



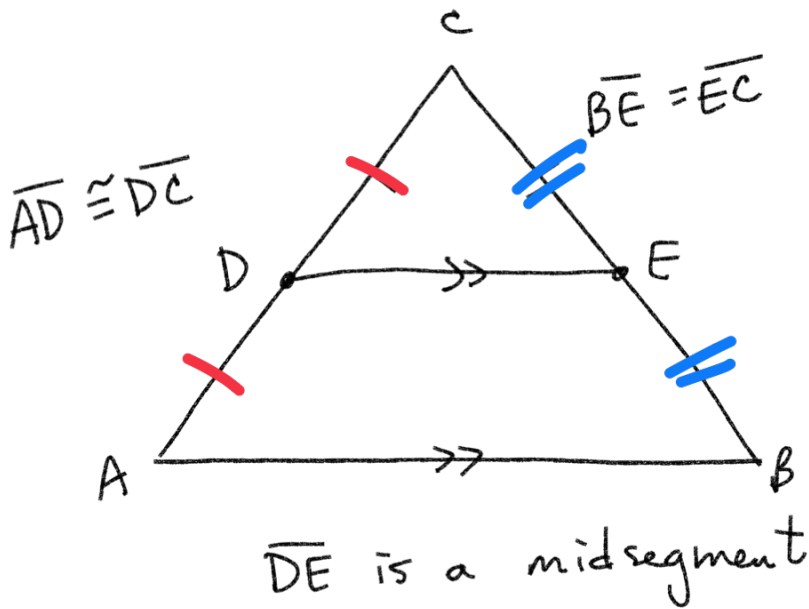
~~AAS~~



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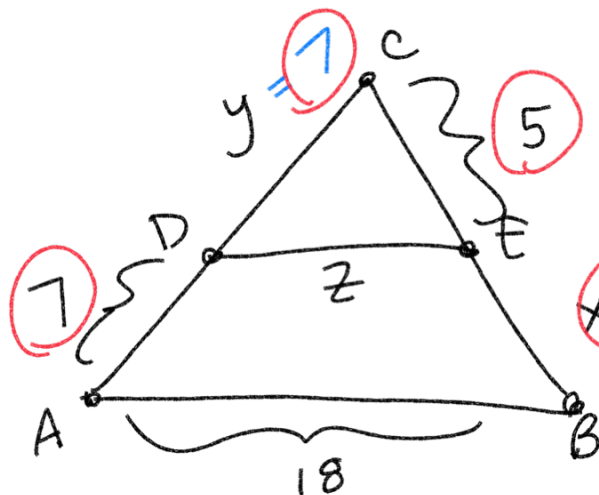
no congruency

Midsegments of Triangles



- Midsegment
- 1.) parallel with base
 - 2.) segment bisector for the legs of the triangle. Cuts each leg into 2 equal pieces.

The midsegment (\overline{DE}) is half the length of the base (\overline{AB})



\overline{DE} is a midsegment

$x = 5$

$y = 7$

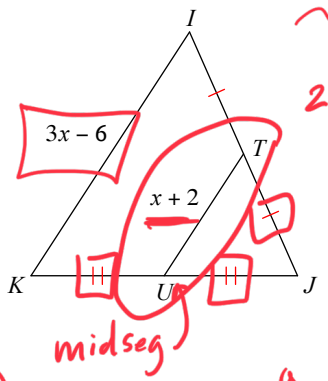
$z = 9$

$18 * \frac{1}{2} = 9$

Assignment

Solve for x.

1)



$$\checkmark 3x - 6 = 2(x + 2)$$

$$\text{or}$$

$$2(3x - 6) = x + 2$$

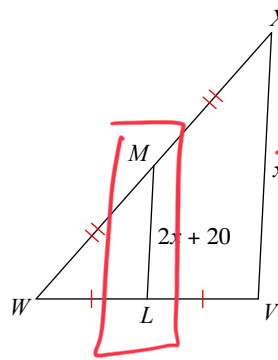
$$3x - 6 = 2(x + 2)$$

$$3x - 6 = 2x + 4$$

$$-2x + 6 - 2x + 6$$

$$x = 10$$

2)



