

# The Polygon Angle Sum Theorem

UNIT 6 LESSON 1

# The Polygon Angle – Sum Theorems

- Theorem – Polygon Angle-Sum Theorem
  - The sum of the measures of the interior angles of an  $n$ -gon is  $(n - 2) * 180$ .

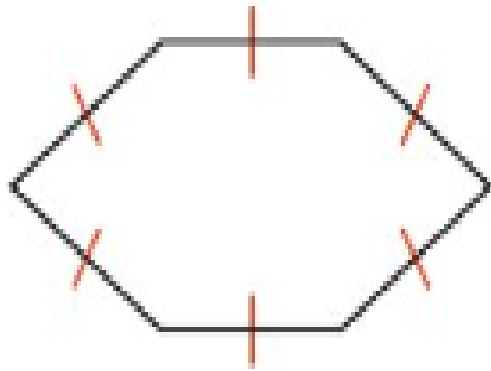
# Finding a Polygon Angle Sum

- What is the sum of the interior angle measures of a heptagon?

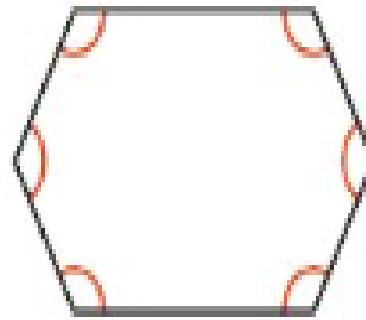
$$\begin{aligned}\text{Sum} &= (n - 2) * 180 \\ &= (7 - 2) * 180 \\ &= 5 * 180 \\ &= 900^\circ\end{aligned}$$

The sum of the interior angle measures of a heptagon is  $900^\circ$ .

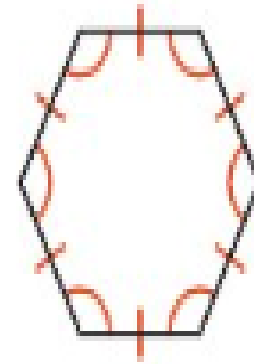
- An **equilateral polygon** is a polygon with all sides congruent.
- An **equiangular polygon** is a polygon with all angles congruent.
- A **regular polygon** is a polygon that is both equilateral and equiangular.



**Equilateral Polygon**



**Equiangular Polygon**



**Regular Polygon**

## Corollary to the Polygon Angle-Sum Theorem

- The measure of each interior angle of a regular  $n$ -gon is

$$\frac{(n - 2) \cdot 180}{n}.$$

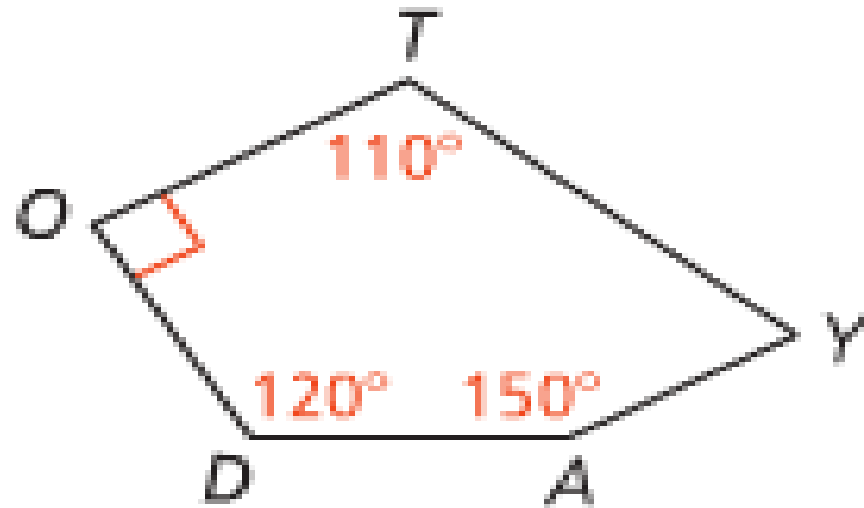
# Using the Polygon Angle-Sum Theorem

- The common housefly, *Musca domestica*, has eyes that consist of approximately 4000 facets. Each facet is a regular hexagon. What is the measure of each interior angle in one hexagonal facet?

$$\begin{aligned} &= \frac{(n-2) \cdot 180}{n} &= \frac{4 \cdot 180}{6} \\ &= \frac{(6-2) \cdot 180}{6} &= 120^\circ \end{aligned}$$

# Using the Polygon-Angle Theorem

- What is the measure of angle Y in pentagon TODAY?



Using the Polygon-Angle Theorem

$$m\angle T + m\angle O + m\angle D + m\angle A + m\angle Y = (5 - 2) \cdot 180$$

$$110 + 90 + 120 + 150 + m\angle Y = 3 \cdot 180$$

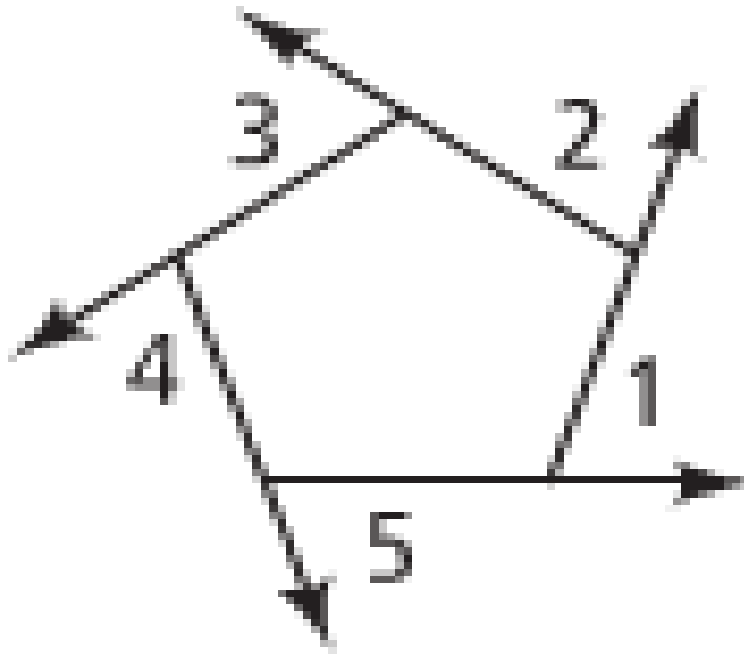
$$470 + m\angle Y = 540$$

$$m\angle Y = 70^\circ$$



# Polygon Exterior Angle-Sum Theorem

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



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

# Finding an Exterior Angle Measure

- What is the measure of angle 1 in the regular octagon?

$$m\angle 1 = \frac{360}{8}$$

$$m\angle 1 = 45^\circ$$

