

Medians & Altitudes

name: _____

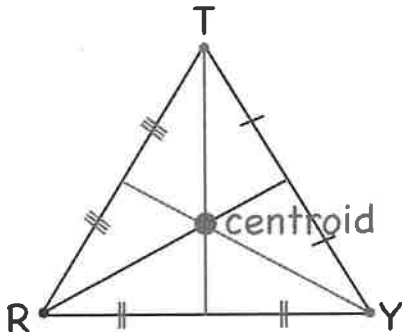
date: _____

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Segments

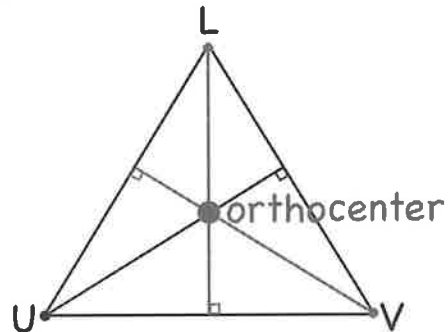
Must know vocabulary:

Median: a segment from a vertex of a triangle to the midpoint of the opposite side.



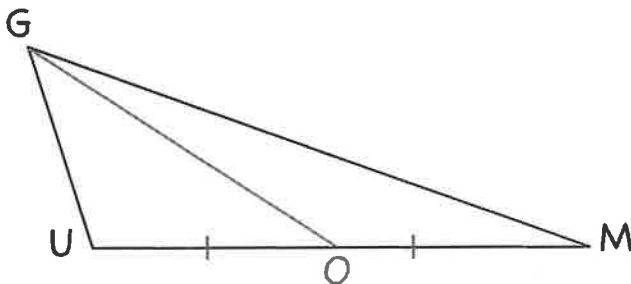
How many medians does a triangle have? 3 The point where all the medians meet is called the centroid.

Altitude (aka height): a segment from a vertex of a triangle and perpendicular to the opposite side.



How many medians does a triangle have? 3 The point where all the medians meet is called the orthocenter.

Given: \overline{GO} is a median.



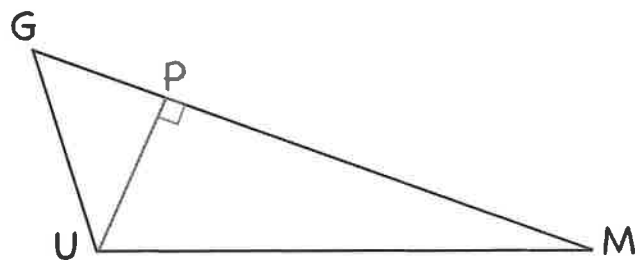
Sketch the given.

What additional information does the given tell you?

$$\overline{UO} \cong \overline{MO}$$

Label this.

Given: \overline{UP} is an altitude.



Sketch the given.

What additional information does the given tell you?

$$\overline{GM} \perp \overline{UP}$$

$\angle UPM$ is a right angle.

Label this.

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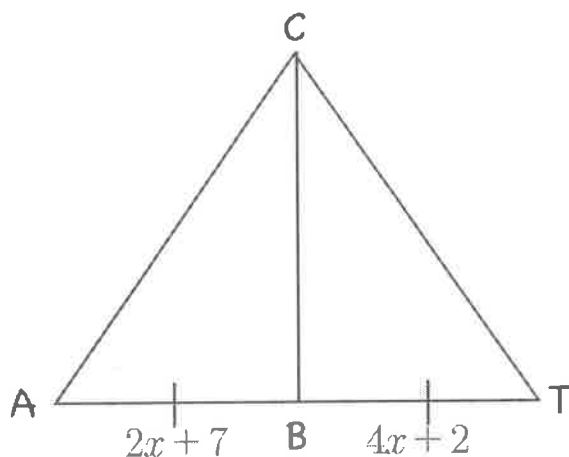
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Example 1:

In $\triangle CAT$, \overline{CB} is a median.

$AB = 2x + 7$ and $TB = 4x + 2$. Find AT .

- a) Sketch $\triangle CAT$ and \overline{CB} . Label all known information.



