

# Geometry

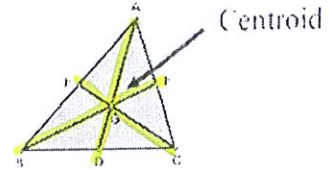
## Medians and Centroids

Name: \_\_\_\_\_

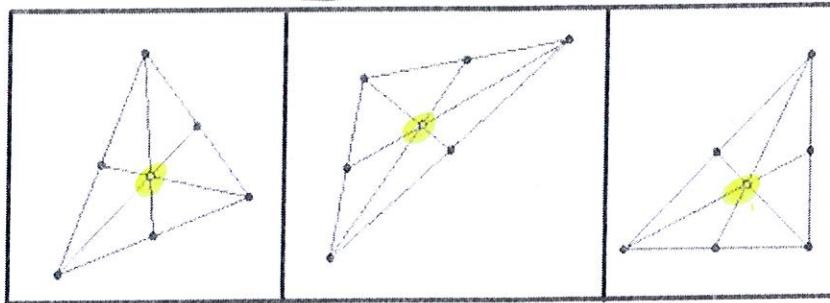
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### Median of a Triangle

- > A line segment that connects a vertex to the midpoint of the opposite side.
- > There are 3 medians in a triangle. These 3 line segments are concurrent
- > The point where the 3 medians meet is called the centroid. This is the center of gravity (balancing point) of the triangle.



Locations of the Centroid: **Acute Triangle:** Inside Triangle    Outside Triangle    On Triangle  
**Obtuse Triangle:** Inside Triangle    Outside Triangle    On Triangle  
**Right Triangle:** Inside Triangle    Outside Triangle    On Triangle



Acute Triangle  
Inside

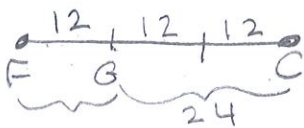
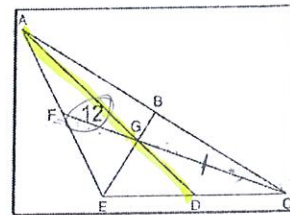
Obtuse Triangle  
Inside

Right Triangle  
Inside

### The Centroid

The centroid divides the medians into a 2:1 ratio. The section of the median nearest the vertex is twice as long as the section near the midpoint of the triangle's side.

1. In the diagram below of  $\triangle ACE$ , medians  $\overline{AD}$ ,  $\overline{EB}$ , and  $\overline{CF}$  intersect at  $G$ . The length of  $\overline{FG}$  is 12 cm. What is the length, in centimeters, of  $\overline{GC}$ ?

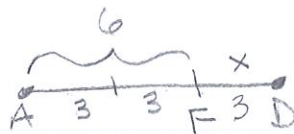
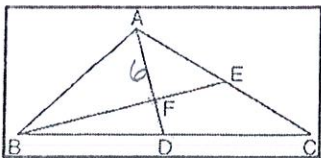


$$\frac{FG}{GC} = \frac{1}{2}$$

$$\frac{12}{x} = \frac{1}{2}$$

$$x = 24 \text{ cm}$$

2. In the diagram of  $\triangle ABC$  medians  $\overline{AD}$  and  $\overline{BE}$  intersect at point  $F$ . If  $AF = 6$ , what is the length of  $\overline{FD}$ ?

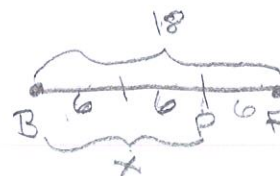
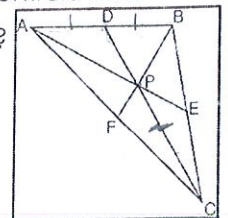


$$\frac{x}{6} = \frac{1}{2}$$

$$2x = 6$$

$$x = 3$$

3. In  $\triangle ABC$  shown below,  $P$  is the centroid and  $BF = 18$ . What is the length of  $\overline{BP}$ ?

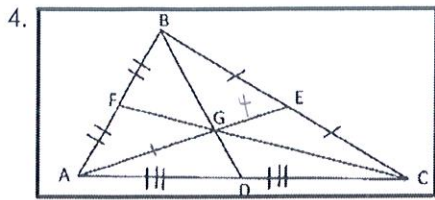


$$\frac{x}{18} = \frac{2}{3}$$

$$3x = 36$$

$$x = 12$$

YOU TRY!!!



a. If  $GE = 4$ , find  $AE$  and  $AG$ .

$A \text{---} 4 \text{---} 4 \text{---} 4 \text{---} E$       $AE = 12$       $AG = 8$

b. If  $CF = 15$ , find  $FG$  and  $CG$ .

$F \text{---} 5 \text{---} 5 \text{---} 5 \text{---} C$       $FG = 5$       $CG = 10$

c. If  $BG = 14$ , find  $BD$ .

$B \text{---} 7 \text{---} 7 \text{---} 7 \text{---} D$       $BD = 21$

**PRACTICE**

**A.** Point  $G$  is the centroid of  $\triangle ABC$ ,  $AD = 8$ ,  $AG = 10$ ,  $BE = 10$ ,  $AC = 16$  and  $CD = 18$ . Find the length of each segment.

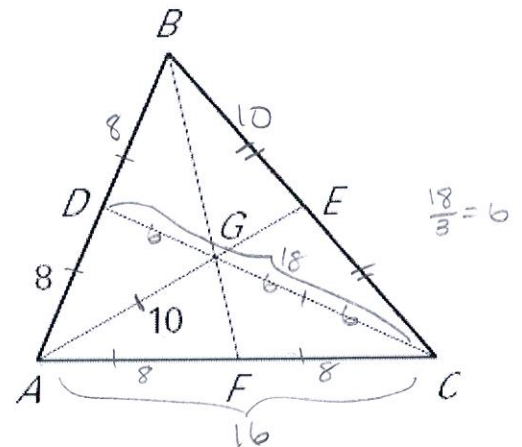
1. If Point  $G$  is the **centroid**, then Point  $G$  is the point of concurrency of the Medians.

2.  $DB = 8$                       3.  $EA = 15$

4.  $CG = 12$                     5.  $BA = 16$

6.  $GE = 5$                       7.  $GD = 6$

8.  $BC = 20$                     9.  $AF = 8$



**B.**  $P$  is the centroid of  $\triangle DEF$ ,  $\overline{EH} \perp \overline{DF}$ ,  $m\angle JFH = 70^\circ$ ,  $DH = 9$ ,  $DG = 5x - 3$ ,  $GE = x + 9$ ,  $EP = 8$ , and  $DE = EF$ .

1.  $FH = 9$

2.  $EH = 12$

3.  $PH = 4$

4.  $x = 3$

5.  $EG = 12$

6.  $EF = 24$

7.  $m\angle PHF = 90^\circ$

8.  $m\angle EDF = 70^\circ$

$5x - 3 = x + 9$

$4x - 3 = 9$

$4x = 12$

$x = 3$

