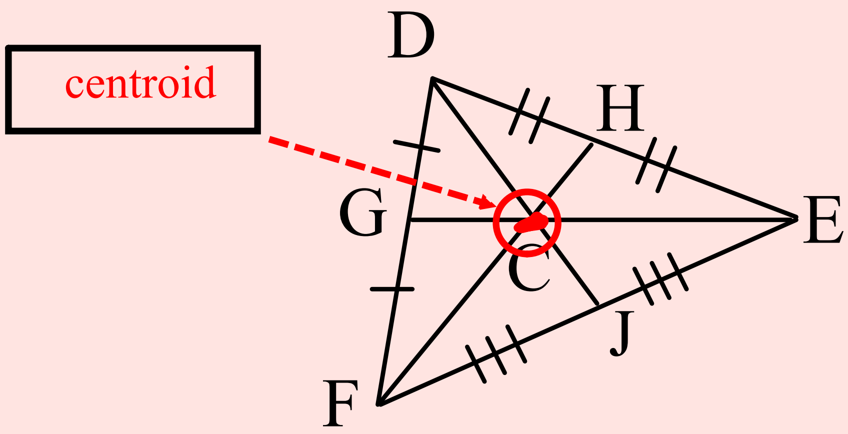
FX = EX = DX



Incenter of a triangle -- is the point of concurrency of the angle bisectors.



