Applying Congruent Triangles – Medians, Altitudes and Bisectors
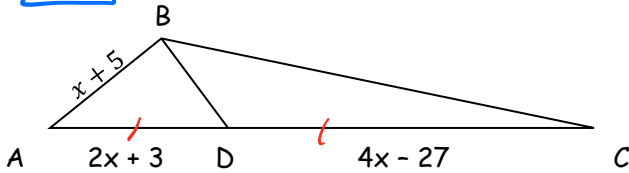
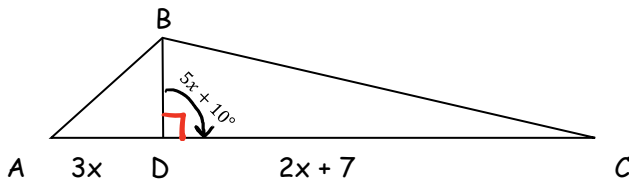Homework Section 5.1   Name_____

#1) Find AB if $\overline{BD}$ is a median of ∆ABC.

B
x + 5
A   2x + 3   D   4x – 27   C

① $AD = DC$
$2x+3 = 4x-27$
$3 = 2x - 27$
$30 = 2x$
$15 = x$

② FIND $AB = x+5$
$= (15)+5$
$AB = 20$

#2) Find AC if $\overline{BD}$ is an altitude of ∆ABC.

B
5x + 10°
A   3x   D   2x + 7   C

① $m\angle BDC = 90$
$5x+10 = 90$
$5x = 80$
$x = 16$

② FIND $AC = AD + DC$
$= 3x + (2x+7)$
$AC = 5x + 7$
$= 5(16)+7$
$= 80 + 7$
$AC = 87$
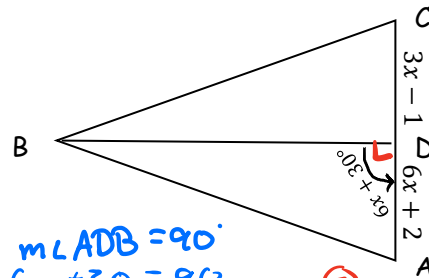
#3) Find m∠ABC if $\overline{BD}$ is an angle bisector of ∆ABC.

B
2x + 40°
$m\angle ABC = 6x + 70$
A   D   C
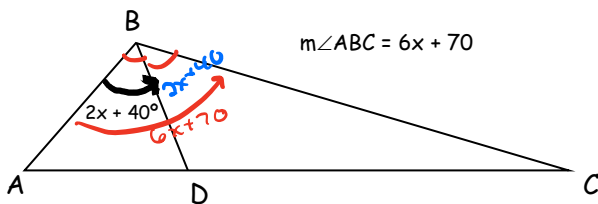
① $m\angle ABC = m\angle ABD + m\angle DBC$
$6x+70 = (2x+40)+(2x+40)$
$6x+70 = 4x+80$
$2x+70 = 80$
$2x = 10$
$x = 5$

② $m\angle ABC = 6x+70$
$= 6(5)+70$
$= 30+70$
$m\angle ABC = 100°$

#4) Find AC if $\overline{BD}$ is an altitude of ∆ABC.
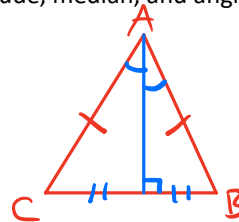
C
3x – 1
B   6x + 30°   D 6x + 2
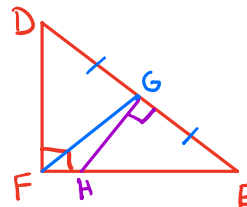A

① $m\angle ADB = 90°$
$6x+30 = 90$
$6x = 60$
$x = 10$

② $AC = AD + DC$
$AC = (6x+2)+(3x-1)$
$= 9x+1$
$= 9(10)+1$
$= 90+1$
$AC = 91$

Draw and label a figure for each statement.
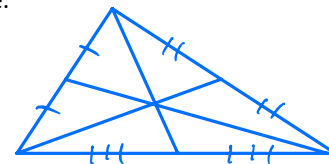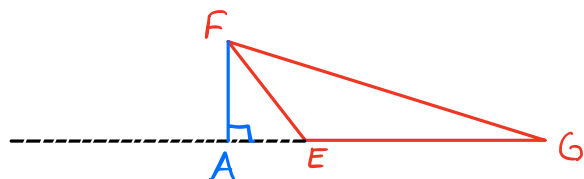**#5)** Isosceles triangle ABC, with vertex angle A, where $\overline{AD}$ is an altitude, median, and angle bisector.

