M-G Geometry Week 24 3/18

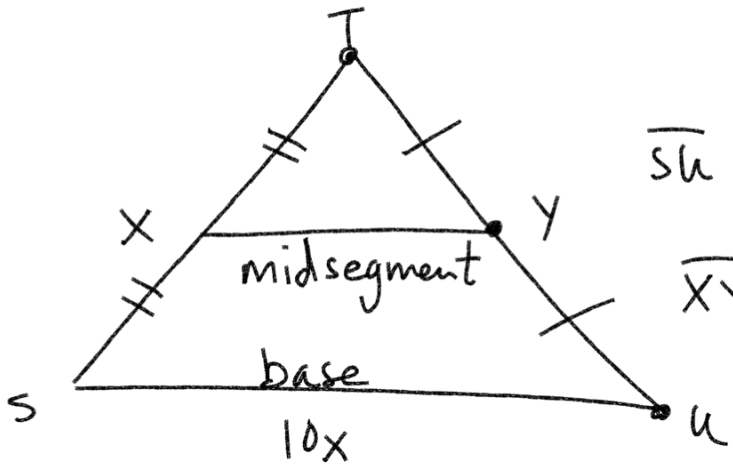
Midsegments

$\overline{XY}$ is a midsegment

$\overline{TY} \cong \overline{YU}$

$\overline{XT} \cong \overline{XS}$

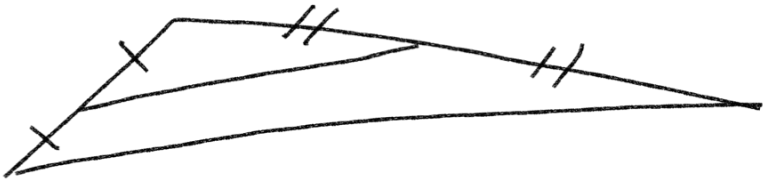
Bisects both legs



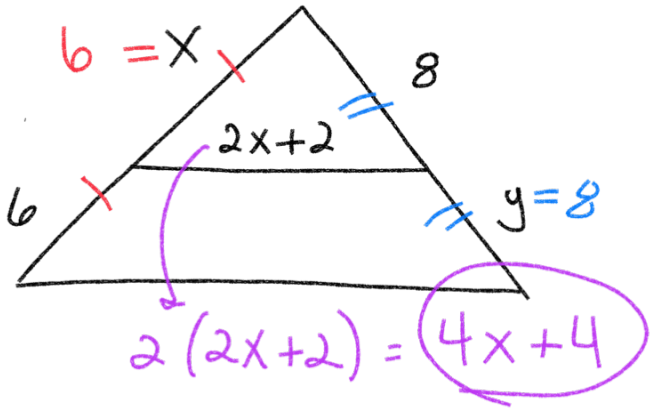
$\overline{SU} = 10x$

$\overline{XY} = \frac{10x}{2} = \boxed{5x}$

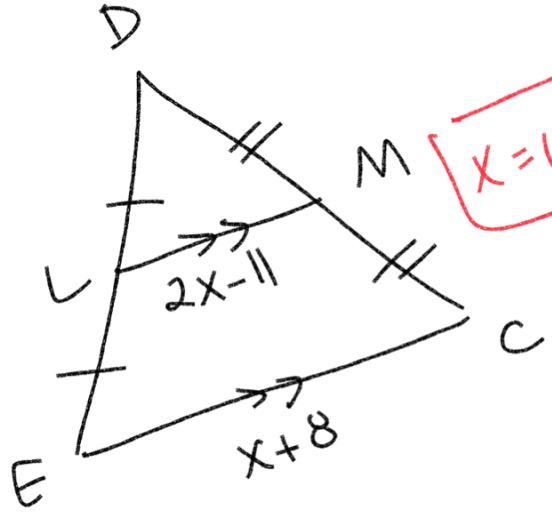
midsegment is half of the base.



$\overline{LM}$ is midsegment



1.)