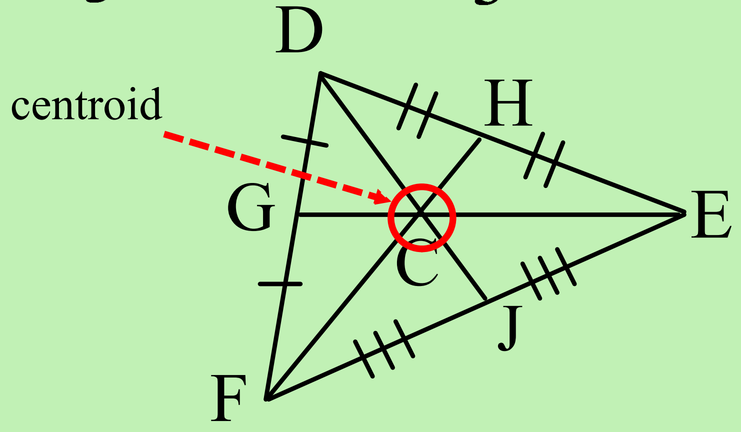

Median
Vertex

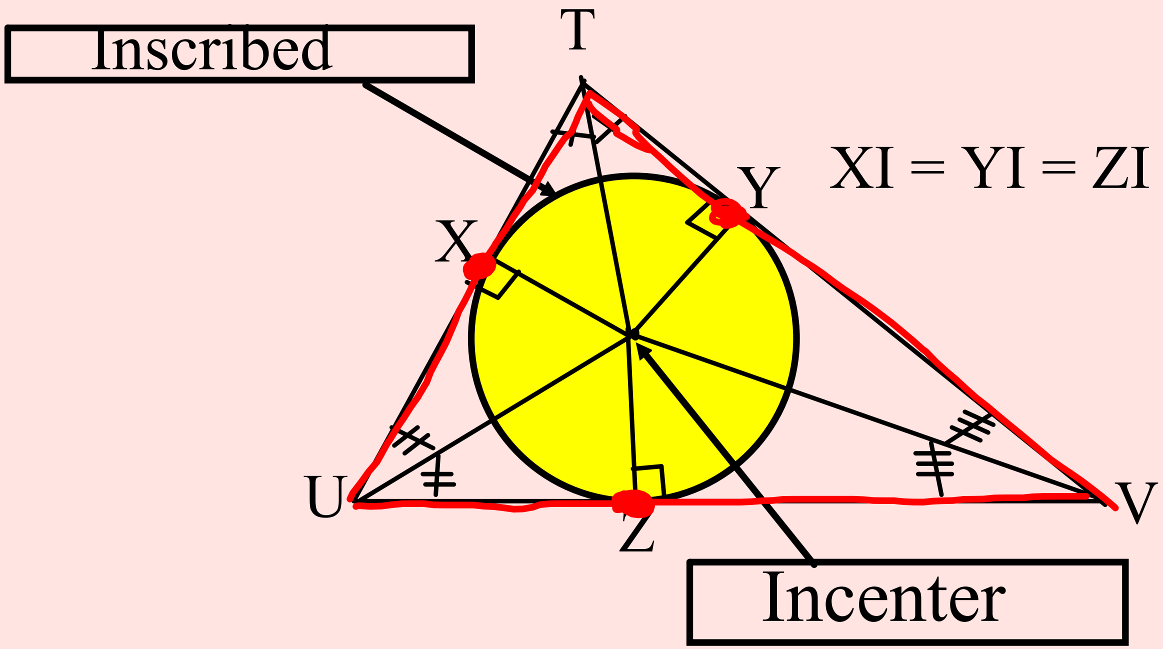

centroid
D
H
G
E
C
J
F

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.

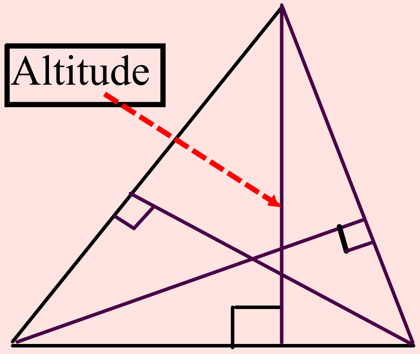
$$DC = \frac{2}{3}DJ, \quad EC = \frac{2}{3}EG, \quad FC = \frac{2}{3}FH$$




Inscribed
T
X
Y
XI = YI = ZI
U
Z
V
Incenter

The altitude of a triangle is the perpendicular segment from a vertex to the line containing the opposite side.

Pull



Acute Triangle

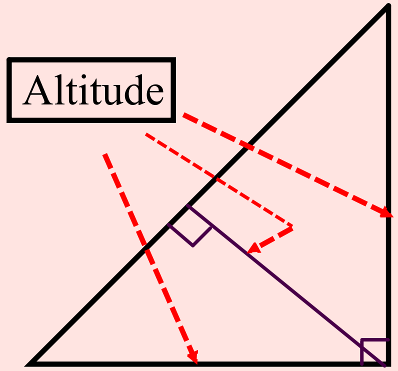
Altitude are

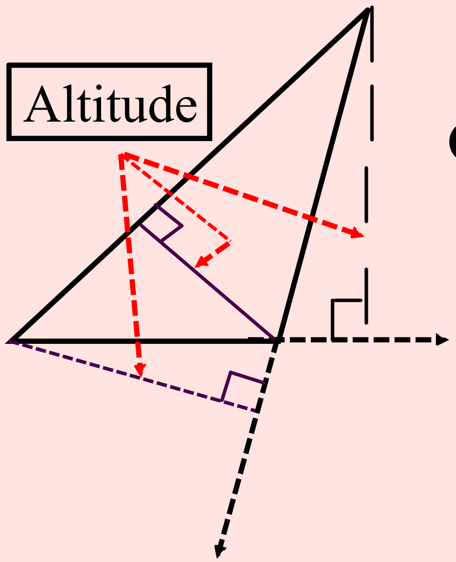
Inside △

Right Triangle

Altitude are

are the legs and one inside





Obtuse Triangle

Altitude are

are 2 outside and 1 inside

1. Find the center of the circle that circumscribes ΔXYZ.

Midpt formula

$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

midpt of AB = (1, 4)

