

## Polygon formula #1:

Yesterday's exploration resulted in the following formula:

The Interior Angle Sum for any convex polygon:

$$IAS = (n - 2)180^\circ$$

$n =$ # of sides

## Polygon formula #2:

The exterior angle sum (*EAS*) for any Convex polygon is 360°, regardless of how many sides it has!

$$EAS = 360^\circ$$

# Polygon formula #3:

*(regular polygons only)*

***Recall: each interior angle of a regular polygon has the same measure.***

Each interior angle (*EIA*) for regular polygons can be found by dividing the interior angle sum by the number of angles in the polygon. *(The number of angles is the same as the number of sides.)*

$$EIA = \frac{180^\circ(n - 2)}{n}$$

***n = # of sides***

## Polygon formula #4: *(regular polygons only)*

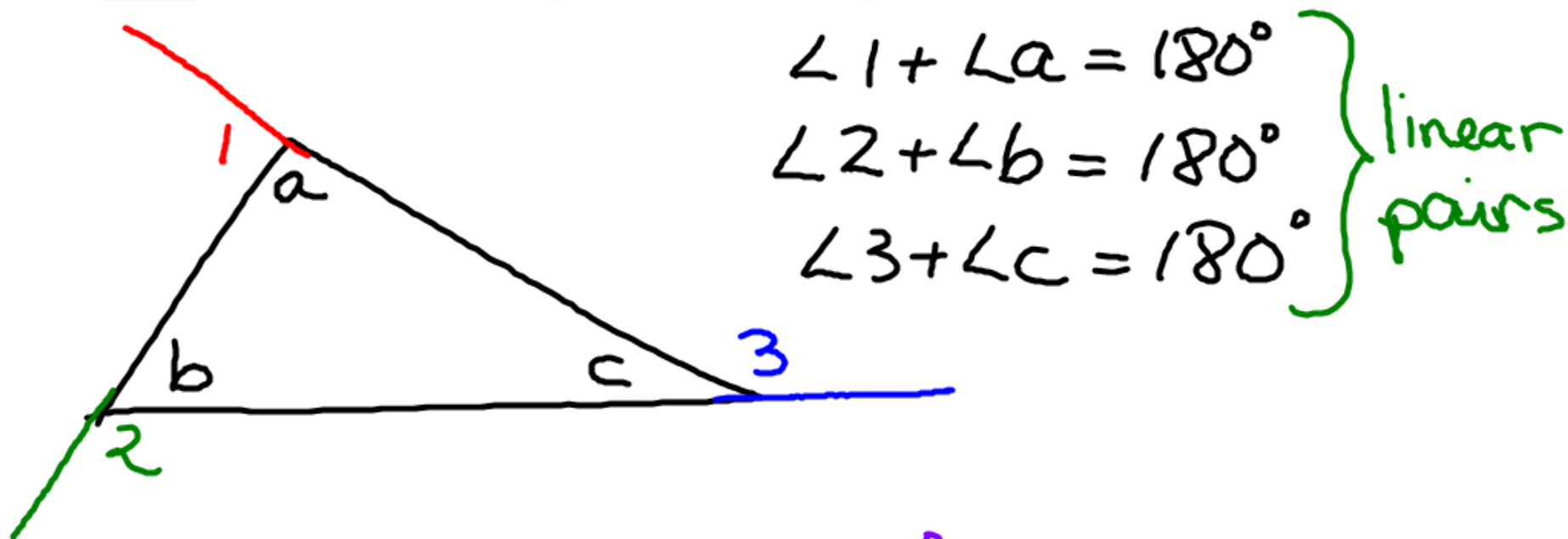
Each exterior angle (*EEA*) for regular polygons can be found by dividing the exterior angle sum (always  $360^\circ$ ) by the number of angles in the polygon.  
*(The number of angles is the same as the number of sides.)*

$$EEA = \frac{360^\circ}{n}$$

*n* = # of sides

## Example #1:

Show that the exterior angle sum for a triangle is  $360^\circ$ .



Show  $\angle 1 + \angle 2 + \angle 3 = 360^\circ$

$$\angle 1 + \angle a + \angle 2 + \angle b + \angle 3 + \angle c = 180^\circ + 180^\circ + 180^\circ$$

$$\angle 1 + \angle 2 + \angle 3 + \underline{\angle a + \angle b + \angle c} = 540^\circ$$

$$\angle 1 + \angle 2 + \angle 3 + 180^\circ - 180^\circ = 540^\circ - 180^\circ$$

## Example #2:

Determine the measure of each interior angle of a regular heptagon.

$$EIA = \frac{(n-2)180^\circ}{n}$$

$$\underline{n=7}$$

$$EIA = \frac{(7-2)(180^\circ)}{7}$$

$$= \frac{5(180^\circ)}{7} = \frac{900^\circ}{7} = 128.\overline{571428}^\circ$$

$$\approx 128.6^\circ$$

## You Try:

Determine the measure of each interior angle of a regular dodecagon.

$$\underline{150^\circ}$$

## Example #3:

Determine the measure of each exterior angle of a regular 15-gon.

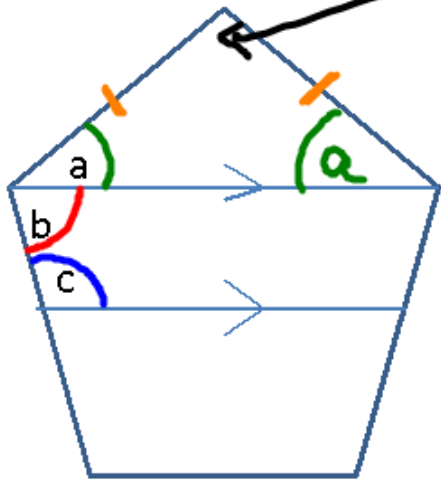
$$EEA = \frac{360^\circ}{n}$$

$$EEA = \frac{360^\circ}{15} = 24^\circ$$



## Example #4:

Determine the measures of angles a, b and c in this regular pentagon:



$$EIA = \frac{(5-2)(180^\circ)}{5}$$

$$EIA = 108^\circ$$

$$\angle a = \frac{180^\circ - 108^\circ}{2} = 36^\circ$$

$$\angle a + \angle b = 108^\circ$$

$$36^\circ + \angle b = 108^\circ$$

$$\angle b = 72^\circ$$

$$\angle b + \angle c = 180^\circ \text{ (same-side int. } \angle\text{s)}$$

$$72^\circ + \angle c = 180^\circ$$

$$\angle c = 108^\circ$$

# **ASSIGNMENT:**

**Text: pg. 99-102,  
#1, 7, 8, 10, 11, 14, 15, 16, 17**

**Handout: #1-20, 31**