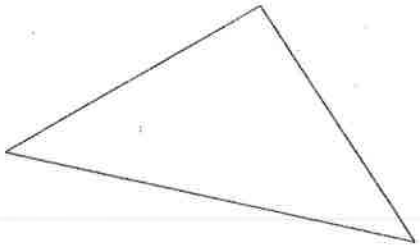
Lesson 32 Altitudes and Medians of Triangles

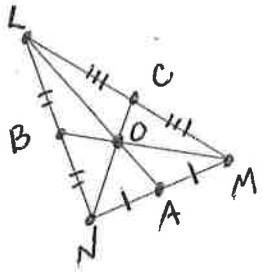
The **median** of a triangle is a segment whose endpoints are a vertex of a triangle and the midpoint of the opposite side. A triangle has a total of **3** medians. All 3 medians will intersect at one point. This point is called the **centroid** of the triangle.



Centroid Theorem

The centroid of a triangle is located ⅔ the distance from each vertex to the midpoint of the opposite side. (closer to the side than to the vertex)

a) In ΔLMN, LA = 12 and OC = 3.1. Find LO and NC.



$LO = \frac{2}{3}(12)$

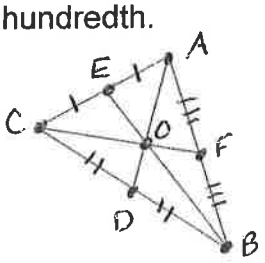
$= 8$

$OC = 3.1$

$NO = 6.2$

$NC = 9.3$

b) In ΔABC, AD = 5 and EO = 4.2. Find OD and BE to the nearest hundredth.



$OD = \frac{1}{3}(5)$

$= \frac{5}{3}$

$EO = 4.2$

$OB = 8.4$

$BE = 12.6$

c) Find the centroid of ΔDEF with vertices at D(-3,5), E(-2,1) and F(-7,3).

$\left(\frac{-3+-2+-7}{3}, \frac{5+1+3}{3}\right)$

$\left(\frac{-12}{3}, \frac{9}{3}\right)$

$(-4,3)$

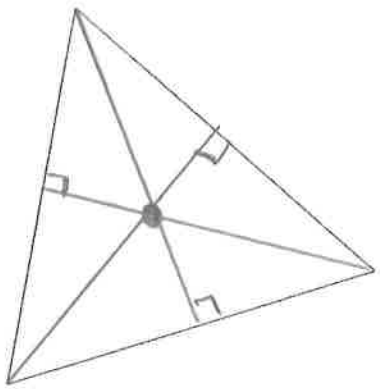
d) Find the centroid of ΔJKL with vertices J(-9,1), K(-1,5), and L(-5,9).

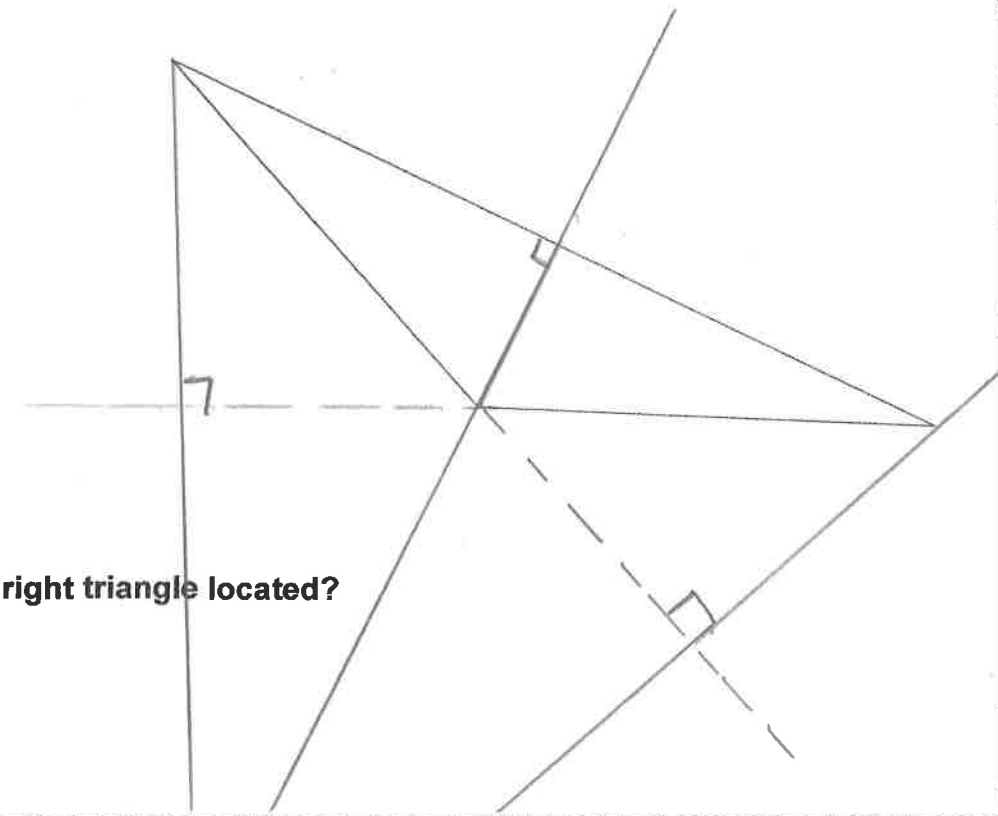
$\left(\frac{-9+(-1)+(-5)}{3}, \frac{1+5+9}{3}\right)$

$\left(\frac{-15}{3}, \frac{15}{3}\right)$

$(-5,5)$

The **altitude** of a triangle is a perpendicular segment from a vertex to the line containing the opposite side. The **orthocenter** of a triangle is the point of concurrency of the three altitudes of a triangle.

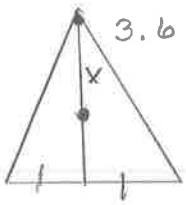




Where is the orthocenter of a right triangle located?

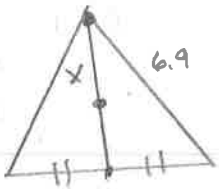
The centroid of a triangle is the point where the triangle can be balanced on a point.

e) Clara is hanging triangles from a mobile. She needs to find the centroid of each triangle for the mobile to hang correctly. If the triangles have medians of 3.6 inches, 6.9 inches, and 4.5 inches respectively, how far is the centroid from each vertex?



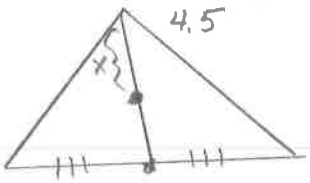
$\frac{2}{3}(3.6)$

2.4



$\frac{2}{3}(6.9)$

4.6



$\frac{2}{3}(4.5)$

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