Honors Geometry
Notes - Section 6.1
Properties and Attributes of Polygons

Name KEY
Date _____ Period _____

I. Vocabulary - Parts of a Polygon

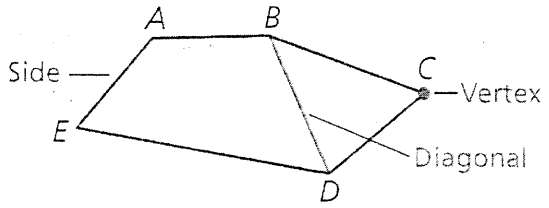
Polygon: a closed plane figure formed by 3+ segments that intersect only at their endpoints

Side of the polygon: each segment that forms a polygon $\overline{AE}$, $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, $\overline{DE}$

Vertex of the polygon: the common endpoint of two sides A, B, C, D, E

Diagonal: a segment that connects any two nonconsecutive vertices $\overline{BD}$ $\overline{CE}$, $\overline{AD}$, etc.

Example:



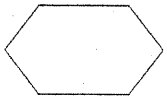
II. Identifying Polygons

You can name a polygon by the number of its sides.

Number of Sides	Polygon Name
1	—
2	—
3	TRIANGLE
4	QUADRILATERAL
5	PENTAGON
6	HEXAGON
7	HEPTAGON
8	OCTAGON
9	NONAGON
10	DECAGON
11	(no name) 11-gon
12	DODECAGON
n	N-GON

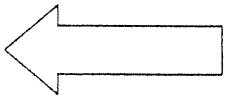
Example #1: Tell whether each figure is a polygon. If it is a polygon, name it by the number of sides.

A.



Polygon
HEXAGON

B.



Polygon
HEPTAGON

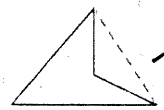
C.

not a polygon

III. Classifying Polygons

Regular Polygon: A polygon that is equilateral & equiangular
(If a polygon is not regular, then it is irregular.) └ all sides ≅ └ all angles ≅

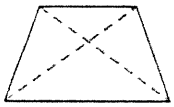
Concave: any part of a diagonal contains points in the exterior of the polygon.



Concave quadrilateral

— diagonal is OUTSIDE the polygon!

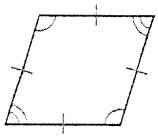
Convex: No diagonal contains points in the exterior. (A regular polygon is always convex.)



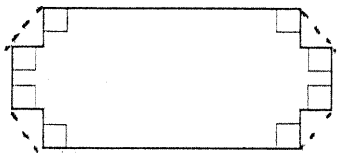
Convex quadrilateral

— diagonals are BOTH INSIDE the polygon!

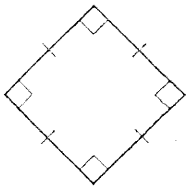
Example #2: Tell whether each polygon is regular or irregular. Tell whether it is concave or convex.



irregular convex



irregular concave



regular convex

IV. Finding Interior Angle Measures and Sums in Polygons

Polygon	# of Sides	# of Triangles	Sum of Interior Angle Measures
Triangle	3	1	(1)180° = 180°
Quadrilateral	4	2	(2)180° = 360°
Pentagon	5	3	(3)180° = 540°
Hexagon	6	4	(4)180° = 720°
.			
.			
.			
n-gon	n	n-2	→ 180(n-2)

V. Polygon Angle Sum Theorem

> The sum of the interior angle measures of a convex polygon with n sides is $(n - 2)180^\circ$.

Example #3:

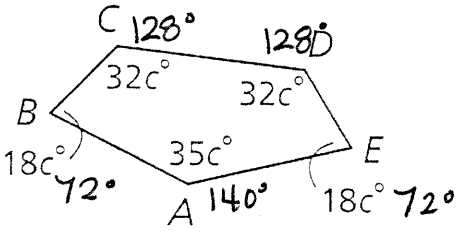
A. Find the sum of the interior angle measures of a convex heptagon. – 7 SIDES!

$$S = 180(7-2) = 180(5) = 900^\circ$$

B. Find the measure of each interior angle of a regular decagon. – 10 SIDES

$$S = 180(10-2) = 180(8) = 1440^\circ \quad \text{all angles} \cong \frac{1440}{10} = 144^\circ \text{ each}$$

C. Find the measure of each interior angle of pentagon ABCDE.



$$S = 180(5-2) = 180(3) = 540$$

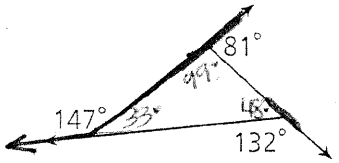
$$32c + 32c + 18c + 35c + 18c = 540$$

$$\frac{135c}{135} = \frac{540}{135}$$

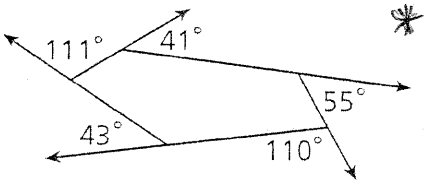
$$c = 4$$

I. Polygon Exterior Angle Sum Theorem

Exterior angle: formed by one side of a polygon and the extension of a consecutive side.



$147^\circ + 81^\circ + 132^\circ = 360^\circ$



$43^\circ + 111^\circ + 41^\circ + 55^\circ + 110^\circ = 360^\circ$

* What do you notice about the measure of one int ∠ and one ext ∠?
→ supplementary angles!

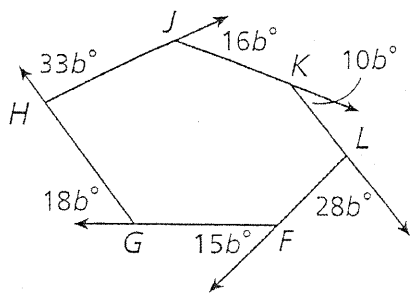
> The sum of the exterior angle measures, one angle at each vertex, of a convex polygon is 360°.

Example #4:

A. Find the measure of each exterior angle of a regular dodecagon. – 12 SIDES

$$\frac{360^\circ}{12} = 30^\circ$$

Find the value of b in polygon FGHIKL.



$$33b + 16b + 10b + 28b + 15b + 18b = 360^\circ$$

$$\frac{120b}{120} = \frac{360}{120} \quad b = 3$$