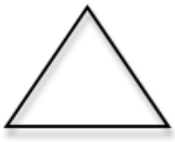
Name: _____ Date: _____

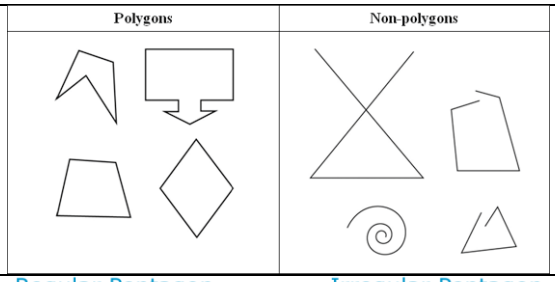
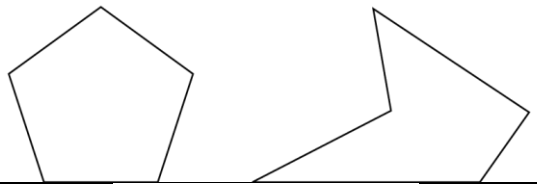
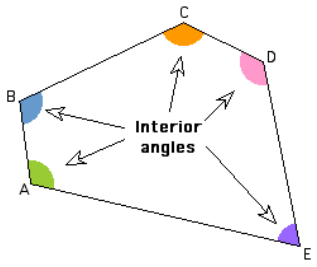
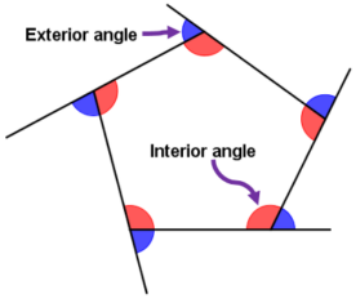
UNIT 4 **LESSON 1**

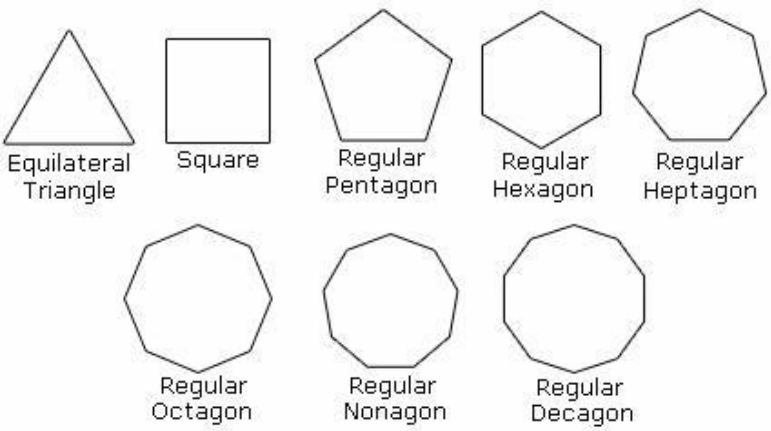
AIM: HOW DO WE DETERMINE THE MEASURE OF INTERIOR AND EXTERIOR ANGLES OF A POLYGON?

Do Now: **RECALL!** Use the table below to find the angles of rotation for the following figures.

	Equilateral Triangle	Square	Regular Pentagon	Regular Hexagon
				
# of sides				
Angles of Rotation				

VOCABULARY

WORD	DEFINITION	IMAGE
Polygon		
Regular Polygon		Regular Pentagon Irregular Pentagon 
Interior Angle		
Exterior Angle		



POLYGON	NUMBER OF SIDES	NUMBER OF TRIANGLES	SUM OF INTERIOR ANGLE MEASURES
Triangle	3	1	$(1)180° = 180°$
Quadrilateral	4	2	$(2)180° = 360°$
Pentagon			$(\quad)180° =$
Hexagon			$(\quad)180° =$
Decagon			$(\quad)180° =$

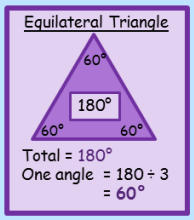
The pattern developed in the example above, is consistent for *ALL* polygons.

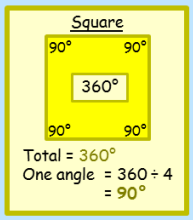
The <u>SUM</u> of the Interior Angles of ***any*** Polygon	<u>ONE</u> Interior Angle of a ***Regular*** Polygon	<u>ONE</u> Exterior angle of a ***Regular*** Polygon
$\boldsymbol{180(n-2)}$	$\boldsymbol{\frac{180(n-2)}{n}}$	$\boldsymbol{\frac{360}{n}}$ **The sum of the exterior angles is *ALWAYS* $360°$**

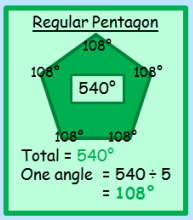
**** where *n* is the number of sides of the polygon****

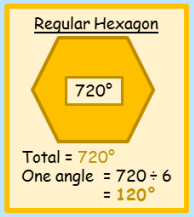
Interior angles in regular polygons

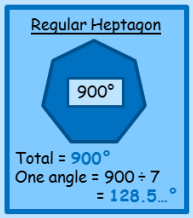
If a shape is regular, all of its angles are the same size.

