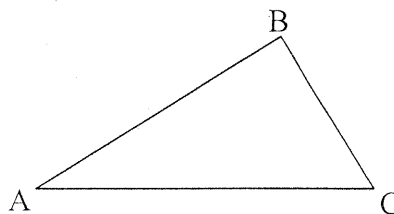


Triangle Sum Theorem: What does it say?

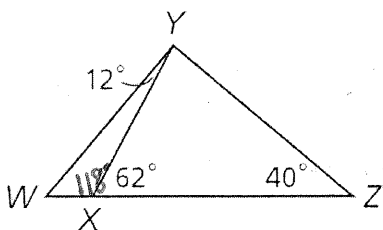
The sum of the angle measures of a triangle is 180° .

Mathematically speaking:

$$m\angle A + m\angle B + m\angle C = 180^\circ$$



Example 1: After an accident, the positions of cars are measured by law enforcement to investigate the collision. Use the diagram drawn from the information collected to find $m\angle XYZ$ and $m\angle YWZ$.



$$m\angle XYZ = 78^\circ$$

$$m\angle YWZ = 50^\circ$$

II. Corollaries to the Triangle Sum Theorem

Corollary: A theorem whose proof follows directly from another theorem.

Corollaries

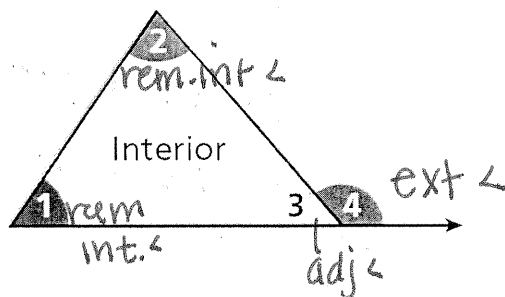
COROLLARY	HYPOTHESIS	CONCLUSION
<p>4-2-2 The acute angles of a right triangle are <u>complementary</u>.</p>		<p>$\angle D$ and $\angle E$ are <u>complementary</u>. $m\angle D + m\angle E = 90^\circ$</p>
<p>4-2-3 The measure of each angle of an equiangular triangle is <u>60°</u>.</p>		<p>$m\angle A = m\angle B = m\angle C = 60^\circ$ $180^\circ / 3 = 60^\circ$</p>

Example 2: One of the acute angles in a right triangle measures $2x^\circ$. $(90 - 2x)^\circ$
 What is the measure of the other acute angle?

acute angles are complementary!
 (sum to 90°)

III. Angle Vocabulary

Term	Definition
Interior	Set of all points inside the figure.
Exterior	Set of all points outside a figure.
Interior Angle	formed by 2 sides of a triangle
Exterior Angle	formed by 1 side of a triangle and an extension of an adj. side
Remote Interior Angle	An interior angle that is NOT adj to the exterior angle.

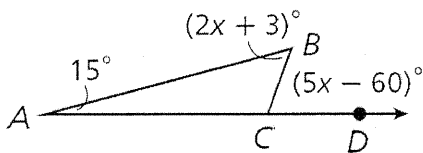


III. Exterior Angle Theorem: What does it say?

The measure of an exterior angle of a triangle is equal to the sum of the measures of its remote interior angles.

$$m\angle 1 + m\angle 2 = m\angle 4$$

Example 3: Find $m\angle B$.



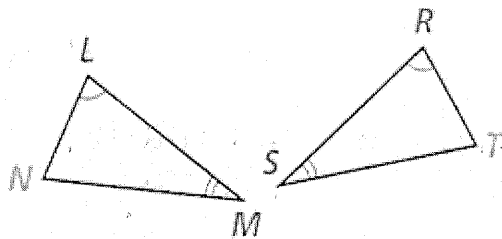
$$\begin{aligned} 15 + 2x + 3 &= 5x - 60 \\ 2x + 18 &= 5x - 60 \\ 2x + 78 &= 5x \\ 78 &= 3x \end{aligned}$$

$$\begin{aligned} m\angle B &= 2(26) + 3 \\ m\angle B &= 52 + 3 \\ m\angle B &= 55^\circ \end{aligned}$$

$$x = 26$$

IV. Third Angles Theorem: What does it say?

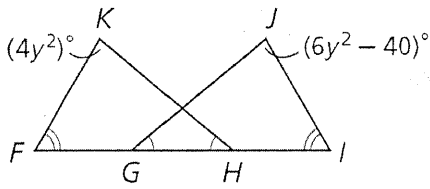
If two angles of one triangle are congruent to two angles of another triangle, then the third pair of angles are congruent.



