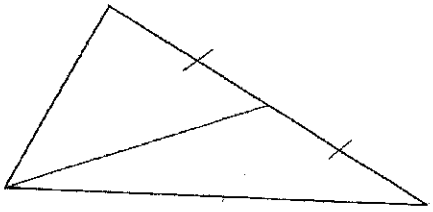
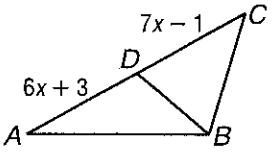
Objectives:

- Identify and use medians in triangles.
- Identify and use altitudes in triangles.



A median is a line segment that connects a vertex of a triangle to the midpoint of the opposite side.

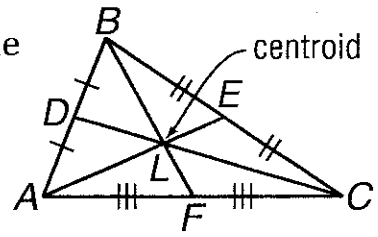


$\overline{BD}$ is a median. Find x.

$6x+3 = 7x-1$
$-6x \quad -6x$
$3 = x-1$
$+1 \quad +1$
$4 = x$

The three medians of a triangle intersect at the centroid of the triangle.

Centroid Theorem: The centroid is located two thirds of the distance from a vertex to the midpoint of the side opposite the vertex on a median.

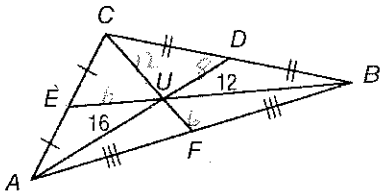


$AL = \frac{2}{3}AE,\ BL = \frac{2}{3}BF,\ CL = \frac{2}{3}CD$

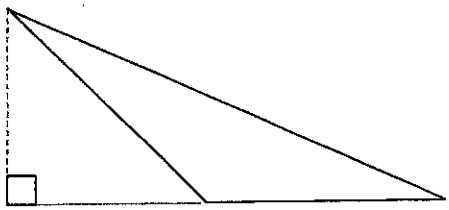
In $\triangle ABC$, $AU = 16$, $BU = 12$, and $CF = 18$. Find each measure.

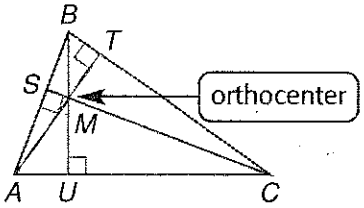
1. UD	2. EU	3. CU	4. AD	5. UF	6. BE
8	6	12	24	6	18
(half of AU)	(half of BU)				

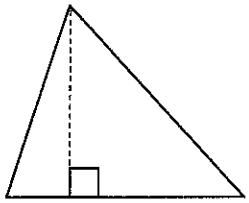
12 6



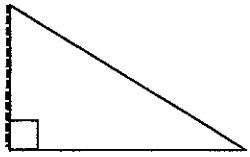
An altitude of a triangle is a segment from a vertex to the line containing the opposite side and perpendicular to the line containing the opposite side.



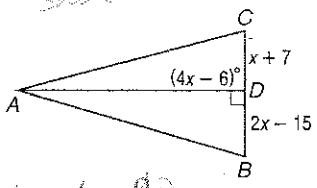




Every triangle has three altitudes that meet at a point called the orthocenter.



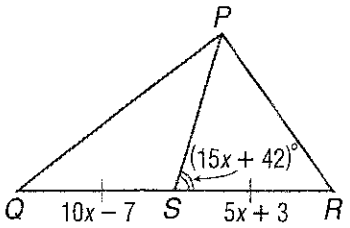
1.



Not congruent b/c it's an altitude!

