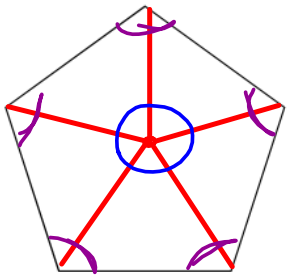
Math 20 – 2
Angles and Regular Polygons
OUTCOME: Determine the Angle Between Two Sides of a Regular Polygon

1. Draw five equal (not equilateral!) triangles raying out from the center of the below polygon. Use this diagram to determine the angle between the sides of the polygon.



a. How many triangles did you draw? ____

5 sides = 5 △

b. What is the total sum of all angles in the above triangles? _____

each △ = 180 5 x 180 = 900

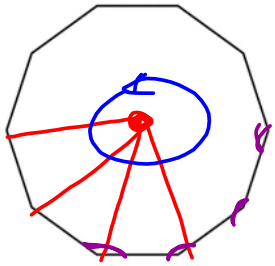
c. By subtracting out all the central triangle angles, we are left with the interior polygon angles.

not part of −360 900 - 360 = 540

d. What is the angle between two sides in a regular pentagon? _____

$\frac{540}{5} = 108$

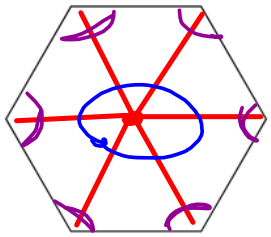
2. Use the above method to determine the angle between the sides of each of the below polygons.
   a. How many triangles.
   b. Sum of all triangle angles.
   c. Take away the 360 for the central angle.
   d. What is the angle between two sides?



10 sides = 10 △

10 x 180 = 1800
− 360
1440

$\frac{1440}{10} = 144$



6 x 180 = 1080
− 360
720

$\frac{720}{6} = 120$

7.0 Angles in polygons.Sept2020

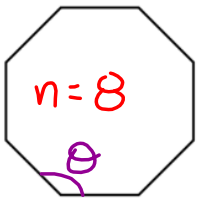
n = # of △

3. Develop a formula to find the angle between two sides of any regular polygon of n sides:

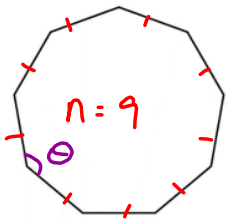
"less centre 360"

$$\text{Angle} = \frac{180n - 360}{n}$$

4. Use the formula to determine the angle between two consecutive sides:



$$\theta = \frac{180(8) - 360}{8} = \frac{1080}{8} = 135^\circ$$



$$\theta = \frac{180(9) - 360}{9} = \frac{1260}{9} = 140^\circ$$

5. Determine the angle between two sides of a 30-sided regular object.

6. Each interior angle of a regular convex polygon measures 144°. How many sides does the polygon have?

$$\frac{144}{1} = \frac{180n - 360}{n} \quad \therefore \quad 144n = 180n - 360$$

$$-144n \quad -144n$$

$$0 = 36n - 360 \quad +360$$

$$360 = 36n \quad \div 36$$

$$n = 10$$

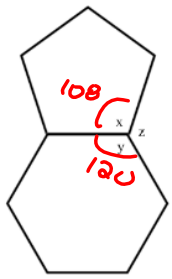
7. Find the measure of all angles x, y and z:

$x \rightarrow$ 5 sided $\therefore$ $x = 108$

$$\frac{5(180) - 360}{5}$$

$x \rightarrow$ 6 sided $\therefore$ $x = 120$

$$\frac{6(180) - 360}{6}$$



$$z = 360 - 108 - 120$$

$$z = 132$$