

Geometry CC - Unit 3

Lesson 4: The Centroid of a Triangle

Homework: Finish Packet 3.4

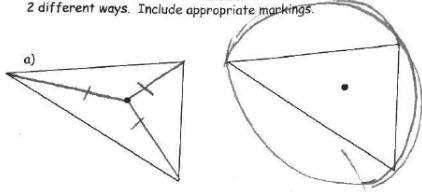
M1 L5

HW Answers 3.3

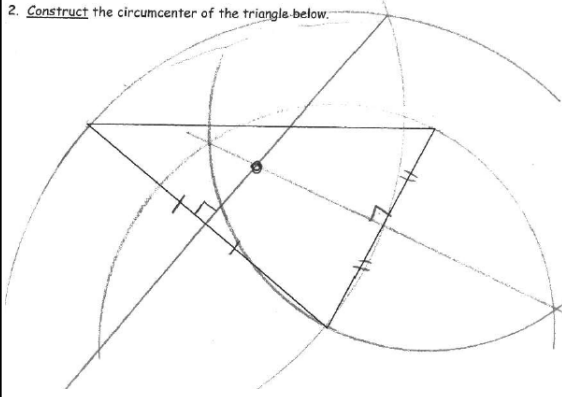
LESSON 3: The Circumcenter of a Triangle
M1 L5 HOMEWORK

Date: _____

1. For each triangle pair below, sketch to show that the given point is the circumcenter in 2 different ways. Include appropriate markings.

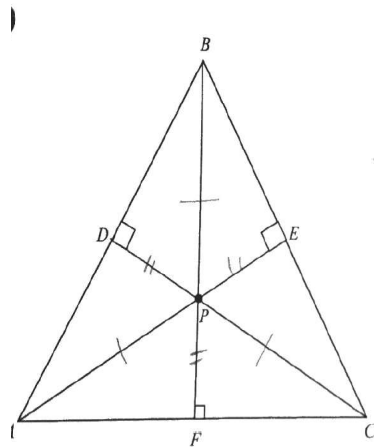


2. Construct the circumcenter of the triangle below.



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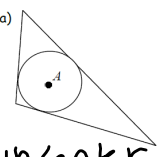
3. Circle incenter or circumcenter for each of the following:

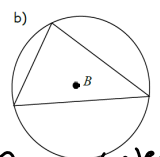


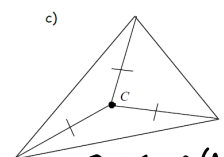
- a) If P is the center of the triangle's circumcircle, then point P is the (incenter/circumcenter)
- b) If P is the center of the triangle's circumcircle, then point P is the (incenter/circumcenter)
- c) If the 3 sides of the triangle are bisected, point P is the (incenter/circumcenter)
- d) If the 3 angles of the triangle are bisected, then point P is the (incenter/circumcenter)
- e) If $\overline{AP} \cong \overline{PB} \cong \overline{PC}$, then point P is the (incenter/circumcenter)
- f) If $\overline{DP} \cong \overline{PE} \cong \overline{PF}$, then point P is the (incenter/circumcenter)

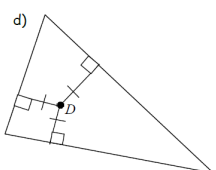
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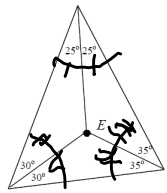
Do Now: Determine whether each point shows the triangles incenter or circumcenter.

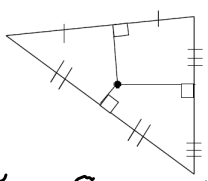
a)  **Incenter**

b)  **Circumcenter**

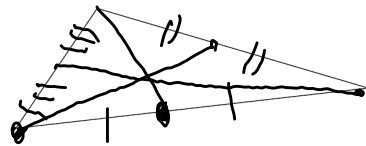
c)  **Circumcenter**

d)  **Incenter**

e)  **Incenter**

f)  **Circumcenter**

Sketch the 3 medians of this triangle:



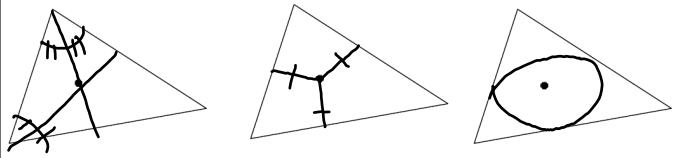
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Let's recap!

INCENTER

a) The incenter of a triangle is the point where the 3 angle bisectors intersect.

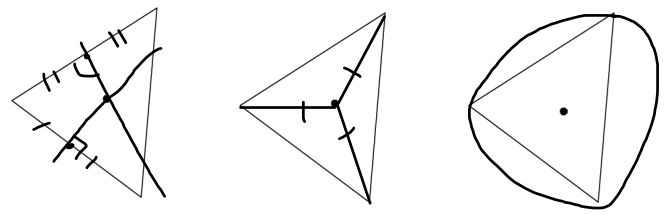
- It is equidistant from the triangle's 3 sides.
- It is the center of the triangle's inscribed circle.



