1. In the following figure $\triangle ABC$, $\overline{AF}$ is an $\angle$ bisector, $\overline{BD}$ is an altitude, and $\overline{CE}$ is a median.
   Find x, y, and z.

A

$2y + 24$

$7x + 3$

$7y - 1$

$8z + 2$ D

E

$4x + 9$

B   F   C
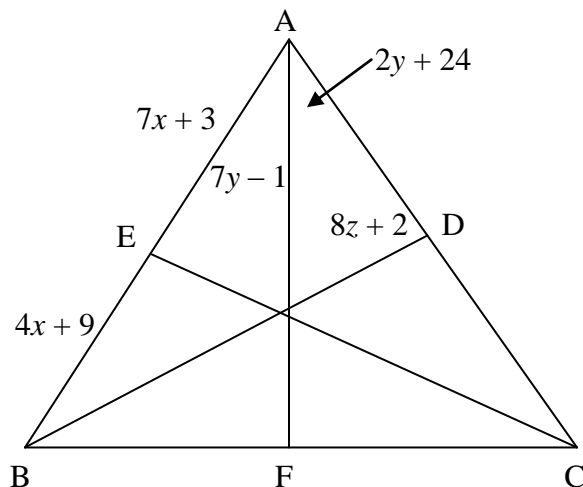
2. Given $\triangle DEF$ with $\overline{EG}$ as a median and $DG = 2x + 1$, $m\angle DEG = 9x + 5$, $m\angle EGF = 19x + 14$,
   $GF = 3x - 2$, and $m\angle GEF = 11x - 1$.
   Find x.

3. $\triangle ABC$ is isosceles with vertex $\angle A$ and $\angle$ bisector $\overline{AD}$. If $m\angle BAD = 5x + 1$, $BD = 3x - 4$,
   $m\angle ADC = 8x + 8z - 6$, $m\angle DAC = 16y - 1$ and $DC = 8y - 2$,
   Find x, y, and z.

4. 1. In $\triangle XYZ$, $\overline{XM}$ is an altitude. YM = 8a − 11, MZ = 3a + 4, YX = 12a − 19, $m\angle XMZ = 11a − 9$. Find a and YX.

5. In $\triangle AWH$, $\overline{WP}$ is an angle bisector. If $m\angle PWA = 3y + 11$, $m\angle WPH = 7y +18$, $m\angle HWP = 7y − 5$, find y.

6. $\triangle KCT$ has vertices K(12, -6), C(9,2) and T(2,4). Determine the coordinates of point M on $\overline{KT}$ so that $\overline{CM}$ is a median of $\triangle KCT$.

T(2, 4)

C(9, 2)
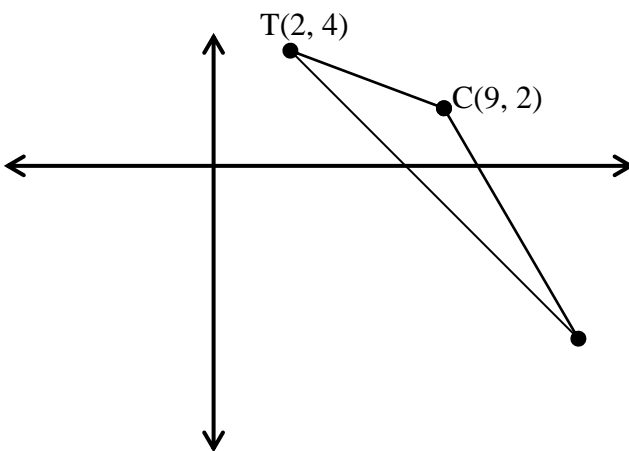
7. $\triangle ABC$ has vertices A(2, 5), B(12, –1) and C(–6,8). Point N is on $\overleftrightarrow{BC}$ and has the coordinates $\left(\dfrac{8}{5}, \dfrac{21}{5}\right)$. Is $\overline{NA}$ an altitude of $\triangle ABC$? Justify your answer.

8. Find the coordinates of point D on $\overleftrightarrow{BC}$ such that $\overline{AD}$ is the shortest distance from A to $\overleftrightarrow{BC}$ for A(9, 9), B(–1, –11) and C(–2, 2).

9. In $\triangle ABC$, $\overline{AD}$ is an altitude. If AC $= (8x-1)$, DC $= (5x+11)$, and AD $= (3x)$ find x.