

Directions: Please fill in all missing vocabulary and special rules.
Please answer all questions and show ALL work for multi-step problems.

5.1 Perpendicular and Angle Bisectors

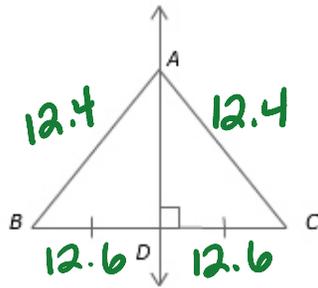
Perpendicular Bisectors:

If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment.

Example 1:

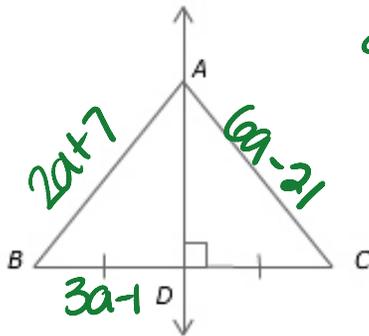
Given \overline{AD} is the perpendicular bisector of \overline{BC} , $AB=12.4$, $AC=12.4$, and $DC=12.6$, find BC .

$BC = 2(12.6)$
 $BC = 25.2$



Example 3:

Given \overline{AD} is the \perp bisector of \overline{BC} , $BD = 3a - 1$, $AB = 2a + 7$, and $AC = 6a - 21$, identify BC . (AC)

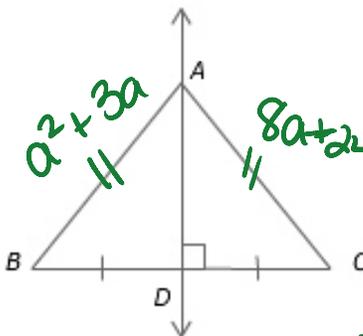


$2a + 7 = 6a - 21$
 $-4a = -28$
 $a = 7$
 $BD = 3(7) - 1$
 $BD = 20$
 $BC = 40$

$AC = 21$

Example 5:

Given \overline{AD} is the perpendicular bisector of \overline{BC} , $AB = a^2 + 3a$ and $AC = 8a + 24$. Find AC .



$a^2 + 3a = 8a + 24$
 $a^2 - 5a - 24 = 0$
 $(x - 8)(x + 3) = 0$
 $x = 8; x = -3$
 $AC = 8(8) + 24 = 88$
 ~~$AC = 8(-3) + 24 = 0$~~

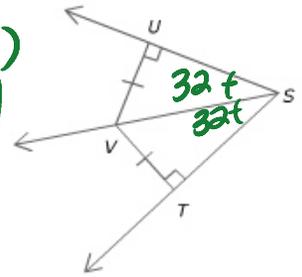
Angle Bisectors:

If a point is on the perpendicular bisector of an angle, then it is equidistant from the sides of the angles.

Example 2:

Given $m\angle TSV = 32^\circ$, find $m\angle UST$.

$m\angle UST = 2(32)$
 $m\angle UST = 64^\circ$

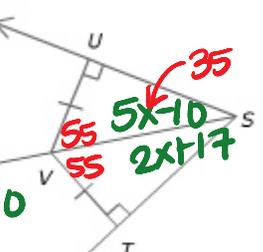


Example 4:

Given $m\angle USV = (2x + 17)^\circ$ and $m\angle VST = (5x - 10)^\circ$, find the $m\angle UVT$.

$5x - 10 = 2x + 17$
 $3x = 27$
 $x = 9$
 $m\angle VST = 5(9) - 10$
 $m\angle VST = 35^\circ$

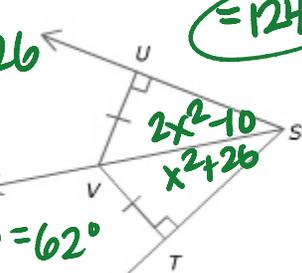
$m\angle UVS = 180 - (90 + 35) = 55^\circ$
 $m\angle UVT = 2(55) = 110^\circ$



Example 6:

Given that $m\angle USV = (2x^2 - 10)^\circ$ and $m\angle VST = (x^2 + 26)^\circ$, find the $m\angle UST$.

$2x^2 - 10 = x^2 + 26$
 $x^2 = 36$
 $x = \pm 6$
 $m\angle VST = (6)^2 + 26 = 62^\circ$
or
 $m\angle VST = (-6)^2 + 26 = 62^\circ$
 $m\angle UST = 2(62) = 124^\circ$



5.2-5.3 Points of Concurrency

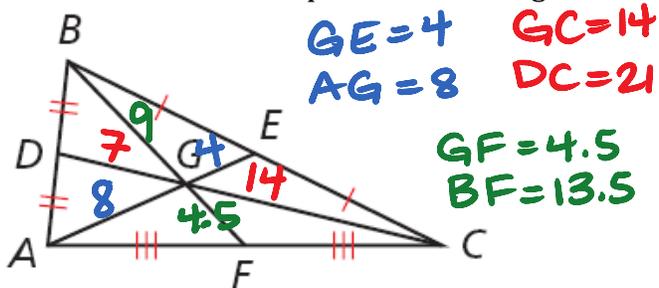
The point of concurrency is the point where three or more lines meet.

