Angle measures in Polygons

Review – *Do you remember?* *(HINT Look on p 322)*

# Sides	Polygon Name		# Sides	Polygon Name
3	triangle		8	octagon
4	quadrilateral		9	nonagon
5	pentagon		10	decagon
6	hexagon		12	dodecagon
7	heptagon		"n"	n-gon

Regular Polygon: A ___convex___ polygon with all ___angles___ and ___sides___ congruent.

Interior Angle Sum Theorem (Discovery)

Choose ONE vertex in each polygon. Draw all the diagonals from that ONE vertex *(connect it to all the other vertices)*. Complete the table below. Find a rule to calculate the sum of the interior angles for ANY convex polygon
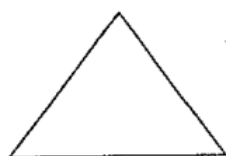
Polygon	# of sides	How many triangles were formed by the diagonals?	Calculate the measure of interior angles (Use the triangles!)
Triangle	3	1	$1 \cdot 180° = 180$
Quadrilateral	4	2	$2 \cdot 180 = 360$
Pentagon	5	3	$3 \cdot 180 = 540°$
Hexagon	6	4	$4 \cdot 180 = 720°$
Do you see a pattern? What about an n-gon?	n	$n-2$	$180(n-2)$

INTERIOR Angle Formulas

SUM of the $\angle$'s = $180(n-2)$ SINGLE $\angle$ = $\dfrac{180(n-2)}{n}$

*regular

Ex 1 Find the sum of the measures of a convex 13-gon.

$$180(13-2)$$
$$1980$$

Ex 2 Find the measure of an interior angle of a regular octagon.

$$\frac{180(8-2)}{8}$$
$$135°$$

Ex 3 If the sum of the interior angles of a regular polygon is 2700°, find the number of sides in the polygon.

$$180(n-2) = 2700$$
$$n-2 = 15$$
$$n = 17$$

Ex 4 If the measure of an interior angle of a regular polygon is 157.5°, find the number of sides in the polygon.
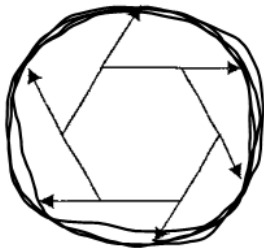
$$\frac{180(n-2)}{n} = 157.5n$$
$$180(n-2) = 157.5n$$
$$180n - 360 = 157.5n$$
$$-360 = -22.5n$$
$$n = 16$$

EXTERIOR Angle Formulas

Recall what an exterior angle looks like:

Sum of the $\angle$'s = $360°$

SINGLE $\angle$ = $\dfrac{360}{n}$

*regular

Ex 5 Find the measure of an exterior angle of a regular dodecagon.

$$\frac{360}{12} = 30°$$