Station 1: Proof Practice

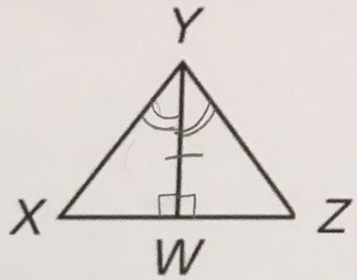
Use the statements and reasons provided to complete the proof. **Mark the diagram first!**

Given: $\overline{WY}$ is an altitude of ΔXYZ

$\overline{WY}$ is an angle bisector ΔXYZ

Prove: $\angle X \cong \angle Z$

ASA



Statements				
~~$\overline{WY} \cong \overline{WY}$~~	~~$\overline{WY} \perp \overline{XZ}$~~	~~$\angle YWX \cong \angle YWZ$~~	~~$\overline{WY}$ is an altitude of ΔXYZ~~	~~$\angle YWX$ and $\angle YWZ$ are right angles~~
~~$\overline{WY}$ is an angle bisector ΔXYZ~~	~~$\Delta XYW \cong \Delta ZYW$~~	~~$\angle X \cong \angle Z$~~	~~$\angle XYW \cong \angle ZYW$~~	

Reasons		
~~Given~~	~~CPCTC~~	~~Reflexive POC~~
~~If two segments are perpendicular, then they form right angles~~	~~If two angles are right angles, then they are congruent~~	~~If a segment is an angle bisector, then it divides an angle into 2 congruent angles~~
~~Given~~	~~If corresponding ASA of two triangles are congruent, then the triangles are congruent~~	~~If a segment is an altitude of a triangle, then it is perpendicular to a side of the triangle~~

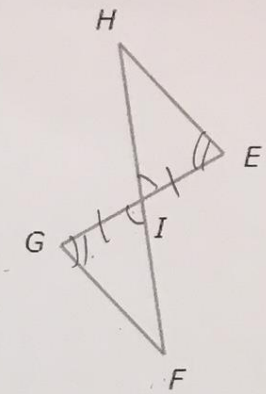
	Statements	**Reasons**
	1. $\overline{WY}$ is altitude of ΔXYZ	1. Given
	2. $\overline{WY} \perp \overline{XZ}$	2. If segment is an altitude, then it is perpendicular to a side of the Δ
	3. $\angle YWX$ & $\angle YWZ$ are right $\angle$s	3. If 2 segments are $\perp$, then they form right $\angle$s
A	4. $\angle YWX \cong \angle YWZ$	4. If 2 $\angle$s are right $\angle$s, then they are $\cong$
	5. $\overline{WY}$ is an angle bisector	5. Given
A	6. $\angle XYW \cong \angle ZYW$	6. If segment is an angle bisector, then it divides an angle into 2 $\cong$ $\angle$s
S	7. $\overline{WY} \cong \overline{WY}$	7. Reflexive POC
	8. $\Delta XYW \cong \Delta ZYW$	8. If corresponding ASA of 2 Δs $\cong$, then the Δs are $\cong$.
	9. $\angle X \cong \angle Z$	9. CPCTC

Fill in the blanks to complete the proof. **Mark the diagram first!**

Given: I is the midpoint of $\overline{EG}$
$\angle E \cong \angle G$

Prove: $\overline{EG}$ bisects $\overline{HF}$

ASA



Statements	Reasons
1. I is the midpoint of $\overline{EG}$	1. Given
2. $\overline{GI} \cong \overline{EI}$	2. If a point is a midpoint of a segment, then it divides segment into 2 $\cong$ segments
3. $\angle E \cong \angle G$	3. Given
4. $\angle GIF$ and $\angle EIH$ are vertical angles	4. Given by diagram
5. $\angle GIF \cong \angle EIH$	5. If two angles are vertical angles, then they are $\cong$
6. $\triangle GIF \cong \triangle EIH$	6. If corresponding ASA of two triangles are congruent, then the triangles are congruent
7. $\overline{IH} \cong \overline{IF}$	7. CPCTC
8. $\overline{EG}$ bisects $\overline{HF}$	8. If a segment divides a segment into two congruent segments, then it bisects the segment

