

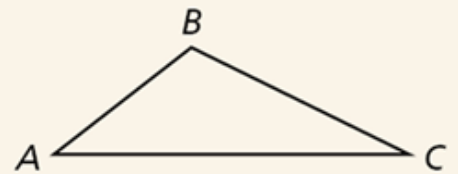
NOTES: 4.3 Angle Relationships in Triangles

Triangle Sum Theorem

Theorem 4-2-1 Triangle Sum Theorem

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

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



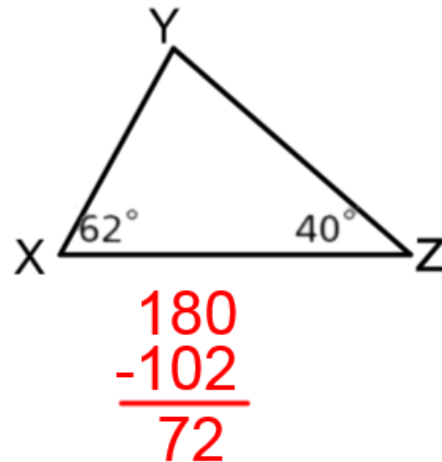
Example 1

a) Find $m\angle XYZ$.

$$\angle X + \angle Z + \angle Y = 180$$

$$62 + 40 + \angle Y = 180$$

$$102 + \angle Y = 180$$



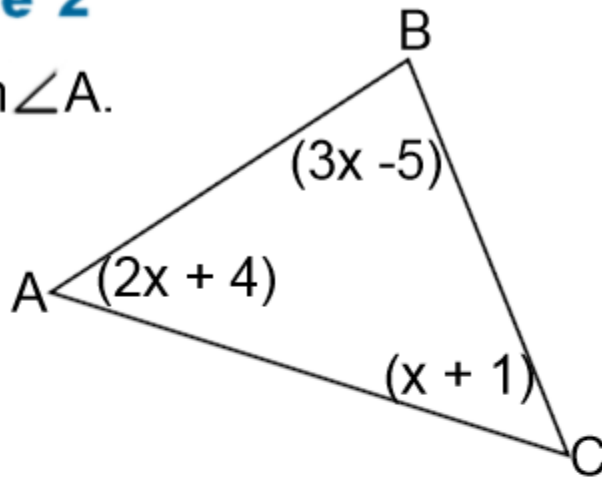
b) In a triangle, find the measure of one angle if two angles measures are 48° and 71° .

$$180 - 48 - 71 = 61$$

Subtract both angles from 180.

Example 2

Find $m\angle A$.



$$\frac{(2x + 4)}{\angle A} + \frac{(3x - 5)}{\angle B} + \frac{(x + 1)}{\angle C} = 180$$

Add like terms - $2x + 3x + 1x + 4 - 5 + 1 = 180$

$$6x + 0 = \frac{180}{6}$$

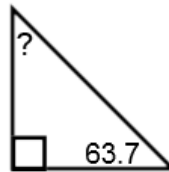
$$x = 30$$

Plug x back in $m\angle A = 2(30) + 4 = 64$

Example 3

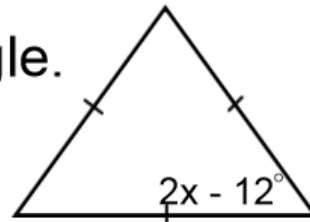
- a) The measure of one of the acute angles in a right triangle is 63.7° . What is the measure of the other acute angle?

$$90 - 63.7 = 26.3$$

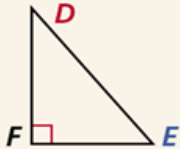
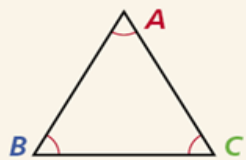


- b) Find x , given the following triangle.

$$\begin{array}{r} 2x - 12 = 60 \\ + 12 \\ \hline 2x = 72 \\ \div 2 \\ \hline x = 36 \end{array}$$



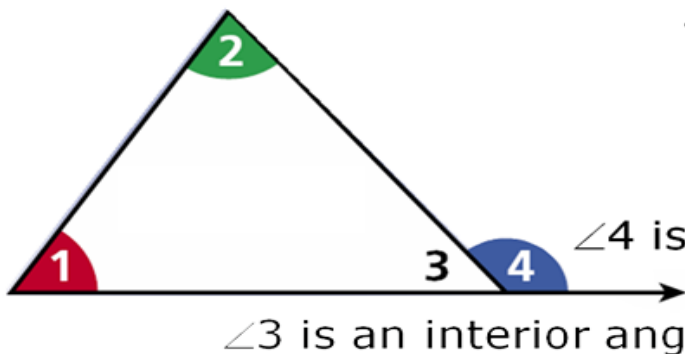
Corollaries

COROLLARY	HYPOTHESIS	CONCLUSION
4.1 The acute angles of a right triangle are complementary.		$\angle D$ and $\angle E$ are complementary. $m\angle D + m\angle E = 90^\circ$
4.2 The measure of each angle of an equiangular triangle is 60° .		$m\angle A = m\angle B = m\angle C = 60^\circ$

Exterior Angles Theorem

An **exterior angle** is formed by one side of the triangle and extension of an adjacent side.

Each exterior angle has two remote interior angles. A **remote interior angle** is an interior angle that is not adjacent to the exterior angle.



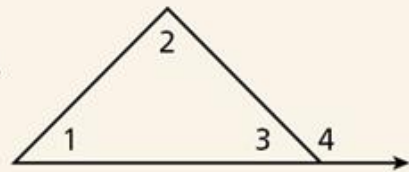
The remote interior angles of $\angle 4$ are $\angle 1$ and $\angle 2$.

$\angle 4$ is an exterior angle.

Theorem 4-2-4 Exterior Angle Theorem

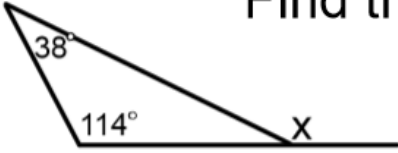
The measure of an exterior angle of a triangle is equal to the sum of the measures of its remote interior angles.

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



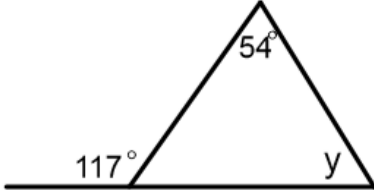
Example 4

a) Find the measures of x and y .



$38 + 114 = x$
Ext. $< < 152$

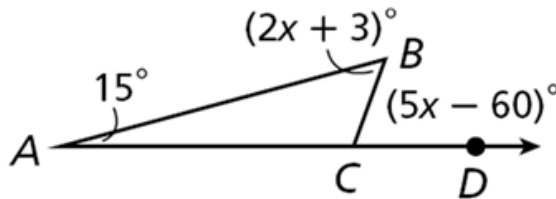
b)



$54 + y = 117$
 $\frac{-54}{63}$

Example 5: Applying the Exterior Angle Theorem

Find $m\angle B$.



$$\begin{aligned} \text{Ext } < &= \angle A + \angle B \\ 5x - 60 &= 15 + 2x + 3 \\ x &= 26 \\ \angle B &= 2(26) + 3 = 55 \end{aligned}$$