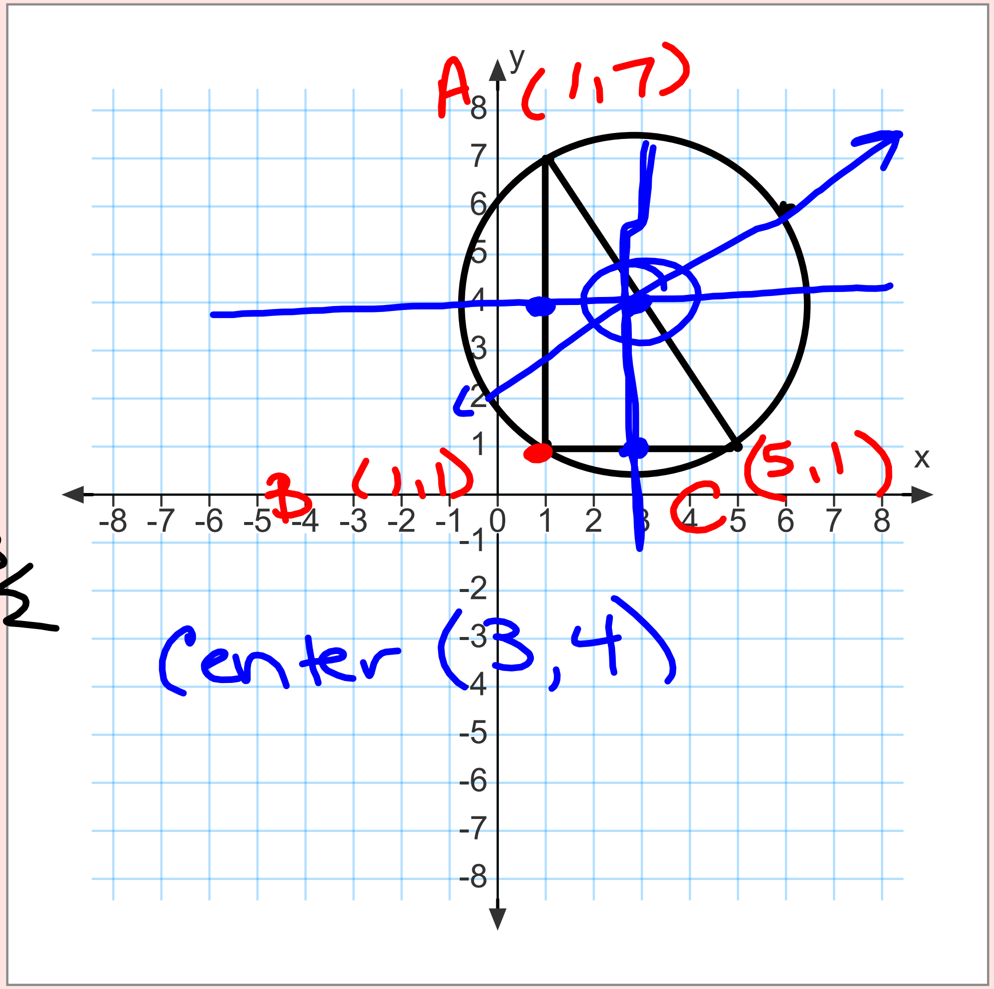
midpt of BC = (3, 1)

midpt of AC = (3, 4)