<u>**Station 2: Drawing Special Segments**</u>

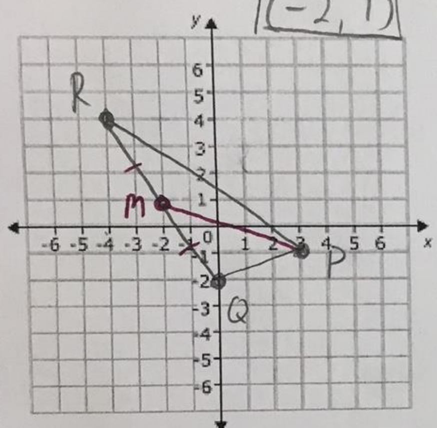
Midpoint Formula
$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

1. **Fill in the blanks to review how to draw each special segment.**
   - To draw a median of a triangle, you need to find the <u>midpoint</u> of the opposite side. The median has endpoints at a <u>vertex</u> of the triangle and the midpoint of the opposite side.
   - To draw an altitude, you need to find the <u>Slope</u> of the opposite side. Begin at the vertex of a triangle and use the <u>opposite</u> <u>reciprocal</u> slope of the opposite side to draw the altitude.
   - To draw a perpendicular bisector of a side of a triangle, you need to find the midpoint and the <u>slope</u> of the side. Begin at the <u>midpoint</u> and use the opposite <u>reciprocal</u> slope of the side to draw the perpendicular bisector.

2. The vertices of ΔPQR are at $P(3, -1)$, $Q(0, -2)$, and $R(-4, 4)$. Graph ΔPQR and label its vertices. Then draw median $\overline{PM}$. Label M.

Midpoint $\overline{RQ}$ $\left(\frac{-4+0}{2}, \frac{4+-2}{2}\right)$

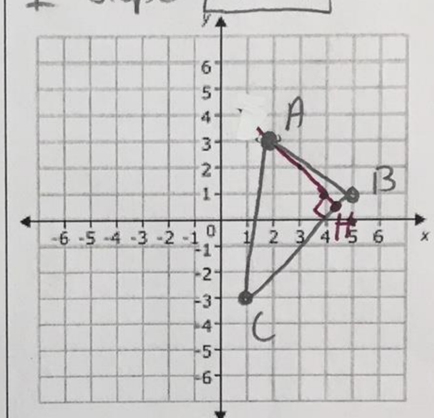
$\boxed{(-2, 1)}$



3. The vertices of ΔABC are at $A(2, 3)$, $B(5, 1)$, and $C(1, -3)$. Graph ΔABC and label its vertices. Then draw altitude $\overline{AH}$. Label H.

Slope $\overline{CB}$ $m = \frac{4}{4} = 1$

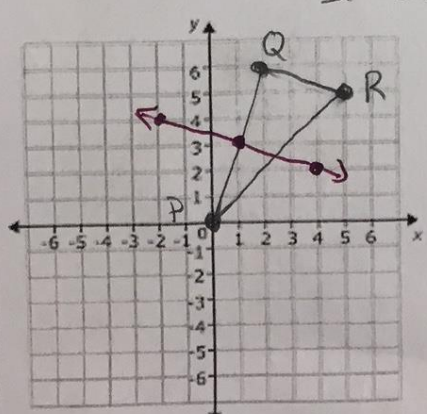
$\perp$ slope $\boxed{m = -1}$



4. The vertices of ΔPQR are at $P(0, 0)$, $Q(2, 6)$, and $R(5, 5)$. Graph ΔPQR and label its vertices. Then draw the perpendicular bisector of $\overline{PQ}$.

Midpt $\overline{PQ}$ $(1, 3)$ Slope $\overline{PQ}$ $m = 3$

$\perp$ slope $m = -\frac{1}{3}$

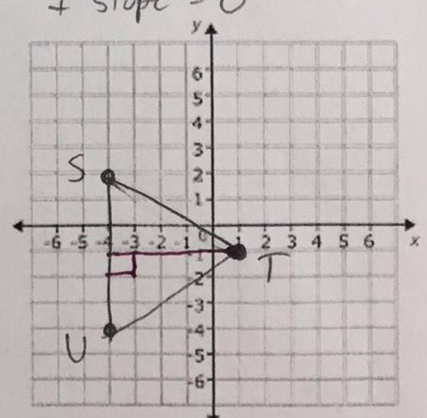


5. The vertices of ΔSTU are at $S(-4, 2)$, $T(1 -1)$, and $U(-4, -4)$. Graph ΔSTU and label its vertices. Then draw the altitude from T.