CIRCUMCENTER **Perp. bisectors**

b) The circumcenter of a triangle is the point where the 3 bisectors intersect.

- It is equidistant from the triangle's 3 vertices.
- It is the center of the triangle's circumscribed circle.



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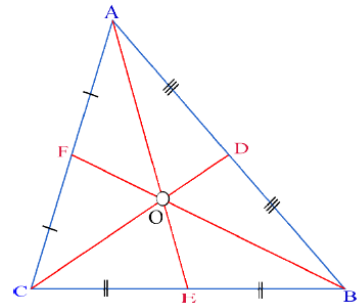
CENTROID

Vocabulary:

- median - A line segment joining a vertex to the midpoint of the opposite side of a triangle. A triangle has 3 medians.
- centroid - The point where the 3 medians of a triangle intersect. One of a triangle's points of concurrency.

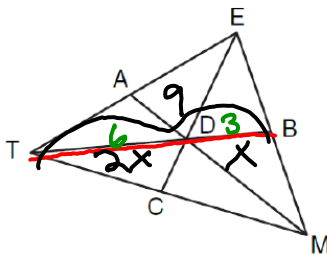
PROPERTIES OF A CENTROID

- Always inside the triangle
- Each median divides the triangle into 2 smaller triangles of equal area.
- It divides each median into a ratio of 1:2.
- The centroid is located two-thirds of the way from each vertex to its opposite side.



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1. In the diagram below of $\triangle TEM$, medians \overline{TB} , \overline{EC} , and \overline{MA} intersect at D , and $TB = 9$. Find the length of \overline{TD} .



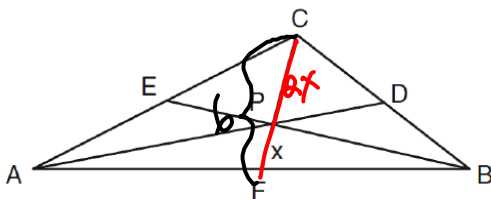
$$2x + x = 9$$

$$3x = 9$$

$$x = 3$$

$$\overline{TD} = 6$$

2. In the diagram of $\triangle ABC$ below, Jose found centroid P by constructing the three medians. He measured \overline{CF} and found it to be 6 inches.



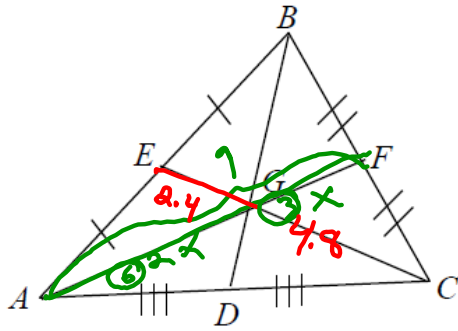
If $PF = x$, which equation can be used to find x ?

1) $x + x = 6$ 3) $3x + 2x = 6$

2) $2x + x = 6$ 4) $x + \frac{2}{3}x = 6$

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3. In $\triangle ABC$, $m\overline{AF} = 9$, and $m\overline{GE} = 2.4$. Find $m\overline{AG}$ and $m\overline{CE}$.



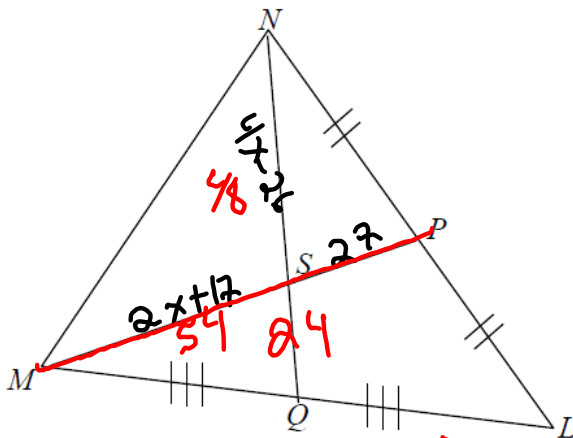
Centroid

$$\begin{aligned} x + 2x &= 9 \\ 3x &= 9 \\ x &= 3 \end{aligned}$$

$$\begin{aligned} \overline{AG} &= 6 \\ \overline{CE} &= 2.4 + 4.8 \\ &= 7.2 \end{aligned}$$

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4. In the diagram, $m\overline{MS} = 2x + 17$, $m\overline{NS} = 4x - 26$, and $m\overline{SP} = 27$.



a) Find x . 18.5

b) Find PS 27

c) Find PM $54 + 27 = 81$

e) Find NS $4(18.5) - 26 = 48$

f) Find SQ

$$\frac{1}{2}(48) = 24$$

$$\begin{aligned} 2x + 17 &= 2(27) \\ 2x + 17 &= 54 \\ -17 &-17 \\ \hline 2x &= 37 \quad x = 18.5 \end{aligned}$$

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