Geometry Notes
8.1 Angle Measures in a Polygon

Name: Key
Date: _____

LEARNING TARGETS

- I can find angle measures in polygons.

all equal sides and angles

In regular polygons....

- the measure of each interior angle can be found using the formula $\frac{(n-2)\cdot 180^\circ}{n}$ ← sum of # of sides; n = # of sides
- the measure of each exterior angle can be found using the formula $\frac{360^\circ}{n}$ ← sum of # of sides

one inside

Ex 1: Find the measure of each interior angle of the regular polygon listed below.

a. pentagon (n=5)

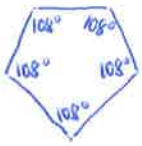
$= \frac{(n-2)\cdot 180}{n}$

$= \frac{(5-2)\cdot 180}{5}$

$= \frac{3\cdot 180}{5}$

$= \frac{540}{5}$

$= \boxed{108^\circ}$



b. nonagon (n=9)

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

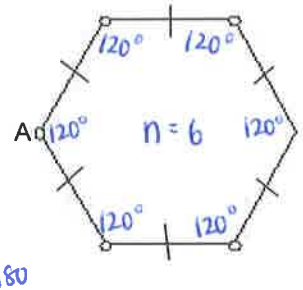
$= \frac{(9-2)\cdot 180}{9}$

$= \frac{7\cdot 180}{9}$

$= \frac{1260}{9}$

$= \boxed{140^\circ}$

c.



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

$= \frac{(6-2)\cdot 180}{6}$

$= \frac{(4)\cdot 180}{6}$

$= \frac{720}{6} = \boxed{120^\circ}$

Ex 2: You are given the measure of each exterior angle of a regular n-gon. Find the value of n.

a. 60°

$\frac{360}{n} = \frac{60}{1}$ ← cross multiply

Solve for # of sides →

$360 = 60n$

$\boxed{n=6}$

Hexagon

b. 45°

$\frac{360}{n} = \frac{45}{1}$

$360 = 45n$

$\boxed{n=8}$

Octagon

c. 30°

$\frac{360}{n} = \frac{30}{1}$

$360 = 30n$

$\boxed{n=12}$

dodecagon

Ex 3: You are given the measure of each interior angle of a regular *n*-gon. Find the value of *n*. ← solve for n

a. 90°

$\frac{(n-2)\cdot 180}{n} = \frac{90}{1}$

$(n-2)\cdot 180 = 90n$

$180n - 360 = 90n$

$-360 = -90n$

$\boxed{n=4}$

Quadrilateral

b. 108°

$\frac{(n-2)\cdot 180}{n} = \frac{108}{1}$

$(n-2)\cdot 180 = 108n$

$180n - 360 = 108n$

$-360 = -72n$

$\boxed{n=5}$

Pentagon

c. 144°

$\frac{(n-2)\cdot 180}{n} = \frac{144}{1}$

$(n-2)\cdot 180 = 144n$

$180n - 360 = 144n$

$-360 = -36n$

$\boxed{n=10}$

decagon

Ex 4: If you were designing a sign for a new building, would it be possible to make a sign that is a regular polygon with each (one) angle having a measure of:

a. 160°

$\frac{(n-2)\cdot 180}{n} = \frac{160}{1}$

$(n-2)\cdot 180 = 160n$

$180n - 360 = 160n$

$-360 = -20n$

$n = 18$

Yes, the sign would have 18 sides

b. 115°

$\frac{(n-2)\cdot 180}{n} = \frac{115}{1}$

$(n-2)\cdot 180 = 115n$

$180n - 360 = 115n$

$-360 = -65n$

$n = 5.53$

No, you can't have a sign that has 5.53 sides