$\boxed{x=10}$

$2\overline{LM} = \overline{EC}$

$2(2x-11) = x+8$

$4x - 22 = x + 8$

$+22 \quad +22$

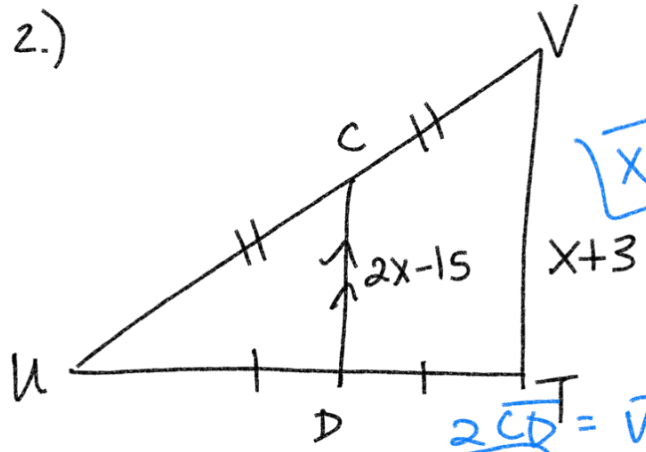
$4x = x + 30$

$-x \quad -x$

$\frac{3x}{3} = \frac{30}{3}$

$\boxed{x=10}$

2.)



$\boxed{x=11}$

$\overline{CD}$ is midsegment

$2\overline{CD} = \overline{VT}$

$2(2x-15) = x+3$

$4x - 30 = x + 3$

$-x \quad -x$

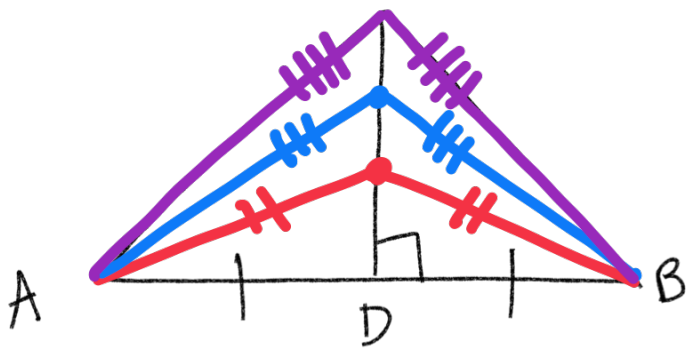
$3x - 30 = 3$

$+30 \quad +30$

$\frac{3x}{3} = \frac{33}{3}$

$\boxed{x=11}$

Perpendicular Bisector



$\overline{CD}$ is perpendicular bisector

$\overline{AD} \cong \overline{DB}$

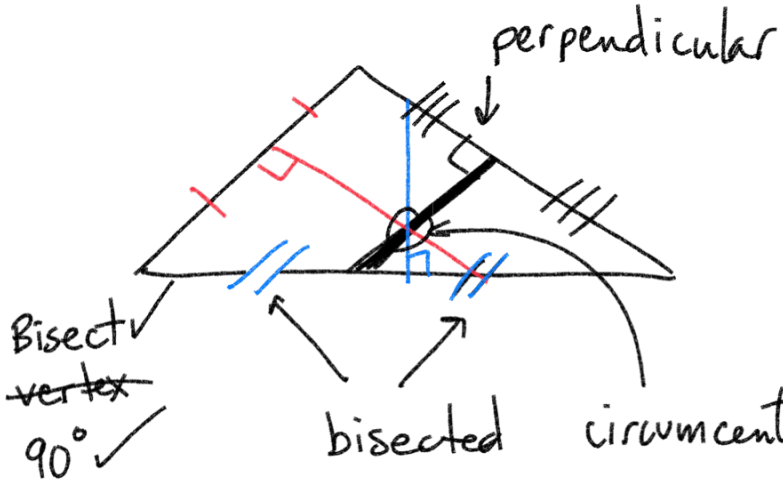
Distance formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$(7,-2)$ and $(-5,3)$