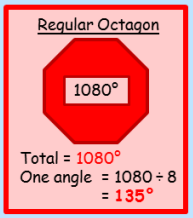












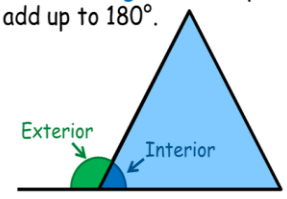
If the polygon has n sides, the angle sum is (n − 2) × 180.

Divide this answer by n to get the size of one angle.

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

Exterior angles

The interior angle and the exterior angle of a shape add up to 180°.

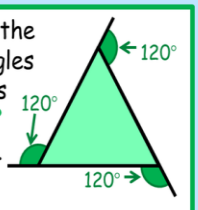


I + E = 180°

This is because angles on a straight line equal 180°.

If I = 60° then E = 120°
60° + 120° = 180°.

The sum of the exterior angles of a shape is always 360° (a full turn).



If the shape is regular, then each angle is the same size.

You can find the size of one angle by dividing 360° by the number of sides, n.

$$\frac{360}{n}$$

PRACTICE!

1. Determine, in degrees, the measure of each interior angle of a regular octagon.

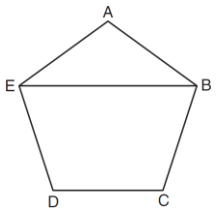
2. Determine and state the measure, in degrees, of an interior angle of a regular decagon.

3. The sum of the interior angles of a regular polygon is 540°. Determine and state the number of degrees in one interior angle of the polygon.

4. What is the measure of each interior angle of a regular hexagon?

   1) 60°
   2) 120°
   3) 135°
   4) 270°

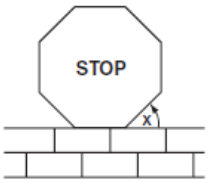
5. In the diagram below of regular pentagon *ABCDE*, $\overline{EB}$ is drawn.



What is the measure of $\angle AEB$?

   1) 36º
   2) 54º
   3) 72º
   4) 108º

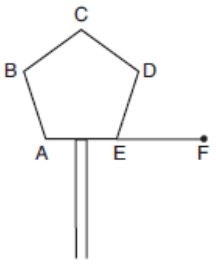
6. A stop sign in the shape of a regular octagon is resting on a brick wall, as shown in the accompanying diagram.



What is the measure of angle *x*?

   1) 45°
   2) 60°
   3) 120°
   4) 135°

7. One piece of the birdhouse that Natalie is building is shaped like a regular pentagon, as shown in the accompanying diagram.



If side *AE* is extended to point *F*, what is the measure of exterior angle *DEF?*

   1) 36°
   2) 72°
   3) 108°
   4) 144°

8. What is the difference between the sum of the measures of the interior angles of a regular pentagon and the sum of the measures of the exterior angles of a regular pentagon?

   1) 36
   2) 72
   3) 108
   4) 180

9. The sum of the interior angles of a regular polygon is 720°. How many sides does the polygon have?

1) 8
2) 6
3) 5
4) 4

10. Melissa is walking around the outside of a building that is in the shape of a regular polygon. She determines that the measure of one exterior angle of the building is 60°. How many sides does the building have?

1) 6
2) 9
3) 3
4) 12

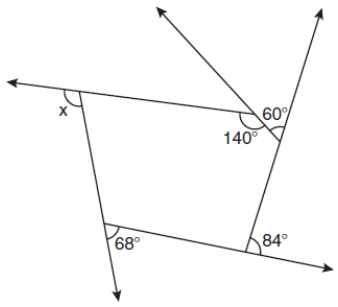
11. For which polygon does the sum of the measures of the interior angles equal the sum of the measures of the exterior angles?

1) hexagon
2) pentagon
3) quadrilateral
4) triangle

12. A regular polygon with an exterior angle of 40° is a

1) pentagon
2) hexagon
3) nonagon
4) decagon

13. The pentagon in the diagram below is formed by five rays.



What is the degree measure of angle *x*?

1) 72
2) 96
3) 108
4) 112

14. The measures of five of the interior angles of a hexagon are 150°, 100°, 80°, 165°, and 150°. What is the measure of the sixth interior angle?

1) 75°
2) 80°
3) 105°
4) 180°