$$\overline{XV} = 2\overline{ML}$$

$$x + 19 = 2(2x + 20)$$

$$x + 19 = 4x + 40$$

$$-x \quad -x$$

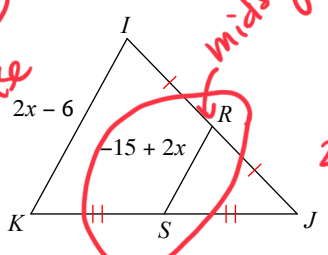
$$19 = 3x + 40$$

$$-40 \quad -40$$

$$\frac{-21}{3} = \frac{3x}{3}$$

$$x = -7$$

3)



$$2(-15 + 2x) = 2x - 6$$

$$-30 + 4x = 2x - 6$$

$$+30 \quad +30$$

$$4x = 2x + 24$$

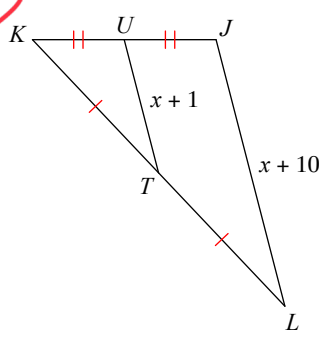
$$-2x \quad -2x$$

$$2x = 24$$

$$\frac{2x}{2} = \frac{24}{2}$$

$$x = 12$$

4)



$$x + 10 = 2(x + 1)$$

$$x + 10 = 2x + 2$$

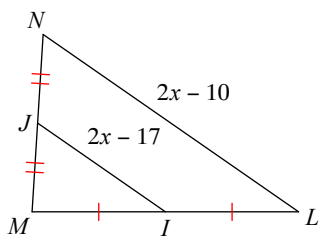
$$-x \quad -x$$

$$10 = x + 2$$

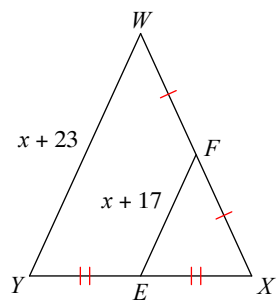
$$-2 \quad -2$$

$$8 = x$$

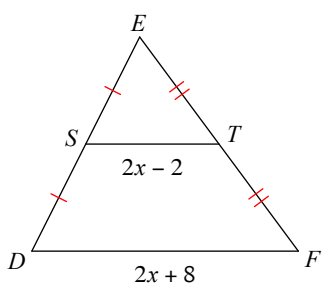
5)



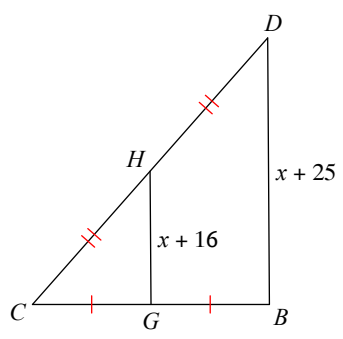
6)

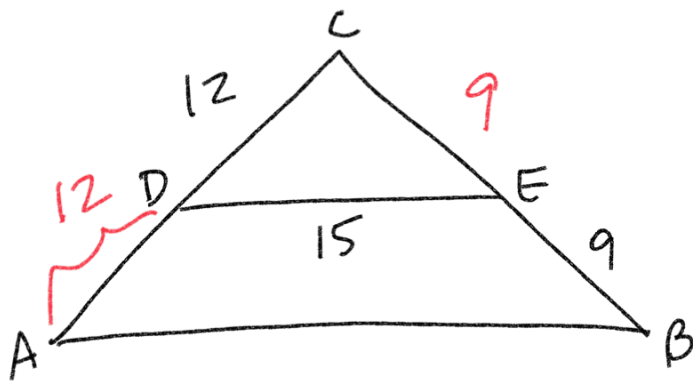


7)



8)





