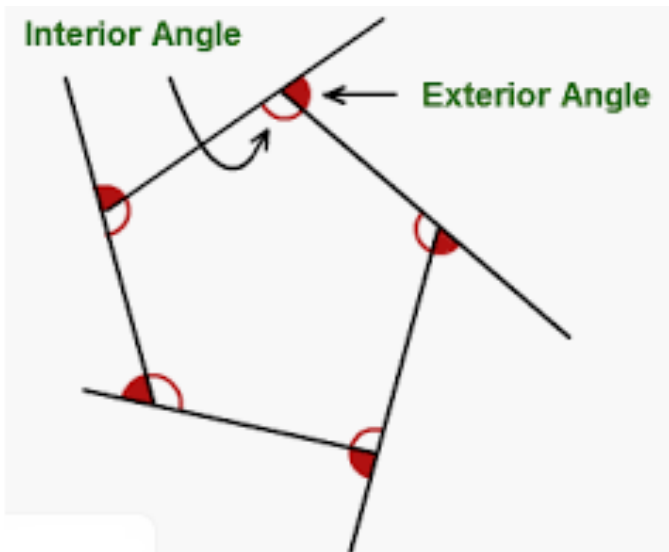


## Polygon Angle Sum Review

### Interior and Exterior Angles of Polygons



Polygon Angle Sum Theorem:

Sum of interior angles =  $(n - 2)180^\circ$  where  $n$  is representing the number of sides in that polygon.

Sum of the **exterior** angles of a polygon



**The exterior angles always add to  $360^\circ$ !**

(It doesn't matter how many sides there are)

Sum of exterior angles =  $360^\circ$

Always.

## Finding Interior Angle Measures and Sums in Polygons

- A** Find the sum of the interior angle measures of a convex octagon.

$$(n - 2)180^\circ \quad \text{Polygon } \angle \text{ Sum Thm.}$$

$$(8 - 2)180^\circ \quad \text{An octagon has 8 sides, so substitute 8 for } n.$$

$$1080^\circ \quad \text{Simplify.}$$

- B** Find the measure of each interior angle of a regular nonagon.

**Step 1** Find the sum of the interior angle measures.

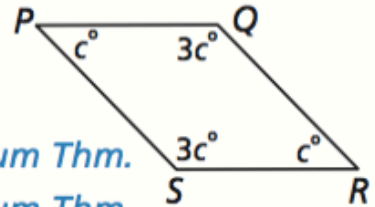
$$(n - 2)180^\circ \quad \text{Polygon } \angle \text{ Sum Thm.}$$

$$(9 - 2)180^\circ = 1260^\circ \quad \text{Substitute 9 for } n \text{ and simplify.}$$

**Step 2** Find the measure of one interior angle.

$$\frac{1260^\circ}{9} = 140^\circ \quad \text{The int. } \angle \text{ are } \cong, \text{ so divide by 9.}$$

- C** Find the measure of each interior angle of quadrilateral  $PQRS$ .



$$(4 - 2)180^\circ = 360^\circ \quad \text{Polygon } \angle \text{ Sum Thm.}$$

$$m\angle P + m\angle Q + m\angle R + m\angle S = 360^\circ \quad \text{Polygon } \angle \text{ Sum Thm.}$$

$$c + 3c + c + 3c = 360 \quad \text{Substitute.}$$

$$8c = 360 \quad \text{Combine like terms.}$$

$$c = 45 \quad \text{Divide both sides by 8.}$$

$$m\angle P = m\angle R = 45^\circ$$

$$m\angle Q = m\angle S = 3(45^\circ) = 135^\circ$$

## Finding Exterior Angle Measures in Polygons

- A** Find the measure of each exterior angle of a regular hexagon.