#6) ∆DEF is a right triangle with right angle at F. $\overline{FG}$ is a median of ∆DEF and $\overline{GH}$ is the perpendicular bisector of $\overline{DE}$.

#7) Three medians of a triangle intersecting in the interior of the triangle.

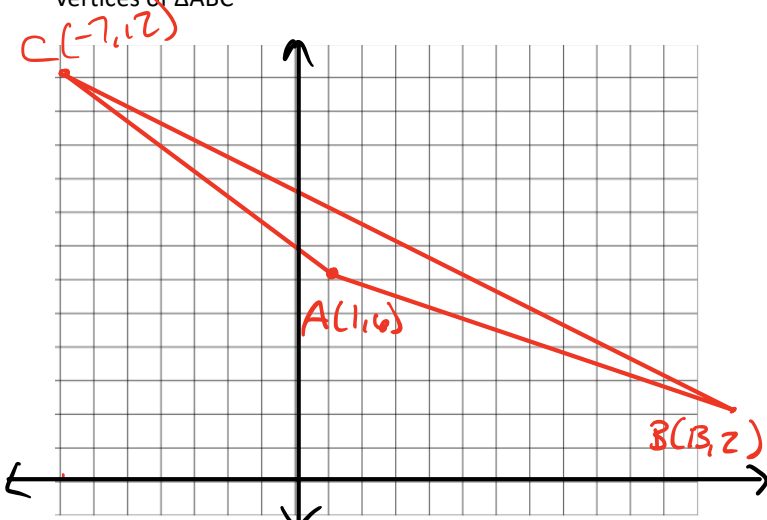

#8) Altitude $\overline{FA}$ on the exterior of ∆EFG.

Geometry
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Answer each question if A(1, 6), B(13, 2), and C(-7, 12) are the vertices of ΔABC

C(-7,12)

A(1,6)

B(13,2)

#9) What are the coordinates of the midpoint of $\overline{AB}$?

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$M = \left(\frac{(1) + (13)}{2}, \frac{(6) + (2)}{2} \right)$$

$$M = \left(\frac{14}{2}, \frac{8}{2} \right)$$

$$M = (7, 4)$$

#10) What is the slope of the perpendicular bisector of $\overline{AB}$?

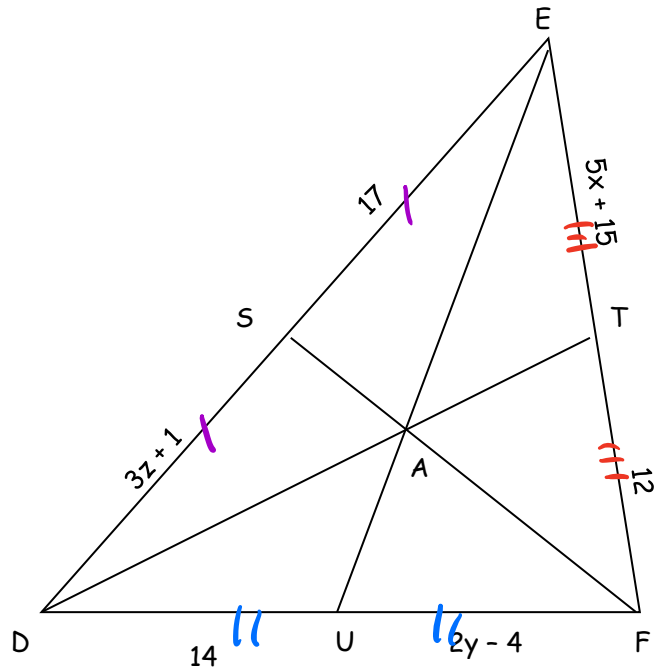$$m_{\overline{AB}} = \frac{\Delta y}{\Delta x}$$

$$= \frac{(6) - (2)}{(1) - (13)}$$

$$= \frac{4}{-12}$$

$$m_{\overline{AB}} = -\frac{1}{3}$$

$$\perp m_{\overline{AB}} = 3$$

#11) Points S, T, and U are the midpoints of $\overline{DE}$, $\overline{EF}$, and $\overline{DF}$, respectively. Find x, y, and z.

E

5x + 15

17

S   T

3z + 1   A   12

D   14   U   2y – 4   F

$5x + 15 = 12$

$5x = -3$

$x = -\frac{3}{5}$

$2y - 4 = 14$

$2y = 18$

$y = 9$

$3z + 1 = 17$

$3z = 16$

$z = \frac{16}{3}$

#1) 20
#2) 87
#3) 54
#4) 91
#5) - #8) See key
#9) (7, 9)
#10) 3
#11) $\left(-\frac{3}{5}, 9, \frac{16}{3} \right)$