\overline{DE} is a midsegment

$$\overline{DC} = 12$$

$$\overline{EB} = 9$$

$$\overline{DE} = 15$$

Find

$$\overline{AD} = 12$$

$$\overline{AB} = 30 \quad 15 \times 2$$

$$\overline{CE} = 9$$

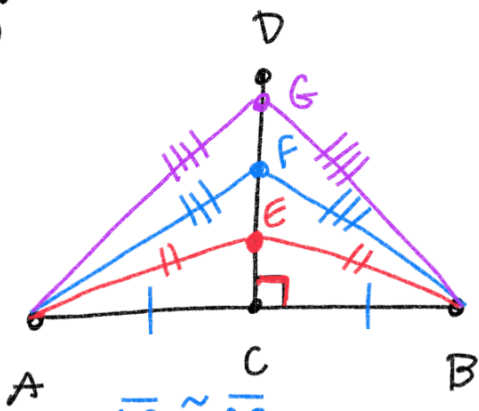
Perpendicular

Bisector

Divides into 2 equal pieces

$\triangle ABE \rightarrow$ isosceles

90°



$$\overline{AC} \cong \overline{CB}$$

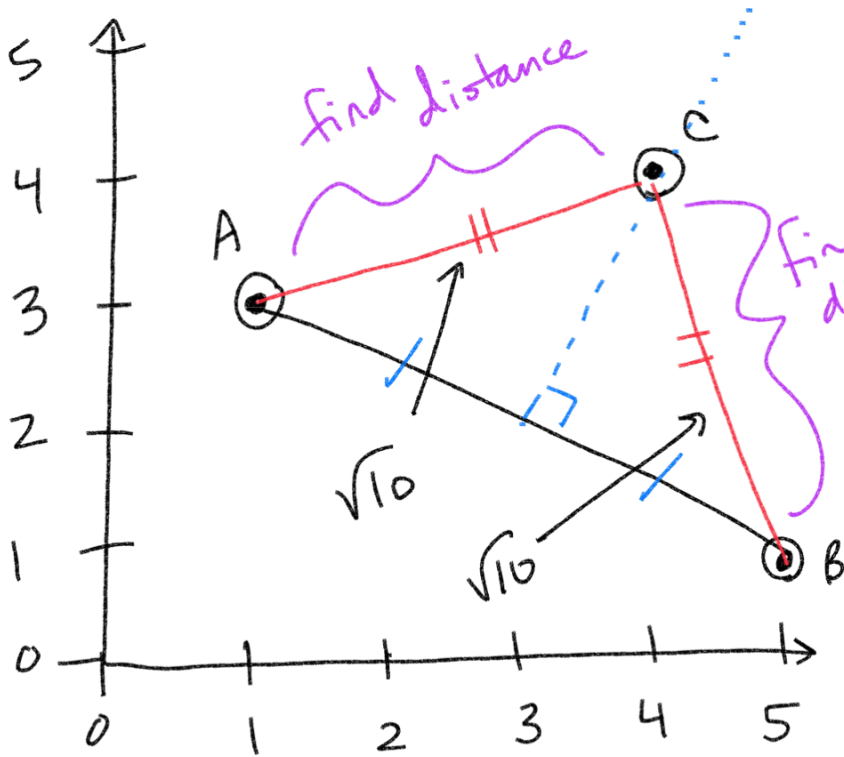
90° angle "right"

$$\overline{AE} \cong \overline{EB}$$

$$\overline{AF} \cong \overline{FB}$$

$$\overline{AG} \cong \overline{GB}$$

Any point on the perpendicular bisector will create an isosceles triangle - a triangle with equal legs.



$$A(1,3) \quad B(5,1)$$

$$C(4,4)$$

Question: is C on the perpendicular bisector of AB?