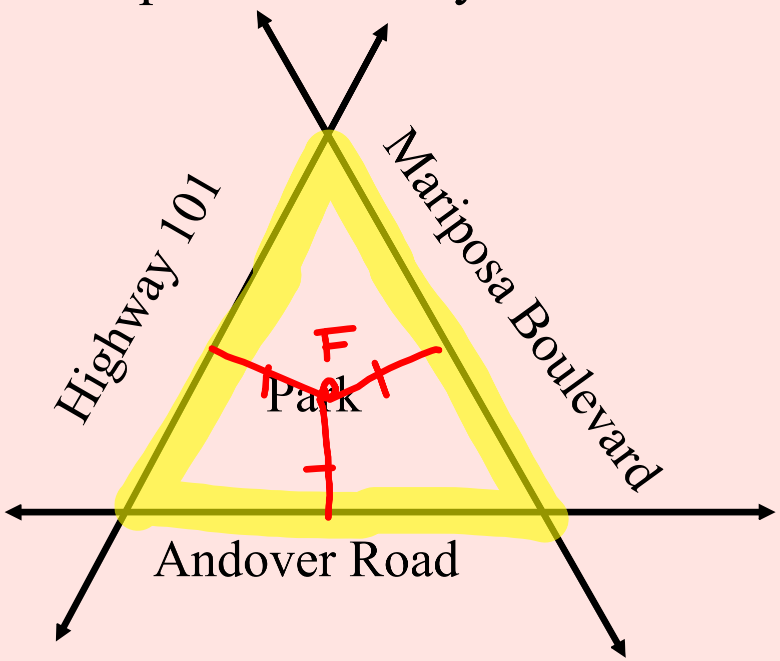
Slope

$\frac{y_2-y_1}{x_2-x_1} = \frac{7-1}{1-5} = \frac{6}{-4} = \frac{-3}{2}$

$m_\perp = 2/3$



2. City planners want to locate a fountain equidistant from three straight roads that enclose a park. Explain how they can find the location.



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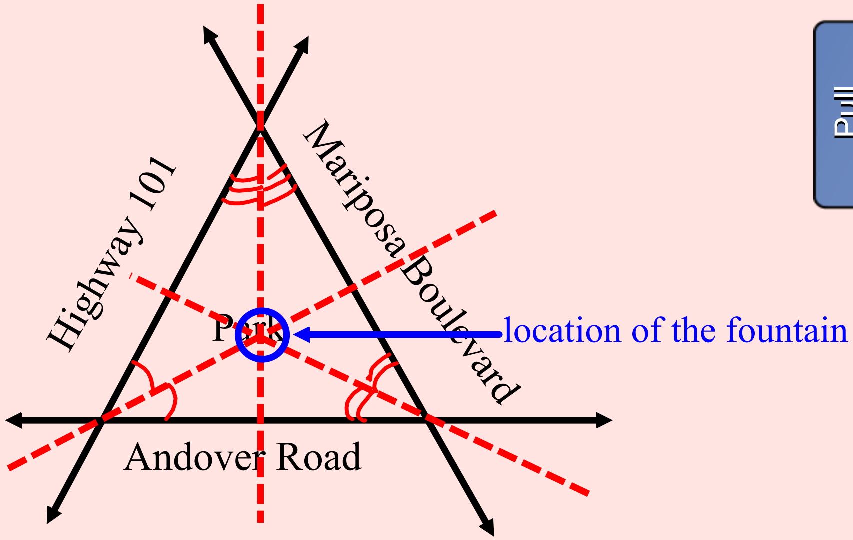
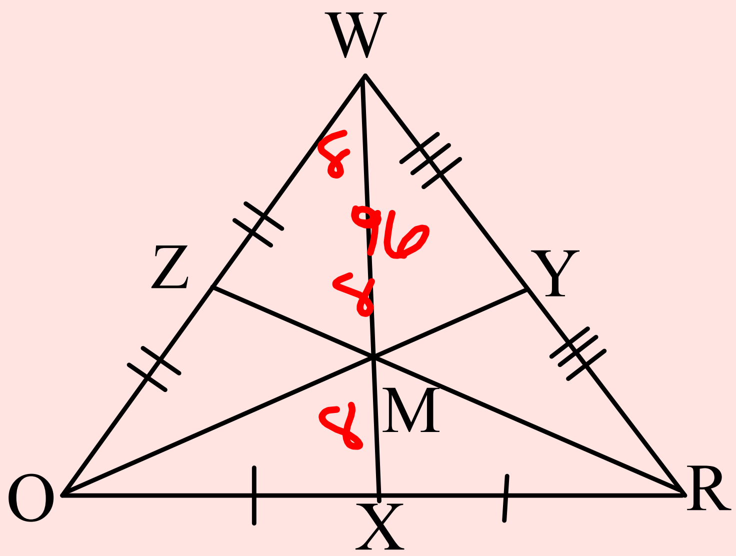


Pull

Locate the fountain at the point of concurrency of the angle bisectors of the triangle formed by the three roads.