Slope of $\overline{SU}$ = undefined

$\perp$ slope = 0

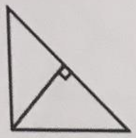
☆ A vertical line is always $\perp$ to a horizontal line ☆



What is the length of the altitude from T? <u>5 units</u>

Station 3: Finding Missing Values with Special Segments

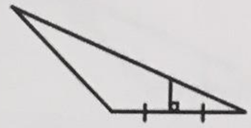
1. Identify each special segment as a median, angle bisector, perpendicular bisector, or altitude.

a) 

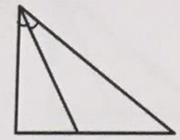
Altitude

b) 

Median

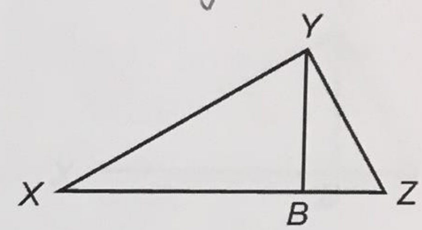
c) 

Perp. Bisector

d) 

Angle Bisector

2. $\overline{YB}$ is an altitude of ΔXYZ and $m\angle YBZ = (7x+27)°$. Find the value of x.

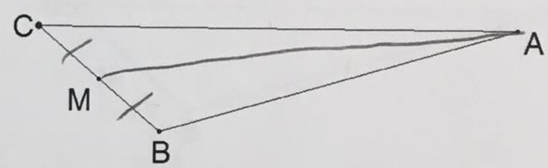


$7x + 27 = 90$

$7x = 63$

$\boxed{x = 9}$

3. $\overline{AM}$ is a *median* of ΔABC. Draw the median in the diagram. If $BM = 10x - 8$ and $CM = 3x + 34$, find the value of x and CB.



$10x - 8 = 3x + 34$

$7x = 42$

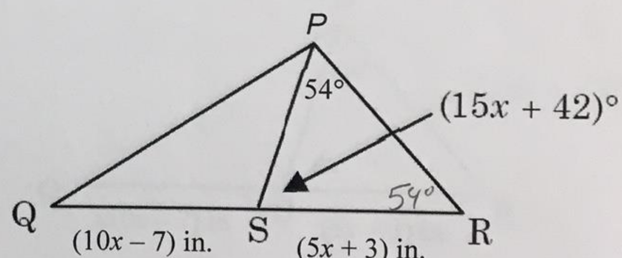
$x = 6$

$3(6) + 34 = 52$

$2(52) = 104$

$x =$ 6 $CB =$ 104

4. Given $\overline{PS}$ is a median. Find $m\angle PSR$.



$10x - 7 = 5x + 3$

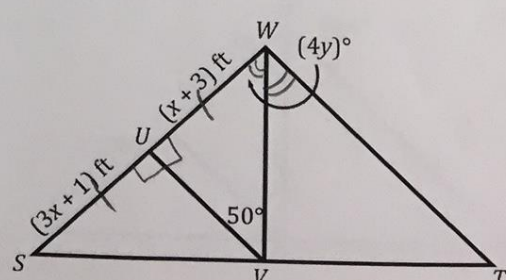
$5x = 10$

$x = 2$

$15(2) + 42 = 72°$

$m\angle PSR =$ 72° Classify ΔPRS by angles and sides: Acute Isosceles

5. In a diagram shown, $\overline{UV}$ is a perpendicular bisector of ΔSVW and $\overline{WV}$ is an angle bisector of ΔSWT. Mark the diagram with the given information and then solve for x, y, and $m\angle SWT$.



$3x + 1 = x + 3$

$2x = 2$

$\boxed{x = 1}$

$40 = 4y$

$\boxed{y = 10}$

$m\angle SWV = 4(10) = 40$

$m\angle SWT = 2(40) = 80$

$m\angle SWT =$ 80°

Station 4: The Triangle Inequality Theorem

Is it possible to form a triangle with the given side lengths? If not, explain why not.