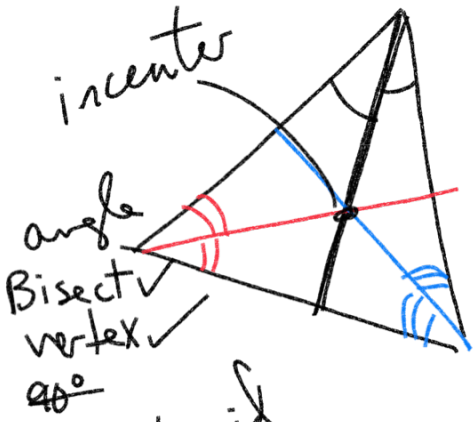
$$d = \sqrt{(7-(-5))^2 + (-2-3)^2}$$

$$\sqrt{12^2 + (-5)^2} = \sqrt{144 + 25} = \sqrt{169} = \boxed{13}$$



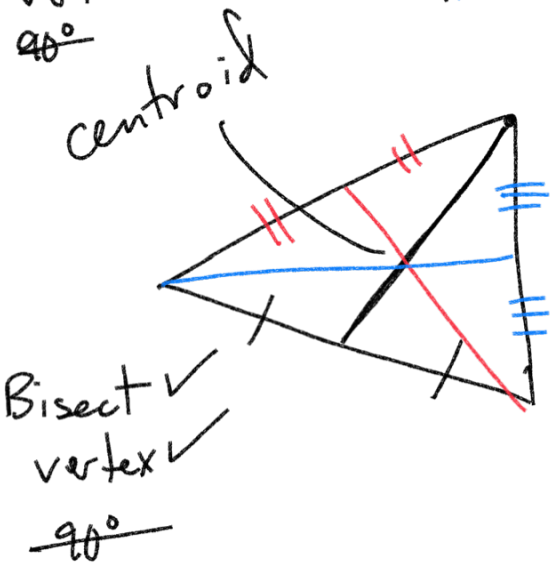
Perpendicular Bisector

- Divides opposite segment in half.
- forms a 90° angle



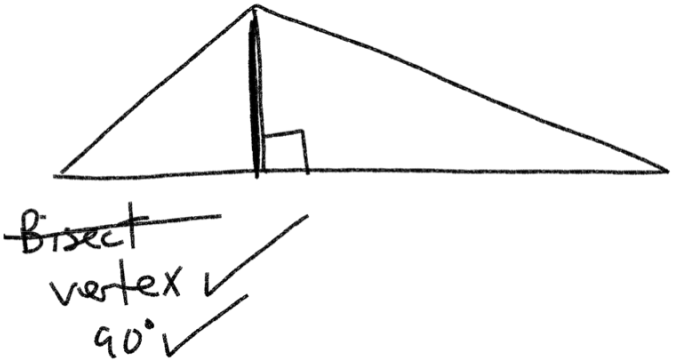
Angle Bisector

Divides angle into two equal pieces



Median

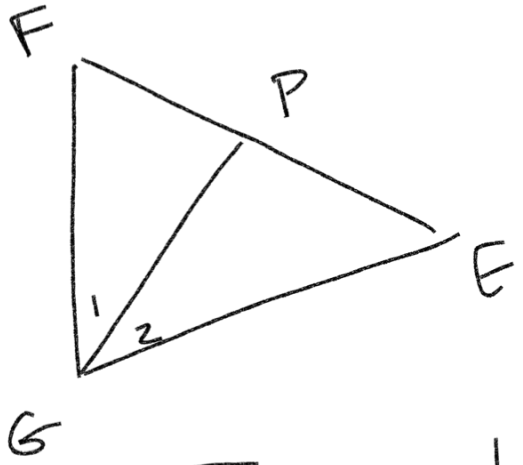
- Divides opposite segment into two equal pieces
- Originates at a vertex, does not form 90° angle.



Altitude (Height)

- from a vertex to the opposite side forming a 90° angle.

