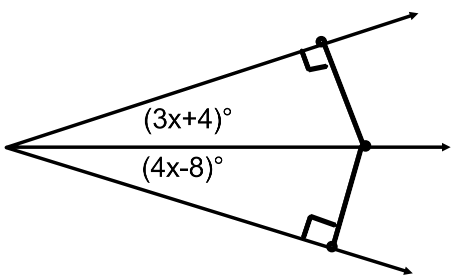
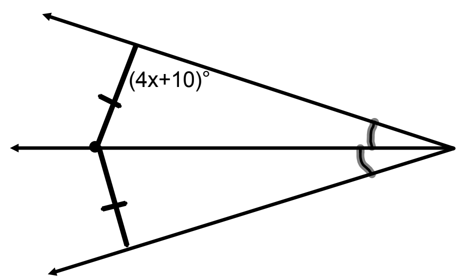
Bellwork
11/08/2011

Find the value of x.

1.



2.



Geometry
5.4 Use Medians and Altitudes
Standard(s): 4,10

Vocabulary:

1. **Median of a Triangle:** A segment from a vertex to the midpoint of the opposite side.

2. **Centroid:** The point of concurrency of the medians of a triangle.

3. **Altitude of a Triangle:** The perpendicular segment from a vertex to the opposite side or to the line that contains the opposite side.

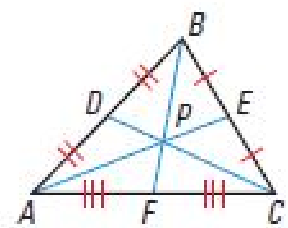
4. **Orthocenter:** The point at which the lines containing the three altitudes of a triangle intersect.

THEOREM *For Your Notebook*

THEOREM 5.8 Concurrency of Medians of a Triangle

The medians of a triangle intersect at a point that is two thirds of the distance from each vertex to the midpoint of the opposite side.

The medians of $\triangle ABC$ meet at P and $AP = \frac{2}{3}AE$, $BP = \frac{2}{3}BF$, and $CP = \frac{2}{3}CD$.



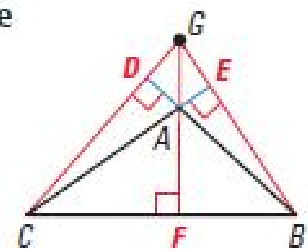
Proof: Ex. 32, p. 323; p. 934

THEOREM *For Your Notebook*

THEOREM 5.9 Concurrency of Altitudes of a Triangle

The lines containing the altitudes of a triangle are concurrent.

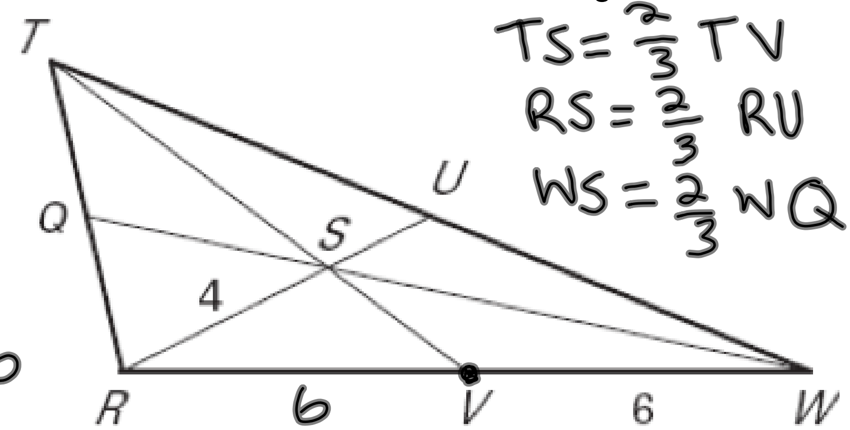
The lines containing $\overline{AF}$, $\overline{BE}$, and $\overline{CD}$ meet at G.



Proof: Exs. 29–31, p. 323; p. 936

Use the Centroid of a Triangle

S is the centroid of $\triangle RTW$, RS = 4, QW = 12, and TV= 9. Find the length of the segment.



$TS = \frac{2}{3} TV$

$RS = \frac{2}{3} RU$

$WS = \frac{2}{3} WQ$

RV= 6

SU= $4 = \frac{2}{3} RU$

$SU = 2$ $RU = 6$

RU= 6

RW= 12

TS= $TS = \frac{2}{3}(9)$

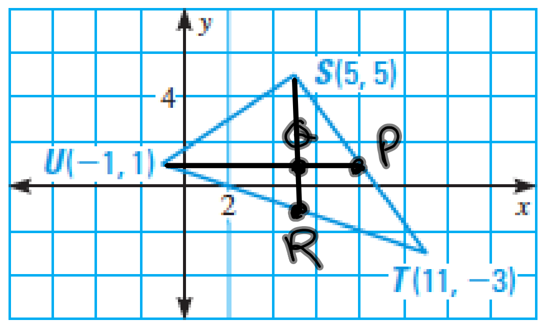
$TS = 6$

SV= 3

Find the Centroid

Use the graph shown.