1. 2 *ft*, 3 *ft*, 4 *ft* Yes

$5 > 4$ ✓

2. 2 *m*, 12 *m*, 10 *m*

$2+10 \not> 12$ No

3. 7.5 *in*, 9 *in*, 1 *in*

$7.5+1 \not> 9$ No

Find the range for the measure of the third side of a triangle given the measures of two sides.

4. 5 *ft*, 9 *ft*

$5+x>9$ $\quad 5+9>x$ $\quad 9+x>5$

$x>4$ $\quad 14>x$ $\quad x>-4$

$\boxed{4<x<14}$

5. 7 *in*, 14 *in.*

$7+14>x$ $\quad 7+x>14$ $\quad 14+x>7$

$21>x$ $\quad x>7$ $\quad x>-7$

$\boxed{7<x<21}$

Find the range of possible measures of *x* if each set of expressions represents measures of the sides of a triangle.

6. (x + 1) yds., 5 yds., 7 yds.

$x+1+5>7$ $\quad x+1+7>5$ $\quad 7+5>x+1$

$x+6>7$ $\quad x+8>5$ $\quad 12>x+1$

$x>1$ $\quad x>-3$ $\quad 11>x$

$\boxed{1<x<11}$

7. 12 ft, 20 ft, (2k + 4) ft

$12+20>2k+4$ $\quad 12+2k+4>20$ $\quad 20+2k+4>12$

$32>2k+4$ $\quad 2k+16>20$ $\quad 2k+24>12$

$28>2k$ $\quad 2k>4$ $\quad 2k>-12$

$14>k$ $\quad k>2$ $\quad k>-6$

$\boxed{2<k<14}$

Station 4: The Triangle Inequality Theorem

Is it possible to form a triangle with the given side lengths? If not, explain why not.

1. 2 *ft*, 3 *ft*, 4 *ft*
2. 2 *m*, 12 *m*, 10 *m*
3. 7.5 *in*, 9 *in*, 1 *in*

Find the range for the measure of the third side of a triangle given the measures of two sides.

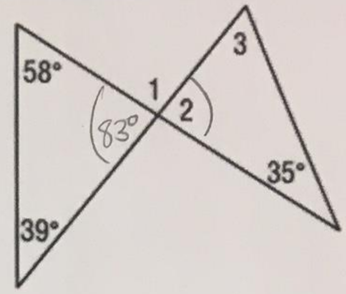
4. 5 *ft*, 9 *ft*
5. 7 *in*, 14 *in.*

Find the range of possible measures of *x* if each set of expressions represents measures of the sides of a triangle.

6. (x + 1) yds., 5 yds., 7 yds.
7. 12 ft, 20 ft, (2k + 4) ft

Station 5: Angle-Side Theorem & Exterior Angle Theorem

1. Find the indicated angle measures.



$m\angle 1 =$ 97°

$m\angle 2 =$ 83°

$m\angle 3 =$ 62°

$m\angle 1 + m\angle 2 = 180$
$m\angle 1 + 83 = 180$
$m\angle 1 = 97$

$35 + m\angle 3 = m\angle 1$
$35 + m\angle 3 = 97$
$m\angle 3 = 62$

2. Fill in the blank with ***sometimes, always, or never***.

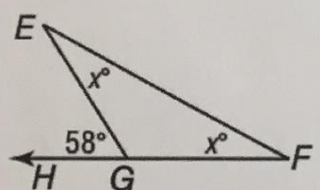
   a. The acute angles of a right triangle are never supplementary.

   b. The acute angles of a right triangle are always complementary.

   c. There can never be two right angles in a triangle.

   d. A right triangle is sometimes an isosceles triangle.

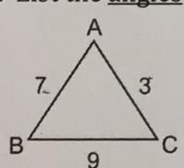
3. Find $m\angle F$.