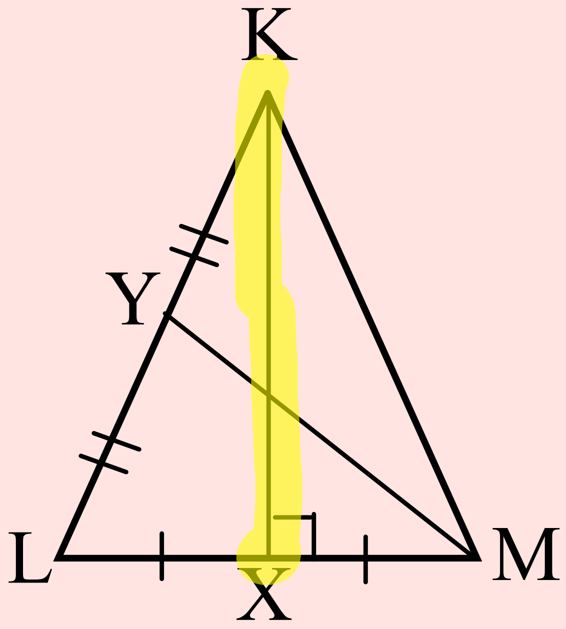
M is the centroid of ΔWOR , and WM = 16. Find WX and MX.