If true, $\overline{AC} \cong \overline{CB}$

Yes, C is on the perp. bisector

To find the distance between points —

Distance Formula

$$\overline{AC} \quad A(1,3) \quad C(4,4)$$

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

$$\sqrt{(4-1)^2 + (4-3)^2}$$

$$\sqrt{3^2 + 1^2}$$

$$\sqrt{9+1} = \sqrt{10}$$

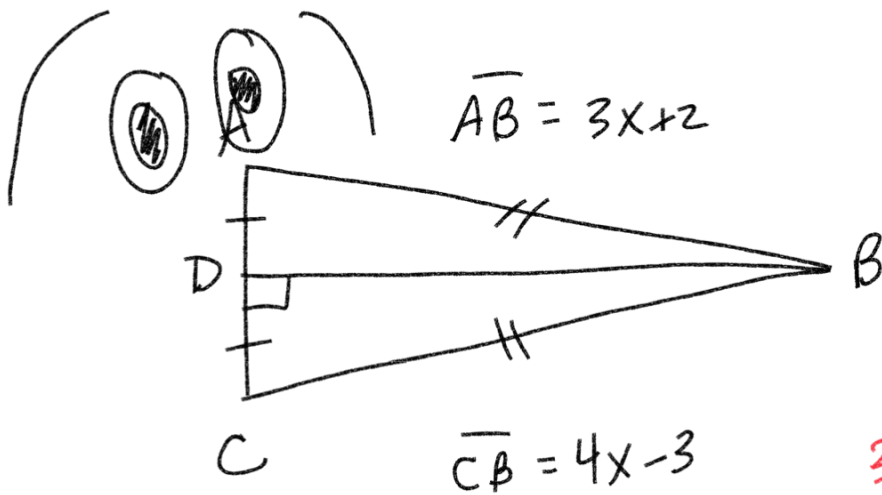
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$B: (5,1) \quad C: (4,4)$$

$$\sqrt{(5-4)^2 + (1-4)^2}$$

$$\sqrt{1^2 + (-3)^2}$$

$$\sqrt{1+9} = \sqrt{10}$$



From given,

\overline{DB} is a perp bisector

$$\overline{AB} = \overline{CB}$$

$$3x+2 = 4x-3$$

$$\begin{array}{r} -2 \\ -2 \end{array}$$

$$3x+2 = 4x-3$$

$$\begin{array}{r} -3x \\ -3x \end{array}$$

$$2 = x-3$$

$$\begin{array}{r} +3 \\ +3 \end{array}$$

$$\boxed{5 = x}$$

$$3x = 4x - 5$$

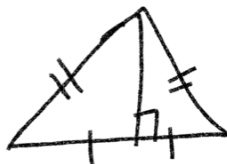
$$\begin{array}{r} -4x \\ -4x \end{array}$$

$$\begin{array}{r} -x = -5 \\ -1 \\ -1 \end{array}$$

$$\boxed{x = 5}$$

Midsegments: midsegment \neq 2 = base

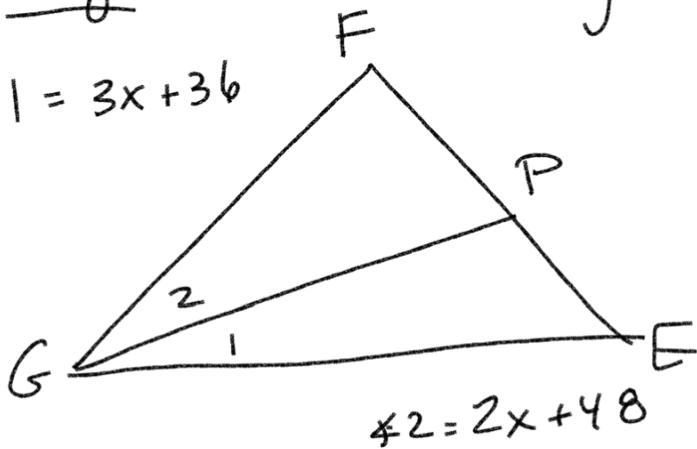
perpendicular bisector:



the base is cut into two equal pieces and the legs are equal.