$x + x = 58$
$2x = 58$
$\boxed{x = 29}$

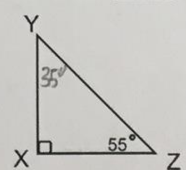
$\boxed{m\angle F = 29°}$

4. List the <u>angles</u> in order from *smallest to largest.*



$\angle B$, $\angle C$, $\angle A$

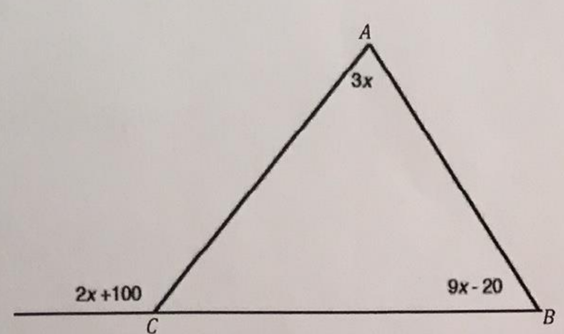
5. List the <u>sides</u> in order from *smallest to largest.*



$\overline{XZ}$, $\overline{YX}$, $\overline{YZ}$

6. Find the value of *x* and the following angle measures.

$3x + 9x - 20 = 2x + 100$
$12x - 20 = 2x + 100$
$10x = 120$
$\boxed{x = 12}$



$x =$ 12

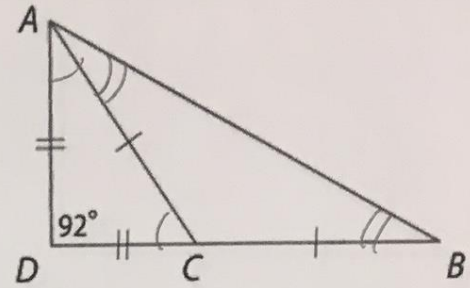
$m\angle A =$ 36° $m\angle B =$ 88° $m\angle ACB =$ 56°

exterior angle = 124°

Classify ΔABC: Acute   Scalene

Station 6: Isosceles and Equilateral Triangles

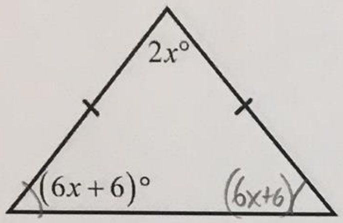
1. Find the indicated angle measures.



$m\angle CAD =$ 44° $m\angle ACD =$ 44°

$m\angle ACB =$ 136° $m\angle ABC =$ 22°

2. Find the value of x. Then classify the triangle by its sides and angles.



$6x+6+6x+6+2x=180$

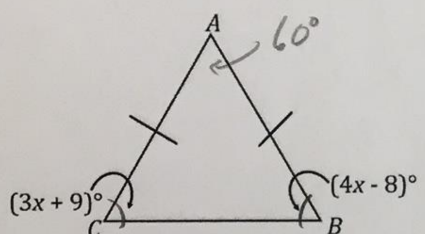
$14x+12=180$

$14x=168$

$x=12$

$x =$ 12 Classification: Acute Isosceles

3. Find the value of x. Then classify the triangle by its sides and angles.



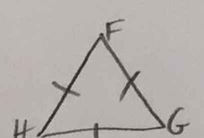
$3x+9=4x-8$ $3(17)+9=60°$

$17=x$ $4(17)-8=60°$

$x =$ 17 $m\angle A =$ 60° Classification: Equiangular Equilateral

all sides ≅

4. ΔFGH is an equilateral triangle with $FG = (x+5)\ in.$, $GH = (3x-9)\ in.$ and $FH = (2x-2)in.$ Find the value of x and FG. (Draw a diagram to help!)



$3x-9=x+5$ $FG=7+5=12$

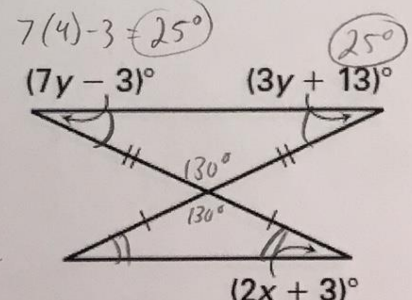
$2x=14$

$\boxed{x=7}$

$x =$ 7 $FG =$ 12 in

5. Find the values of x and y in the diagram shown.

$7(4)-3=25°$



$7y-3=3y+13$ $2x+3=25$

$4y=16$ $2x=22$

$\boxed{y=4}$ $\boxed{x=11}$

$x =$ 4 $y =$ 11