A hexagon has 6 sides and 6 vertices.

$$\text{sum of ext. } \angle = 360^\circ$$

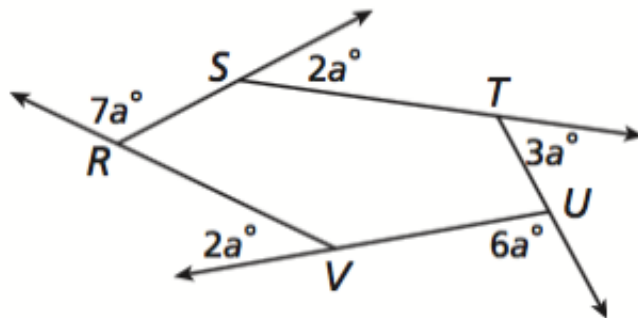
*Polygon Ext.  $\angle$  Sum Thm.*

$$\text{measure of one ext. } \angle = \frac{360^\circ}{6} = 60^\circ$$

*A regular hexagon has 6  $\cong$  ext.  $\angle$ , so divide the sum by 6.*

The measure of each exterior angle of a regular hexagon is  $60^\circ$ .

**B** Find the value of  $a$  in polygon  $RSTUV$ .



$$7a^\circ + 2a^\circ + 3a^\circ + 6a^\circ + 2a^\circ = 360^\circ$$

$$20a = 360$$

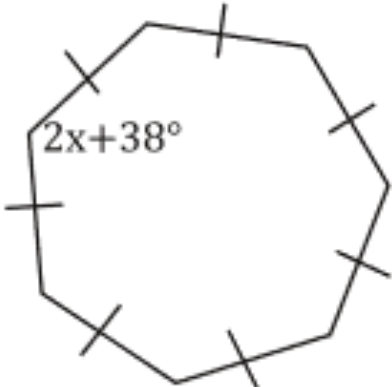
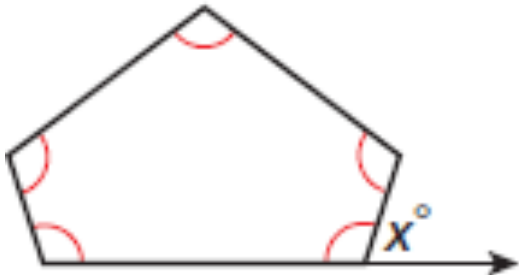
$$a = 18$$

*Polygon Ext.  $\angle$  Sum Thm.*

*Combine like terms.*

*Divide both sides by 20.*

OPTIONAL PRACTICE BELOW. (ANSWERS AT THE END)

<p>1. Find the sum of the interior angle measures of a convex dodecagon.</p> <p>Find the measure of each angle if it is a regular dodecagon.</p>	<p>2. Find the measure of each interior angle of a regular nonagon.</p>
<p>3. Find the measure of each exterior angle of a regular octagon.</p>	<p>4. Find the measure of each exterior angle of a regular 16-gon.</p>
<p>5. Find the value of <math>x</math>.</p> 	<p>6. Find the value of <math>x</math>.</p> 

Answers

1. Find the sum of the interior angle measures of a convex dodecagon.

3600°

Find the measure of each angle if it is a regular dodecagon.

300°

2. Find the measure of each interior angle of a regular nonagon.

140°

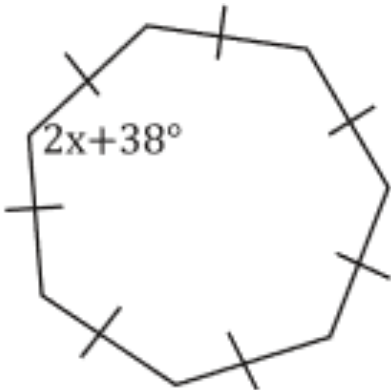
3. Find the measure of each exterior angle of a regular octagon.

45°

4. Find the measure of each exterior angle of a regular 16-gon.

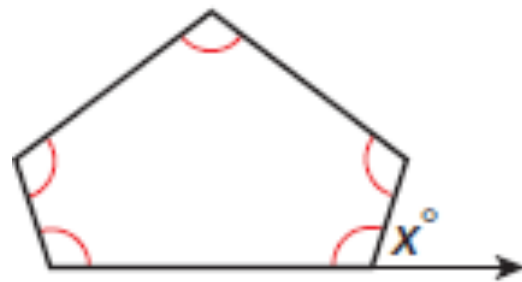
22.5°

5. Find the value of x.



45.3

6. Find the value of x.



72°