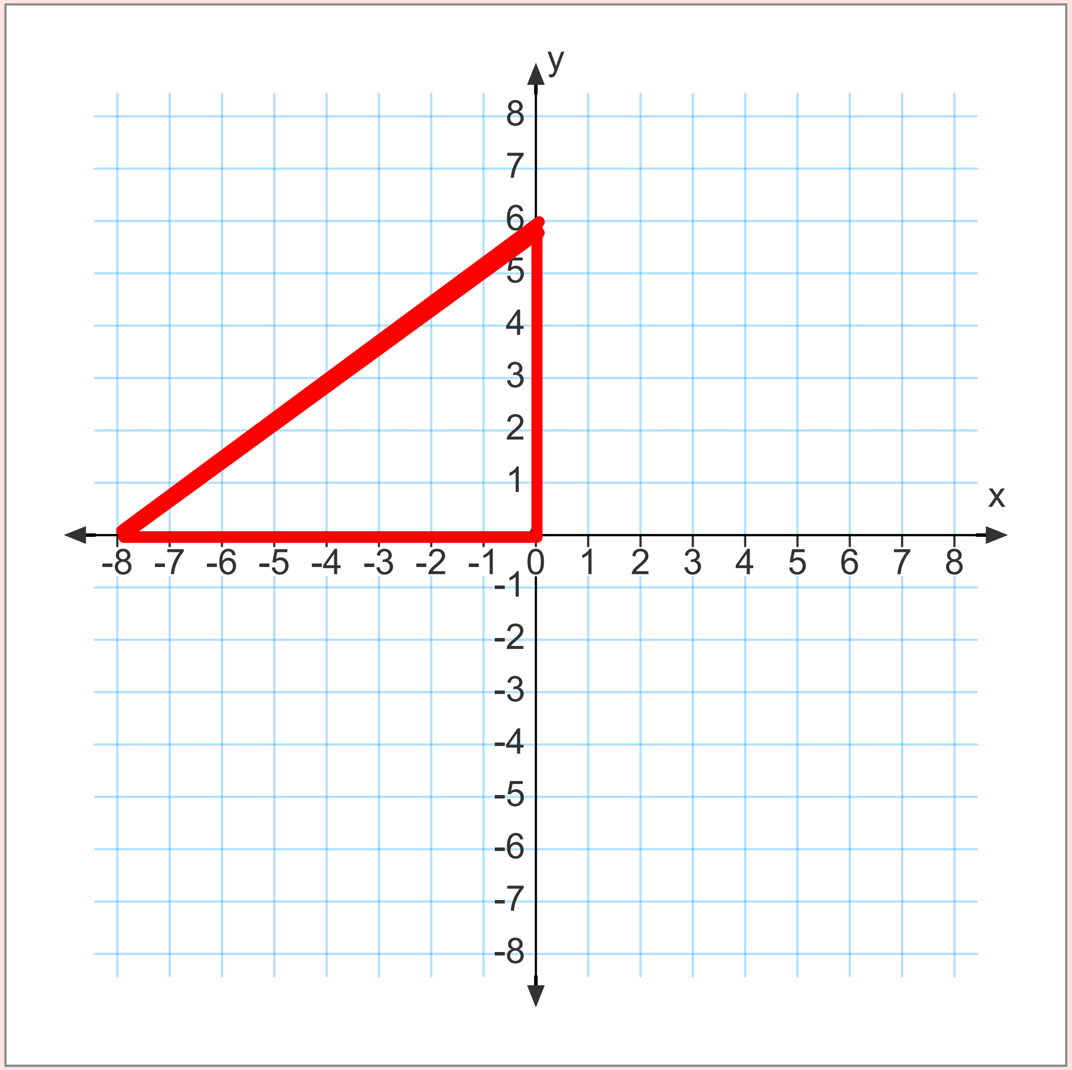
WX = 24

MX = 8

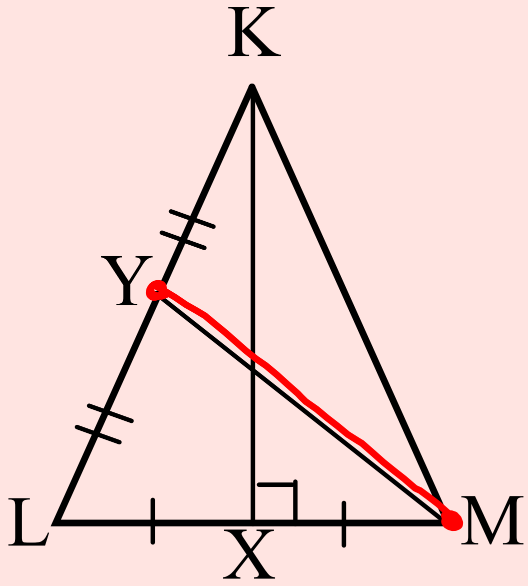
Is $\overline{KX}$ a median, an altitude, neither, or both?



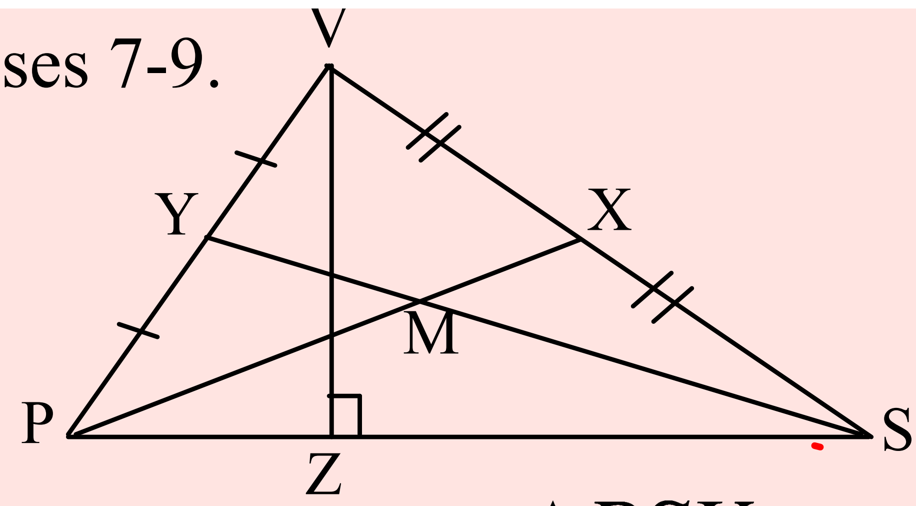
5. Find the center of the circle that you can circumscribe about the triangle with vertices (0, 0), (-8, 0), and (0, 6).