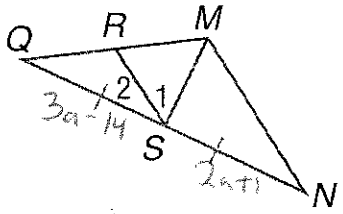
$4x - 6 = 90$
$+6 \quad +6$
$\frac{4x}{4} = \frac{96}{4}$
$x = 24$

2. Find x if $\overline{PS}$ is a median of $\triangle PQR$.



$10x - 7 = 5x + 3$
$5x = 10$
$x = 2$

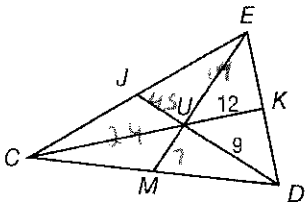
3. If $\overline{MS}$ is a median of $\triangle MNQ$, $QS = 3a - 14$, $SN = 2a + 1$, and $m\angle MSQ = 7a + 1$, find the value of a. Is $\overline{MS}$ also an altitude of $\triangle MNQ$? Explain.



$3a - 14 = 2a + 1$
$a = 15$

If $\overline{MS}$ is an altitude, $m\angle MSQ = 90°$
$7(15) + 1 = 106$: so NO, not an altitude.

4. **In $\triangle CDE$, U is the centroid, $UK = 12$, $EM = 21$, and $UD = 9$. Find each measure.**



CU 24 MU 7

CK 36 JU 4.5

EU 14 JD 13.5

$\frac{2}{3} = 2\left(\frac{1}{3}\right)$

longer segment = 2x shorter segment

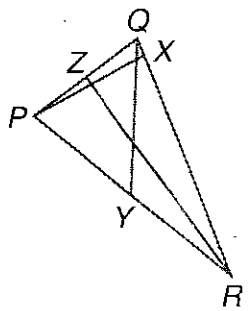
shorter segment = $\frac{1}{2}$ of the longer segment

* shorter segment (+) longer segment = whole line

In $\triangle PQR$, $ZQ = 3a - 11$, $ZP = a + 5$, $PY = 2c - 1$, $YR = 4c - 11$, $m\angle PRZ = 4b - 17$, $m\angle ZRQ = 3b - 4$, $m\angle QYR = 7b + 6$, and $m\angle PXR = 2a + 10$.

5. $\overline{PX}$ is an altitude of $\triangle PQR$. Find a.
6. If $\overline{RZ}$ is an angle bisector, find $m\angle PRZ$.
7. Find PR if $\overline{QY}$ is a median.
8. If $\overleftrightarrow{QY}$ is a perpendicular bisector of $\overline{PR}$, find b.

Next week.

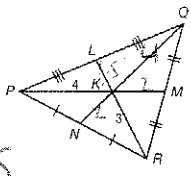


NAME _____ DATE _____ PERIOD _____

5-2 Skills Practice

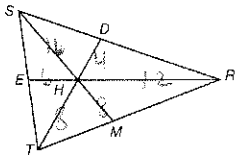
Medians and Altitudes of Triangles

In $\triangle PQR$, $NQ = 6$, $RK = 3$, and $PK = 4$. Find each length.



1. KM 2
2. KQ 4
3. LK 1.5
4. LR 4.5
5. NK 2
6. PM 6

In $\triangle STR$, H is the centroid, $EH = 6$, $DH = 4$, and $SM = 24$. Find each length.



7. SH 16
8. HM 8
9. TH 8
10. HR 12
11. TD 12
12. ER 18

COORDINATE GEOMETRY Find the coordinates of the centroid of each triangle.

13. $X(-3, 15)$, $Y(1, 5)$, $Z(5, 10)$
14. $S(2, 5)$, $T(6, 5)$, $R(10, 0)$

Not assigned

COORDINATE GEOMETRY Find the coordinates of the orthocenter of each triangle.

15. $L(8, 0)$, $M(10, 8)$, $N(14, 0)$
16. $D(-9, 9)$, $E(-6, 6)$, $F(0, 6)$

Lesson 5-2