The **centroid** is formed by the medians of the triangle. Another name for the centroid is the **center of gravity**. (2:1 ratio)

Special Rule: The distance from the vertex to the centroid is twice the distance from the centroid to opp side

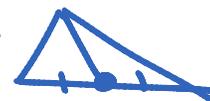


Example 1: In $\triangle ABC$, $AE = 12$, $DG = 7$, and $BG = 9$. Find all possible side lengths.



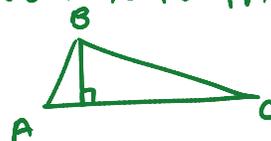
Example 2: What is a median? Draw a picture and describe in words.

The median is a segment that connects the vertex to the midpt of the opp side.



Example 3: What is an altitude? Draw a picture and describe in words

The altitude is a \perp segment from the vertex to the opposite side

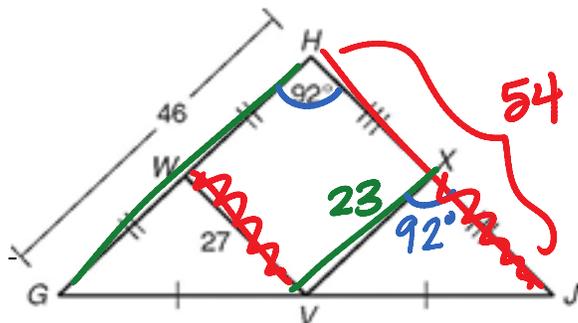


5.4 Midsegment Theorem

Triangle Midsegment Theorem:

A **midsegment** of a triangle is || to a side of the triangle, and its length is $\frac{1}{2}$ the length of that side.

Example 1: Use the diagram below to answer Examples 1-4.



Example 1: $VX = \underline{46 \div 2 = 23}$

Example 2: $HJ = \underline{27 \cdot 2 = 54}$

Example 3: $m\angle VXJ = \underline{92^\circ}$
b/c corr $\angle s \cong !!!$

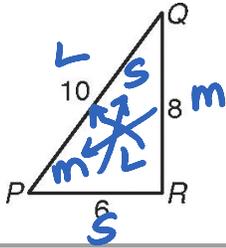
Example 4: $XJ = \underline{27}$

5.5 Inequalities in One Triangle

Angle-Side Relationships in \triangle 's

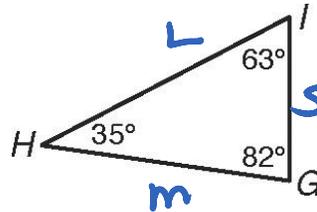
If two sides of a triangle are not congruent, then the angles across from those sides are not \cong , and the larger angle is opposite the longer side.

Example 1: Name the angles in order from smallest to largest.



$$m\angle Q < m\angle P < m\angle R$$

Example 2: Name the sides in order from smallest to largest.



$$IG < GH < HI$$

Triangle Inequality Theorem:

The sum of any two Side lengths of a triangle is greater than the 3rd side length.

Directions: For examples 1 and 2, tell whether a triangle can have sides with the given lengths. Explain why or why not.

Example 1:

8, 15, 25

$$8 + 15 ? 25$$

$$23 < 25$$

NO, Sum of 2 smaller sides is not greater than 3rd side

Example 2:

3, 10, 12

$$3 + 10 ? 12$$

$$13 > 12 \quad \text{YES} \checkmark$$

Example 3:

If $a = 12$ and $b = 37$, what are the possible lengths for side c ?

$$37 - 12 < c < 37 + 12$$

$$25 < c < 49$$

5.6 Inequalities in Two Triangles

Hinge Theorem:

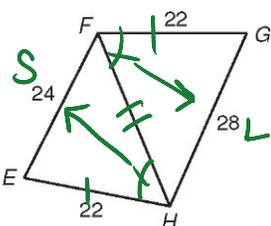
If 2 sides of one triangle are congruent to 2 sides of another triangle and the included angles are not congruent, then the longer 3rd side is across from the larger \angle

Converse of the Hinge Theorem

If 2 sides of one triangle are congruent to 2 sides of another triangle and the third sides are not congruent, then the larger 3rd \angle is opposite the longer side

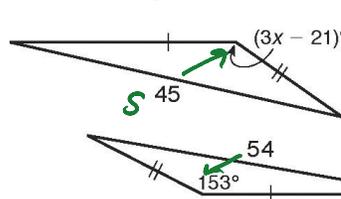
Example 1: Compare the given measures.

$m\angle FHE$ and $m\angle HFG$



$$m\angle FHE < m\angle HFG$$

Example 2: Find the range of values for x .



$$15^\circ + 3x - 21 < 153$$

$$3x < 174$$

$$x < 58$$

$$3x - 21 > 0$$

$$3x > 21$$

$$x > 7$$

$$7 < x < 58$$

$$x < 67$$

To prepare for the test, please review all note sheets, homework & in-class assignments! Good Luck!