6. Is $\overline{MY}$ a median, an altitude, or neither. Explain.



Use the diagram for exercises 7-9.

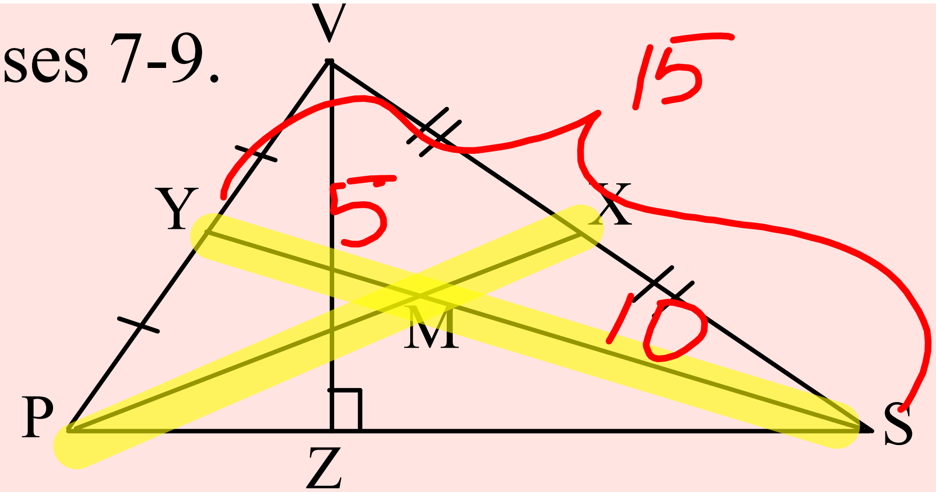


7. Identify all medians and altitudes drawn for ΔPSV.

Medians: $\overline{PX}$, $\overline{SY}$

altitudes: $\overline{VZ}$

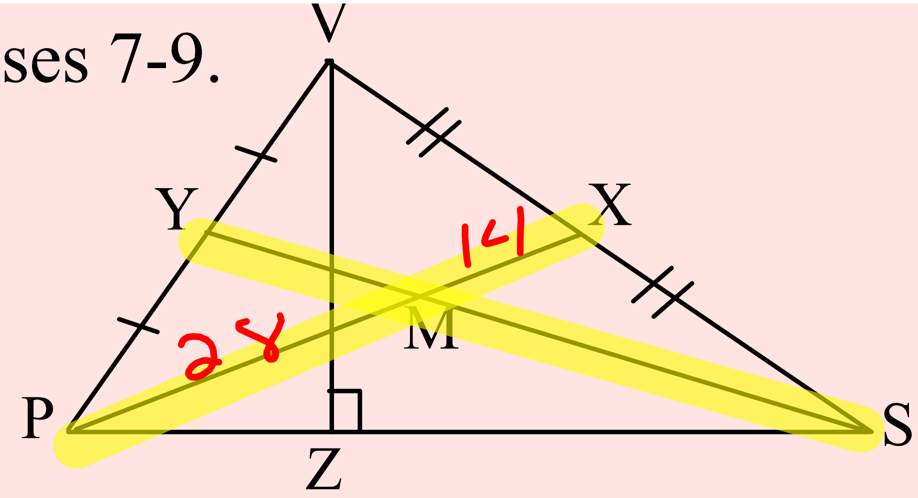
Use the diagram for exercises 7-9.



8. If SY = 15, find SM and MY.

5 10

Use the diagram for exercises 7-9.



9. If MX = 14, find PM and PX.

28 42