Angle Bisectors



$\angle 1 \cong \angle 2$

$\angle 1 = 3x + 36$

$\angle 2 = 2x + 48$

$\angle 1 = \angle 2$

$\downarrow$

$3x + 36 = 2x + 48$

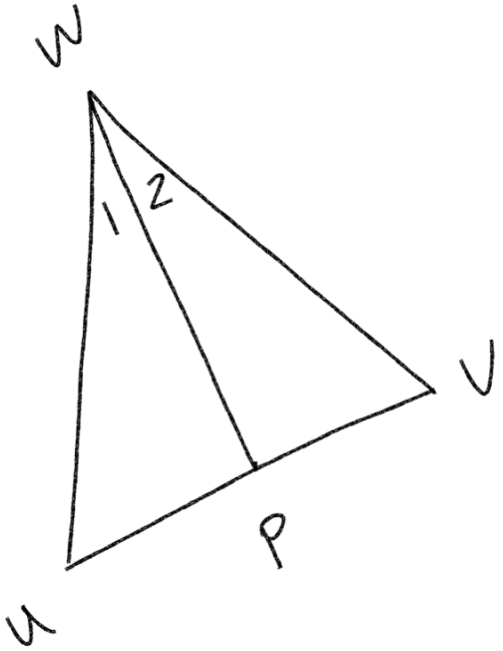
$-2x \qquad -2x$

$x + 36 = 48$

$-36 \qquad -36$

$\boxed{x = 12}$

$\overline{GP}$ is angle bisector



$\overline{WP}$ is angle bisector

$\angle 2 = 7x - 1$

$\boxed{\angle UWV} = 12x + 4$

$\frac{1}{2}(\angle UWV) = \angle 2$

or

$\angle UWV = 2(\angle 2)$

$\Downarrow$

$12x + 4 = 2(7x - 1)$

$12x + 4 = 14x - 2$

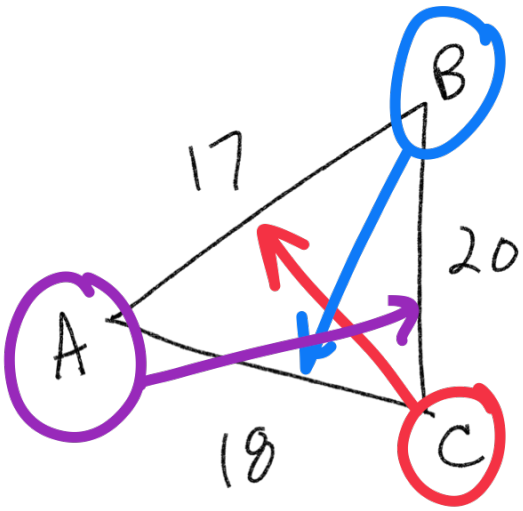
$+2 \qquad +2$

$12x + 6 = 14x$

$-12x \qquad -12x$

$\frac{6}{2} = \frac{2x}{2}$

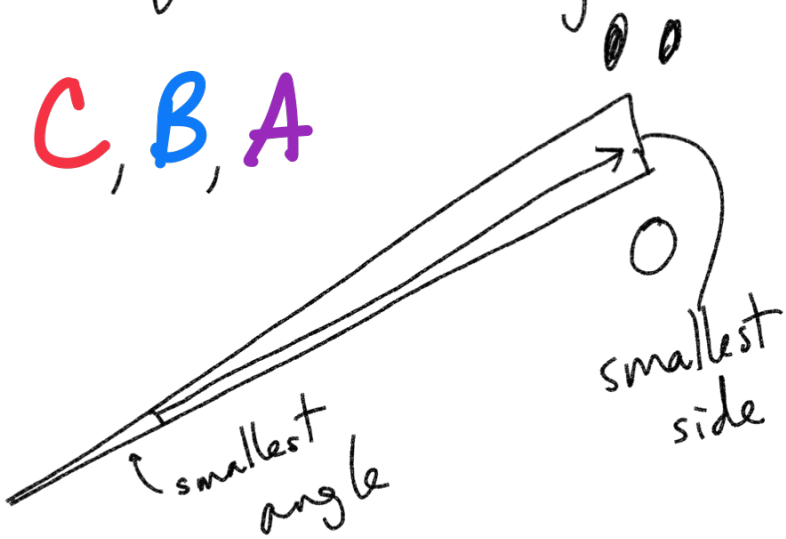
$\boxed{x = 3}$

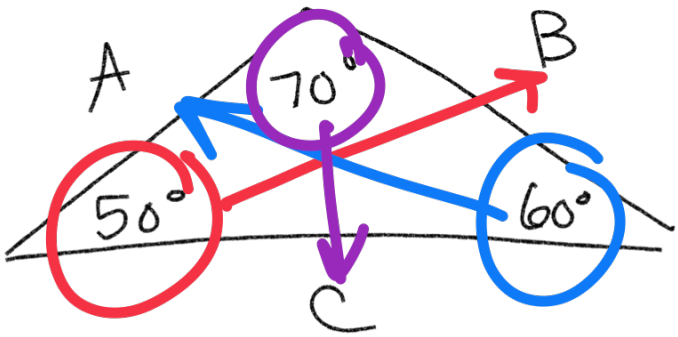


smallest angle is opposite the smallest side

smallest angle → largest angle

C, B, A





Order the sides from least to greatest.

B, A, C

The sum of any two sides of a triangle is greater than any one side

3, 8, 10

$3+8>10$

$11>10$

$3+10>8$ ✓

$13>8$

$8+10>3$

$18>3$

Triangle

3, 8, 12

$3+8>12$

$11 \not> 12$

$8+12>3$

$12+3>8$

Not a triangle

sum of two smallest sides > largest side

Can each of the following be a triangle?

1.) 8, 17, 24 Yaw! $8+17>24$ $25>24$

2.) 9, 13, 22 Naw! $9+13>22$ $22 \not> 22$

3.) 12, 8, 21 Naw! $12+8>21$ $20>21$

4.) 15, 18, 4 Yaw! $4+15>18$ $19>18$