What are we able to conclude?

$$\angle N \cong \angle T$$

Example 4: Find $m\angle K$ and $m\angle J$.



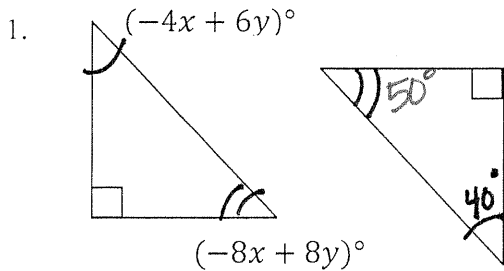
$$4y^2 = 6y^2 - 40$$

$$-2y^2 = -40$$

$$\sqrt{y^2} = \sqrt{20}$$

$$y = \sqrt{20} = \sqrt{4 \cdot 5} = 2\sqrt{5}$$

Extra Practice (4.1 and 4.2)



$$x = 1.25$$

$$y = 7.5$$

$$\begin{cases} -8x + 8y = 50 \\ (-4x + 6y = 40) \cdot 2 \\ -8x + 12y = 80 \end{cases}$$

$$\underline{-4y = -30}$$

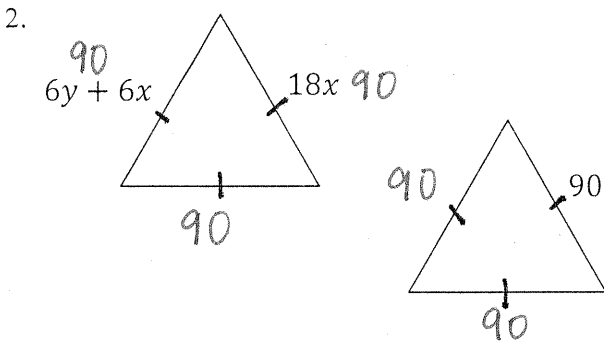
$$\frac{-4}{-4} \quad \frac{-30}{-4}$$

$$y = 7.5$$

$$\begin{aligned} -8x + 8(7.5) &= 50 \\ -8x + 60 &= 50 \\ -8x &= -10 \end{aligned}$$

$$x = \frac{-10}{-8} = \frac{-5}{-4}$$

$$x = 1.25$$



$$x = 5$$

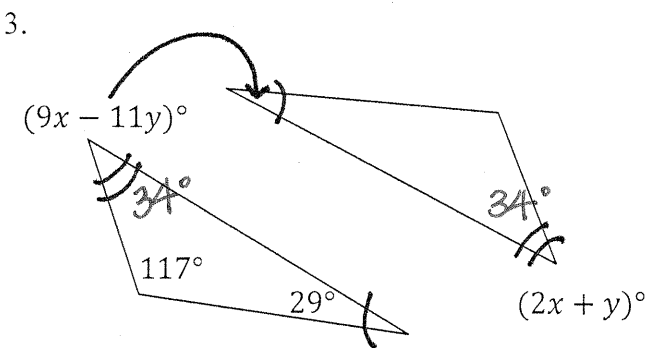
$$y = 10$$

$$\begin{cases} 18x = 90 \\ 6y + 6x = 90 \end{cases} \rightarrow x = \frac{90}{18} = 5$$

$$6y + 30 = 90$$

$$6y = 60$$

$$y = 10$$



$$x = 13$$

$$y = 8$$

$$\begin{cases} 9x - 11y = 29 \\ (2x + y = 34) + 11 \end{cases} \rightarrow \begin{cases} 9x - 11y = 29 \\ 22x + 11y = 374 \end{cases}$$

$$\underline{31x = 403}$$

$$x = 13$$

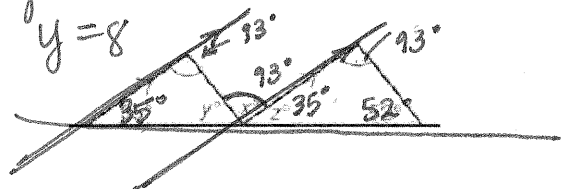
$$9(13) - 11y = 29$$

$$117 - 11y = 29$$

$$-11y = -88$$

$$y = 8$$

4. A landscape artist plans to draw a pair of mountains. He wants his drawing to be reasonably accurate, so he takes some measurements and draws this figure. Find x , y , and z .



$$z = 35^\circ$$

$$x = 93^\circ$$

$$y = 52^\circ$$

