Convex Polygons
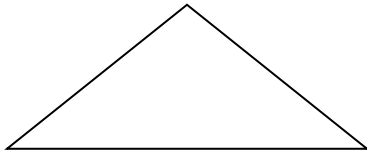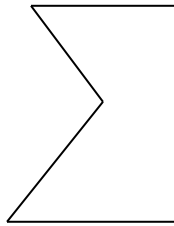
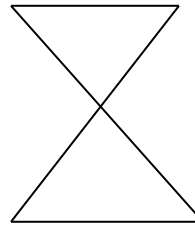**Definition:** A polygon is closed plane figure whose sides are line segments that intersect only endpoints.

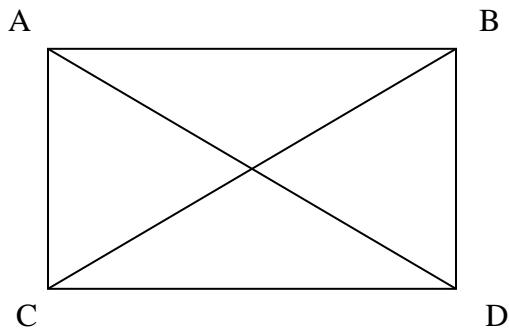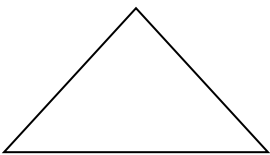Convex   Concave   Not a Polygon

Special names for polygons with fixed numbers of sides *[fill in the polygon column with the names]*

Number of sides	Polygon
3	
4	
5	pentagon
6	
7	
8	
9	
10	
21	

Diagonal is a line segment that join _____ vertices.

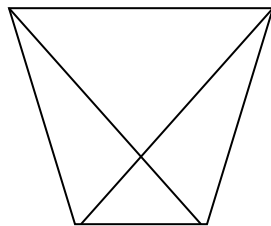A   B

C   D
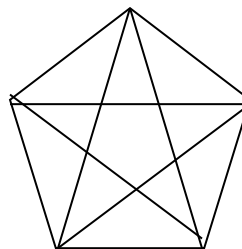
Page 100: Number of diagonals

0 diagonals
triangle

2 diagonals
quadrilateral

5 diagonals
pentagon

Theorem 2.5.1: The total number of diagonals D in a polygon of n sides is given by the formula $D = \dfrac{n(n-3)}{2}$

Example 1: Given the number of sides of a polygon find the number of diagonals.

    a. Triangle

    b. 11 sided polygon

Theorem 2.5.2: The sum S of the measures of the interior angles of a polygon with n sides is given by $S = (n-2) \bullet 180°$. Note that n >2 for any polygon.

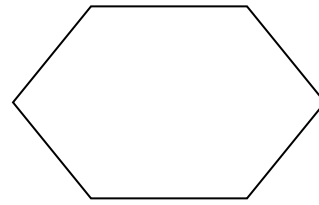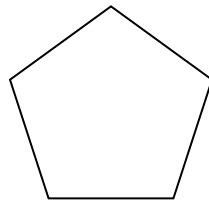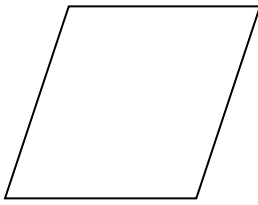**Example 2:** Find the sum of the interior angles of the given polygon.

    a. Triangle

    b. 11 sided polygon.

Example 3: Find the number sides a polygon has given the sum of the interior angles.

S = 1980

Regular Polygons

Definition: A regular polygon is a polygon that is both equilateral and equiangular.

Corollary 2.4.3: the measure I of each interior angle of a regular polygon or equiangular polygon of n sides
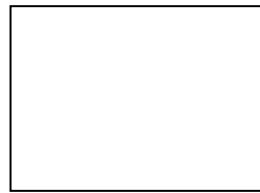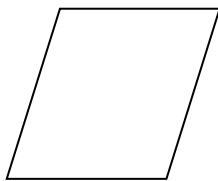
$$I = \frac{(n-2) \bullet 180°}{n}$$

Example 4: Find the measure of each of the interior angle of a regular hexagon.
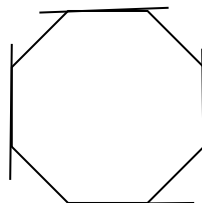
Example 5: Each interior angle of a regular polygon is $150°$. Find the number of sides.

Corollary 2.5.4: The sum of the four interior angles of a quadrilateral is $360°$.

$$S = (n-2) \bullet 180° \text{ or } S = (4-2) \bullet 180° = 360°$$

Corollary 2.5.5: The sum of the measured of the exterior angles of a polygon is $360°$.

Corollary 2.5.6: The measure E of each exterior angle of a regular polygon of n sides is
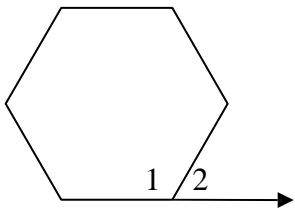
$$E = \frac{360°}{n}$$

Example 6: Find the number of sides in a regular polygon whose exterior angles each measure $22.5°$.

Example 7: Find the measure of each interior angle of a stop sign.

Example 8: Find the number of sides that a regular polygon has if the measure of each interior angle is $144°$.

Observation: An interior of a polygon angle and an adjacent exterior angle are supplementary.

Example 9: If an interior angle of a regular polygon measures $165°$, find
  a)   the measure of an exterior angle

  b)   the number of sides

TRY THESE: p 101 #'s 14, 28, 29