

## Exterior and Remote Interior Angles of a Triangle

The **interior** is the set of all points inside the figure. The **exterior** is the set of all points outside the figure. An **interior angle** is formed by two sides of a triangle. An **exterior angle** is formed by one side of the triangle and the 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.



$\angle 4$  is an exterior angle.

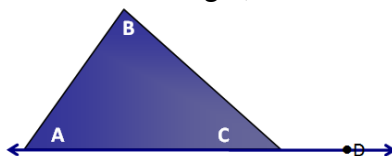
Its remote interior angles are

$\angle 1$  and  $\angle 2$ .

### Activity

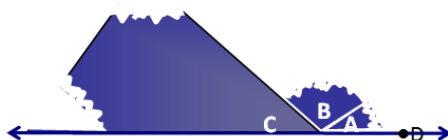
#### STEP 1 Draw exterior angle.

Draw and cut several different triangles. Place each triangle on a piece of paper and extend one side to form an *exterior angle*, as shown on a diagram.



#### STEP 2 Tear off corners.

For each triangle, tear off the corners that are not next to the *exterior angle*. Use them to fill the exterior angle as shown.

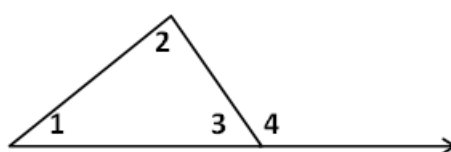


#### STEP 3 Make conjecture.

Make a conjecture about the sum of the measures of the interior angles of a triangle.

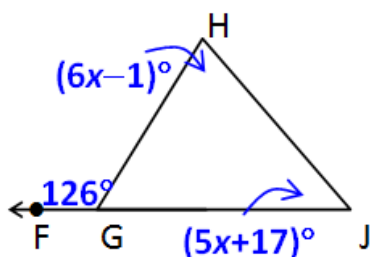
### Theorem 1:

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 1: Find  $m\angle J$ .



$$m\angle J + m\angle H = m\angle FGH$$

Ext.  $\angle$  Thm.

$$5x + 17 + 6x - 1 = 126$$

Substitute  $5x + 17$  for  $m\angle J$ ,  $6x - 1$  for  $m\angle H$ , and 126 for  $m\angle FGH$

$$11x + 16 = 126$$

Simplify.

$$11x = 110$$

Subtract 16 from both sides.

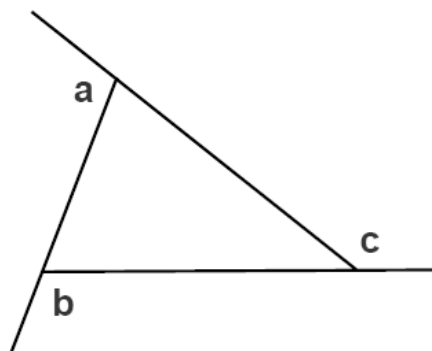
$$x = 10$$

Divide both sides by 11.

$$m\angle J = 5x + 17 = 5(10) + 17 = 67^\circ$$

### Theorem 2: Exterior Angle Sum Theorem

The sum of the exterior angles of any triangle is  $360^\circ$



$$m\angle a + m\angle b + m\angle c = 360^\circ$$