Find the coordinates of P, the midpoint of ST.
Use the median UP to find the coordinates of the centroid Q.



$P\left(\frac{5+11}{2}, \frac{5-3}{2}\right) = P(8, 1)$

$UP = \sqrt{(8+1)^2 + (1-1)^2} = 9$

$Q(5, 1)$

Find the coordinates of R, the midpoint of TU.
Verify that SQ=$\frac{2}{3}$SR.

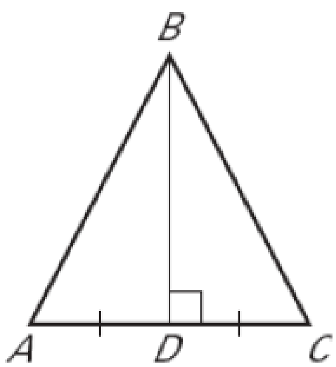
$R\left(\frac{11-1}{2}, \frac{1-3}{2}\right)$

$R(5, -1)$

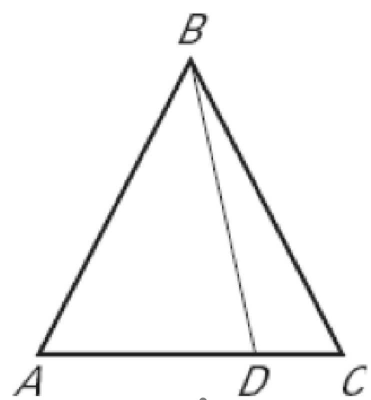
$SQ = 4$
$SR = 6$ ✓

Reasoning

Is $\overline{BD}$ a median of $\triangle ABC$? Is $\overline{BD}$ an altitude? A perpendicular bisector?



Median.
Altitude.
$\perp$ bisector



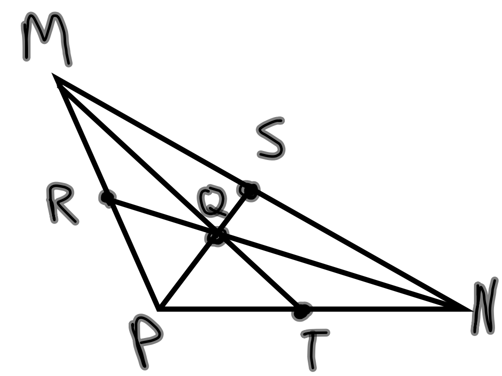
No.
No.
No.

Relating Lengths

Copy and complete the statement for ∆MNP with medians MT, NR, and PS, and centroid Q.

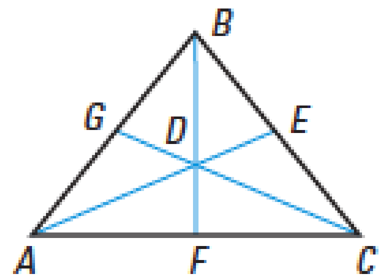
$QR = \underline{\quad \frac{1}{3} \quad} NR$

$MQ = \underline{\quad \frac{2}{3} \quad} MT$



Apply Centroid Algebraically

Point D is the centroid of △ABC. Use the given information to find the value of *x*.



$BD = \frac{2}{3} BF$

$CD = \frac{2}{3} CG$

$AD = \frac{2}{3} AE$

BD=4x+5, BF=9x

$4x+5 = \frac{2}{3}(9x)$

$4x+5 = 6x$

$2x = 5$

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

GD=2x-8, GC=3x+3

$GD = \frac{1}{3} GC$

$2x-8 = \frac{1}{3}(3x+3)$

$2x-8 = x+1$

$x = 9$

AD=5x, DE=3x-2

$\frac{1}{2}(5x) = 3x-2$

$5x = 2(3x-2)$

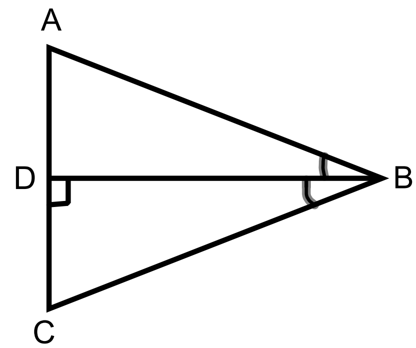
$5x = 6x-4$

$x = 4$

Prove a Property of Isosceles Triangles

Prove that if an angle bisector of a triangle is also an altitude, then the triangle is isosceles.

Given: $\triangle ABC$, with $\overline{BD}$ an angle bisector and altitude to $\overline{AC}$.
Prove: $\triangle ABC$ is isosceles.



Homework Assignment

Worksheet 5.4B