- b) Solve for x and AT .

$$2x + 7 = 4x + 2$$

$$5 = 2x$$

$$x = \frac{5}{2} = 2.5$$

$$AT = 2(2 \cdot 2.5 + 7)$$

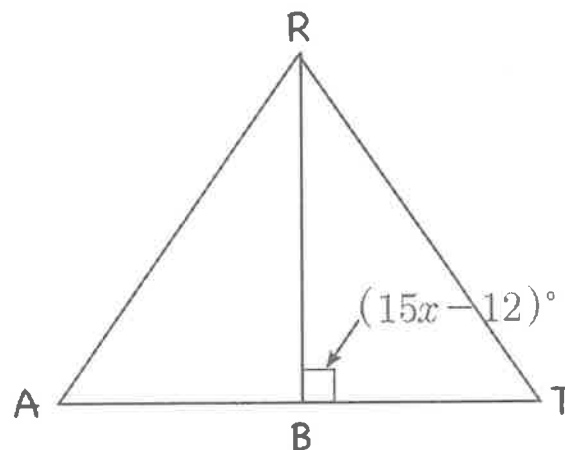
$$= 24$$

Example 2:

In $\triangle RAT$, \overline{RB} is an altitude.

$m\angle RBT = (15x - 12)^\circ$.

- a) Sketch $\triangle RAT$ and \overline{RB} . Label all known information.



- b) Solve for x .

$$15x - 12 = 90$$

$$15x = 102$$

$$x = \frac{102}{15}$$

$$= \frac{34}{5} = 6.8$$

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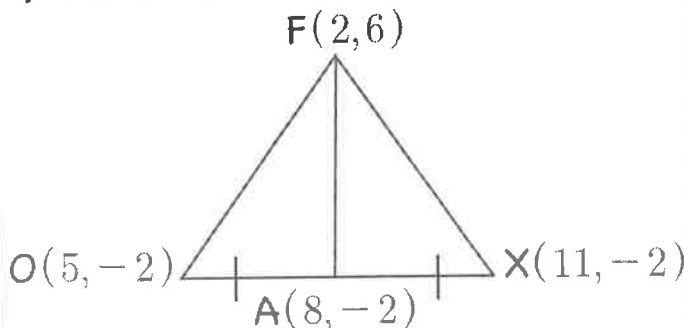
Segments

Example 3:

Given: The vertices of $\triangle FOX$ are $F(2,6)$, $O(5,-2)$, $X(11,-2)$ and the point $A(8,-2)$.

Prove/Disprove: \overline{FA} is a median.

a) Sketch $\triangle FOX$ and \overline{FA} .



b) If \overline{FA} is a median what must be true?

• A is the midpoint of \overline{OX} .

c) How could you determine this?
Determine the midpoint of \overline{OX} and see if it is the same as A .

d) Show your calculations.

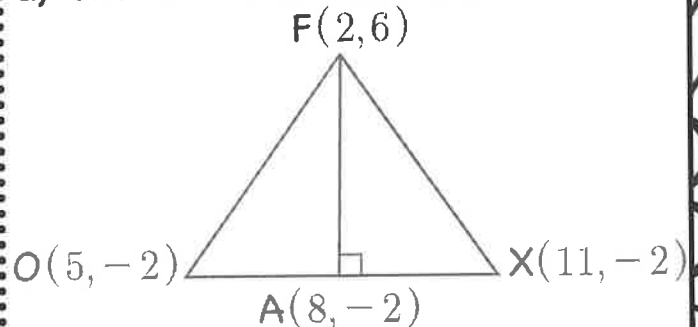
$$\begin{aligned} \text{mdpt } \overline{OX} &= \left(\frac{11+5}{2}, \frac{-2-2}{2} \right) \\ &= \left(\frac{16}{2}, -\frac{4}{2} \right) \\ &= (8, -2) \end{aligned}$$

e) Write a conclusion.

\overline{FA} is a median of $\triangle FOX$.

Prove/Disprove: \overline{FA} is an altitude.

a) Sketch $\triangle FOX$ and \overline{FA} .



b) If \overline{FA} is an altitude what must be true?

$\overline{OX} \perp \overline{FA}$

c) How could you determine this?
Show the slopes are opposite reciprocal of each other.

d) Show your calculations.

$$\begin{aligned} m_{OX} &= \frac{-2+2}{5-11} = 0 \\ m_{FA} &= \frac{-2-6}{8-2} = -\frac{8}{6} = -\frac{4}{3} \end{aligned}$$

Not opposite reciprocal slopes.

e) Write a conclusion.

\overline{FA} is not an altitude of $\triangle FOX$.