

The measure of an interior angle of a regular polygon is 150. Find the number of sides in the polygon.

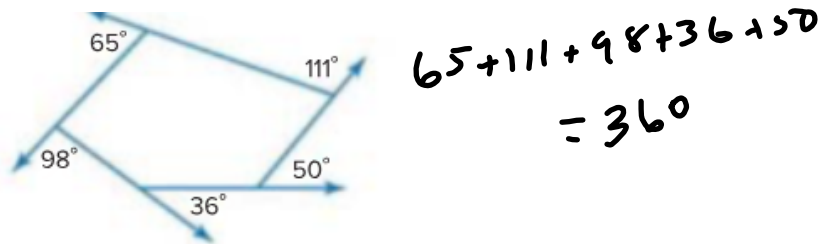
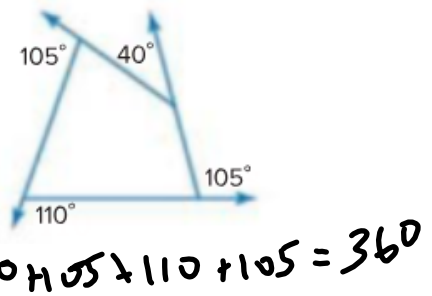
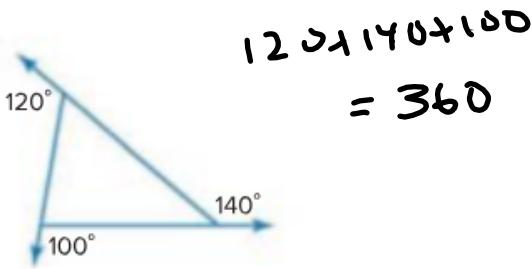
The measure of an interior angle of a regular polygon is 144. Find the number of sides in the polygon.

$$\begin{aligned}144n &= (n-2) \cdot 180 \\144n &= 180n - 360 \\360 &= 36n \\n &= 10\end{aligned}$$

Review Vocabulary

exterior angle an angle formed by one side of a polygon and the extension of another side

2 Polygon Exterior Angles Sum Does a relationship exist between the number of sides of a convex polygon and the sum of its exterior angle measures? Examine the polygons below in which an exterior angle has been measured at each vertex.

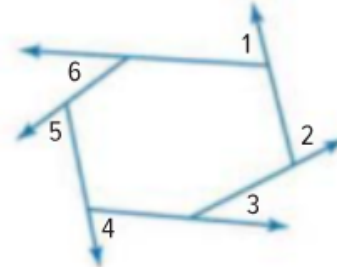


Theorem 6.2 Polygon Exterior Angles Sum

The sum of the exterior angle measures of a convex polygon, one angle at each vertex, is 360.

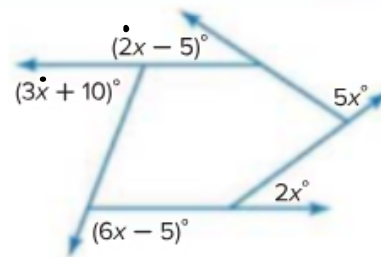
Example

$$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 + m\angle 5 + m\angle 6 = 360$$



- a. **ALGEBRA** Find the value of x in the diagram.

Use the Polygon Exterior Angles Sum Theorem to write an equation. Then solve for x .



$$18x = 360$$

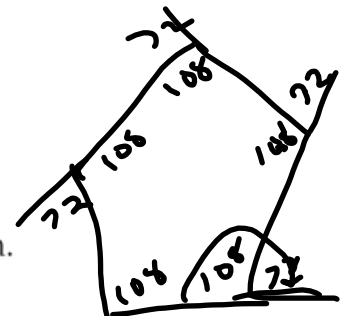
$$x = 20$$

- b. Find the measure of each exterior angle of a regular nonagon.

$$(9-2) \cdot 180 = 1260$$

$$\frac{1260}{9} = 140 \text{ interior}$$

$$+ 40 \text{ exterior}$$



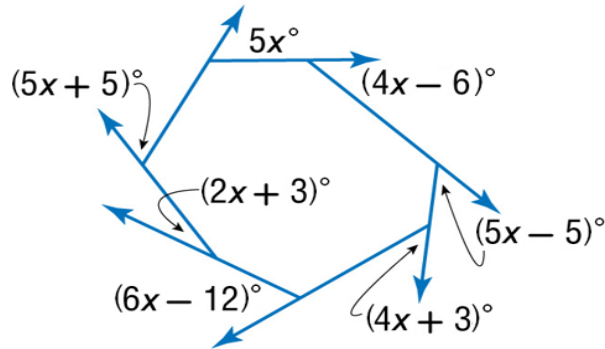
Sum of exterior is 360

$$\frac{360}{9} = 40$$

$$180$$

$$140$$

A. Find the value of x in the diagram.



$$\begin{aligned} 31x - 12 &= 360 \\ 31x &= 372 \\ x &= 12 \end{aligned}$$

B. Find the measure of each exterior angle of a regular decagon.

$$\frac{360}{10} = 36^\circ$$

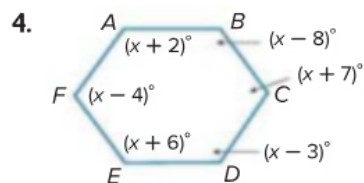
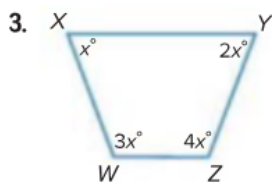
C. Find the measure of each exterior angle of a regular pentagon.


$$\text{sum } \frac{360}{5} = 72^\circ$$

Example 1 Find the sum of the measures of the interior angles of each convex polygon.

1. decagon
2. pentagon

Find the measure of each interior angle.



Example 2  **5 AMUSEMENT** The Wonder Wheel at Coney Island in Brooklyn, New York, is a regular polygon with 16 sides. What is the measure of each interior angle of the polygon?



Example 3 The measure of an interior angle of a regular polygon is given. Find the number of sides in the polygon.

6. 150
7. 170