angle bisector - Angle cut into two equal pieces

$$\angle 1 = 3x + 36$$



\overline{GP} is an angle bisector

$$\angle 1 = \angle 2$$

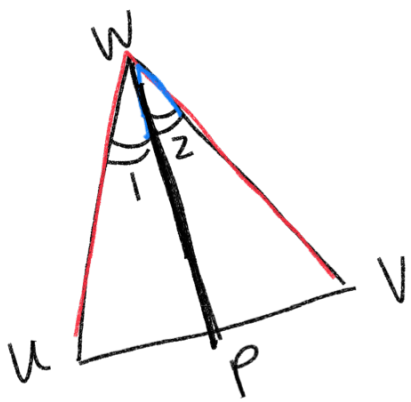
$$3x+36 = 2x+48$$

$$\begin{array}{r} -2x \\ -2x \end{array}$$

$$x+36 = 48$$

$$\begin{array}{r} -36 \\ -36 \end{array}$$

$$\boxed{x = 12}$$



$$\angle 1 = \angle 2$$

$\Sigma \overline{WP}$ is an angle bisector

$$\angle 2 = 7x - 1$$

$$\angle UWV = 12x + 4$$

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

$$\downarrow$$

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

$$12x + 4 = 14x - 2$$

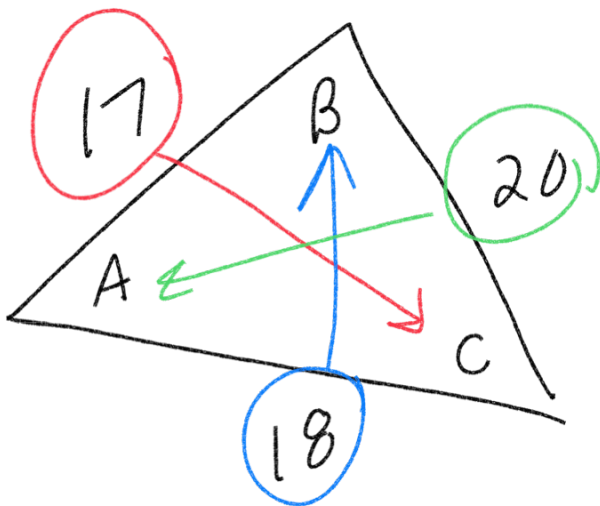
$$-12x \quad -12x$$

$$4 = 2x - 2$$

$$+2 \quad +2$$

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

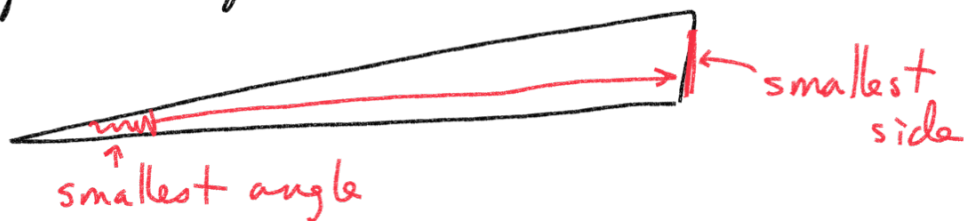
$$x = 3$$

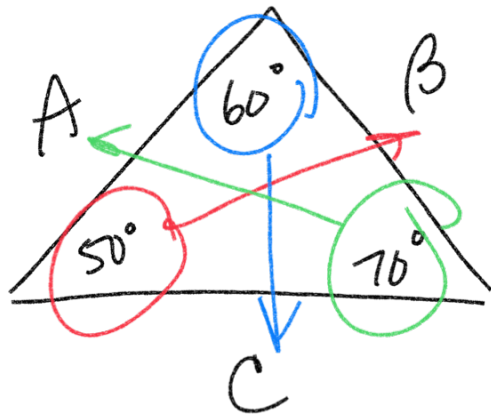


smallest angle \rightarrow largest angle

C, B, A

the smallest angle opens to the smallest side.
the largest angle opens to the largest side.





order the sides
least \rightarrow greatest

B, C, A

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

3, 8, 10 triangle!

$$3 + 8 > 10$$

$$11 > 10$$

3, 8, 12 Not triangle

$$3 + 8 < 12$$

Can each of the following be a triangle?

1.) 8, 17, 24 ✓

$$8 + 17 > 24 \quad 25 > 24 \text{ triangle!}$$

2.) 9, 13, 22 ✗

$$9 + 13 > 22 \quad 22 < 22 \text{ Not triangle}$$

3.) 12, 8, 21 ✗

$$12 + 8 > 21 \quad 20 < 21 \text{ Not triangle}$$

4.) 15, 18, 4 ✓

$$15 + 4 > 18 \quad 19 > 18$$

triangle!