

Key

## Regular Polygons

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## Vocabulary

- Equilateral Polygon: all sides congruent
- Equiangular Polygon: all angles are congruent (both interior and exterior)
- Regular Polygon: both equilateral and equiangular



## Finding Angle Measures of Regular Polygons

- One Interior Angle Measure  
 $\frac{\text{Int. Angle Sum}}{\# \text{ of sides}} \text{ or } \frac{(n-2) \cdot 180^\circ}{n}$

- One Exterior Angle Measure  
 $\frac{360^\circ}{\# \text{ of sides}} \text{ or } \frac{360^\circ}{n}$

\*An interior and an exterior angle are supplementary.

## Example 1

- Find the measure of each interior angle and each exterior angle of a regular 15-sided polygon.

$$\frac{(15-2) \cdot 180}{15} = \frac{2340}{15} = \boxed{156^\circ} \text{ Int.}$$

$$\frac{360}{15} = \boxed{24^\circ} \text{ Ext.}$$

$$180 - 156$$

## Example 2

- Find the number of sides if a regular polygon has an interior angle of  $144^\circ$ .

$$\frac{(n-2) \cdot 180}{180} = \frac{1440}{180}$$

$$n-2=8$$

$$+2 \quad +2$$

$$\boxed{n=10}$$

## Example 3

- Find the number of sides if a regular polygon has an interior angle of  $162^\circ$ .

$$\frac{(n-2) \cdot 180}{n} = 162 + n$$

$$\frac{(n-2) \cdot 180}{n} = 162n$$

$$180n - 360 = 162n$$

$$-180n \quad -180n$$

$$\frac{-360}{-18} = \frac{-18n}{-18}$$

$$\boxed{n=20}$$

$$\frac{\text{Ext. Angle}}{180 - 162} = 18$$

$$\frac{360}{n} = 18 \cdot n$$

$$\frac{360}{18} = \frac{18n}{18}$$

$$\boxed{n=20}$$