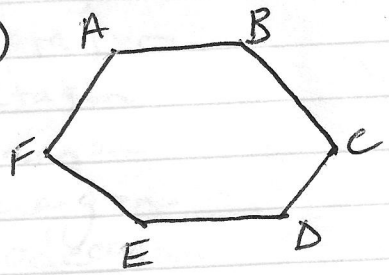
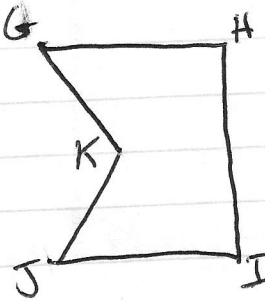
3-5 Polygon Angle Sums

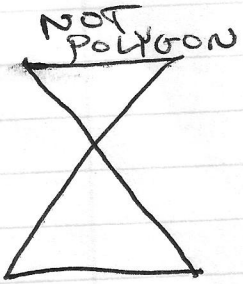
Polygon – closed figure formed by coplanar segments.

- sides w/ common endpoint are non-collinear
- each intersects 2 other sides at their endpoints.

Ex)



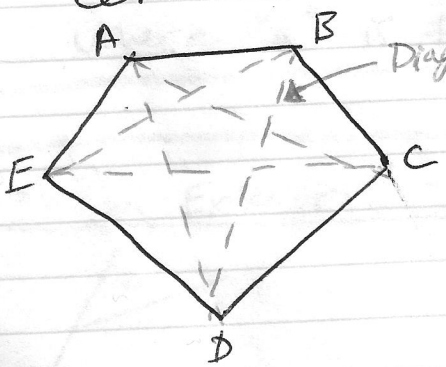




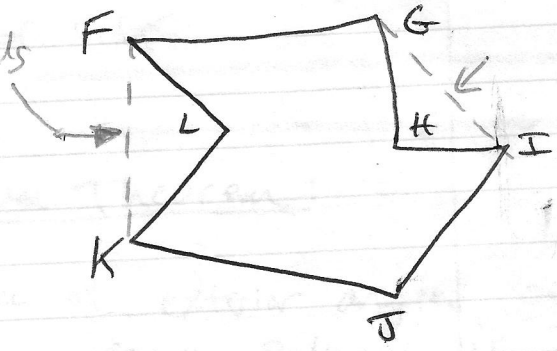
Naming: start at any vertex, listing consecutive vertices, clockwise or counterclockwise.

Ex) ABCDEF

Convex vs. Concave Polygons



- No lines containing a side extend into the interior.
- No diagonals have points outside.



- at least one diagonal w/ points outside polygon.

(AB ⊥ BC)

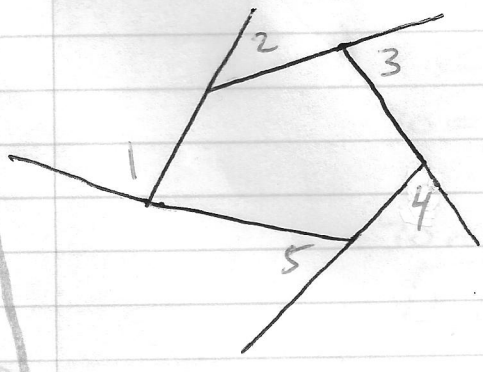
Names of Polygons by # of Sides:

3 - triangle
4 - quadrilateral
5 - pentagon
6 - hexagon
7 - heptagon
8 - octagon
9 - nonagon
10 - decagon
12 - dodecagon
n - n-gon
ex) 32 sides → 32-gon

Polygon Interior Angle Sum Theorem:

Sum of interior angle measures is $(n-2)180$, where "n" is # of sides.

Polygon Exterior ∠ - Sum Theorem:



Sum of exterior angles of any convex polygon is 360°

(AB ⊥ DC)

Each ext. $\angle = \frac{360}{n}$	Each Int. $\angle = \frac{(n-2)180}{n}$

Regular Polygon : all sides and $\angle$s $\cong$.

Ex) Find each exterior $\angle$ of a regular dodecagon.

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

Ex) Each Interior $\angle$ of a regular polygon is 157.5°. How many sides does it have?

$$\frac{(n-2)180}{n} = 157.5(n)$$

$$180(n-2) = 157.5n$$

$$180n - 360 = 157.5n$$

$$22.5n = 360$$

$$\boxed{n = 16}$$

Ex) The measure of an exterior angle of a regular polygon is given. How many sides does it have?

A) 30

$$30 = \frac{360}{n}$$

$$30n = 360$$

$$\boxed{n = 12}$$

B) 8

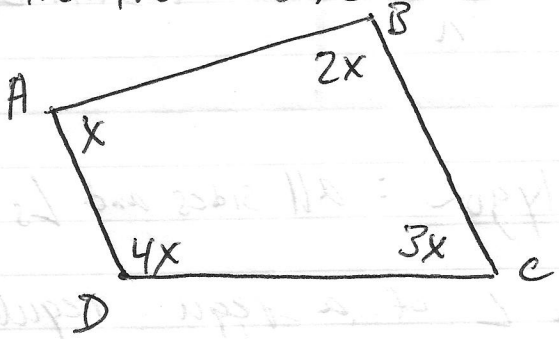
$$\frac{360}{n} = 8$$

$$8n = 360$$

$$\boxed{n = 45}$$

(AB ⊥ BC)

Ex) Find the measure of each interior $\angle$.



$$x + 2x + 3x + 4x = (4-2)180$$

$$10x = 360$$

$$x = 36$$

$m\angle A = 36°$, $m\angle B = 72°$ $m\angle C = 108°$,

$m\angle D = 144°$