Formulas Involving Polygons - Lesson 7-3

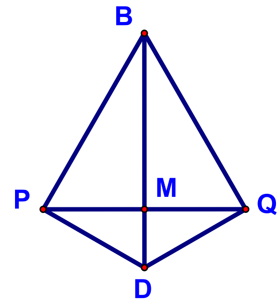
Here's today's warmup…don't forget to "phone home!"

Given: $\overrightarrow{BD}$ bisects $\angle PBQ$

$\overline{PD} \perp \overline{PB}$

$\overline{QD} \perp \overline{QB}$

Prove: $\overleftrightarrow{BD}$ is $\perp$ bis. of $\overline{PQ}$



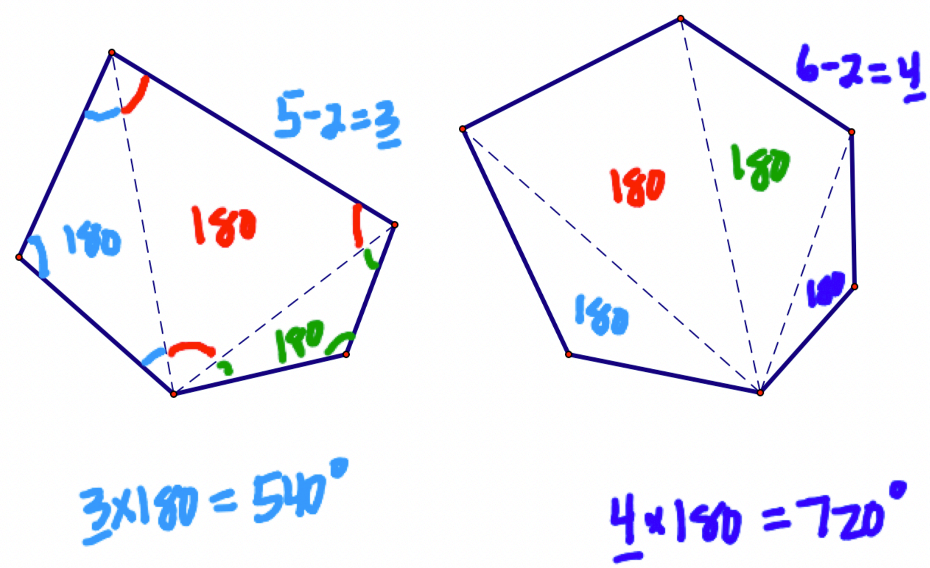
Statements	Reasons

Today, we started by learning how polygons are classified by their number of sides...you should already know a lot of these - just make sure to memorize the ones you don't know!!

Sides	Name
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon
8	Octagon
9	Nonagon
10	Decagon
11	Undecagon
12	Dodecagon
13	Tridecagon
14	Tetradecagon
15	Pentadecagon
16	Hexadecagon
17	Heptadecagon
18	Octadecagon
19	Enneadecagon
20	Icosagon
n	*n*-gon

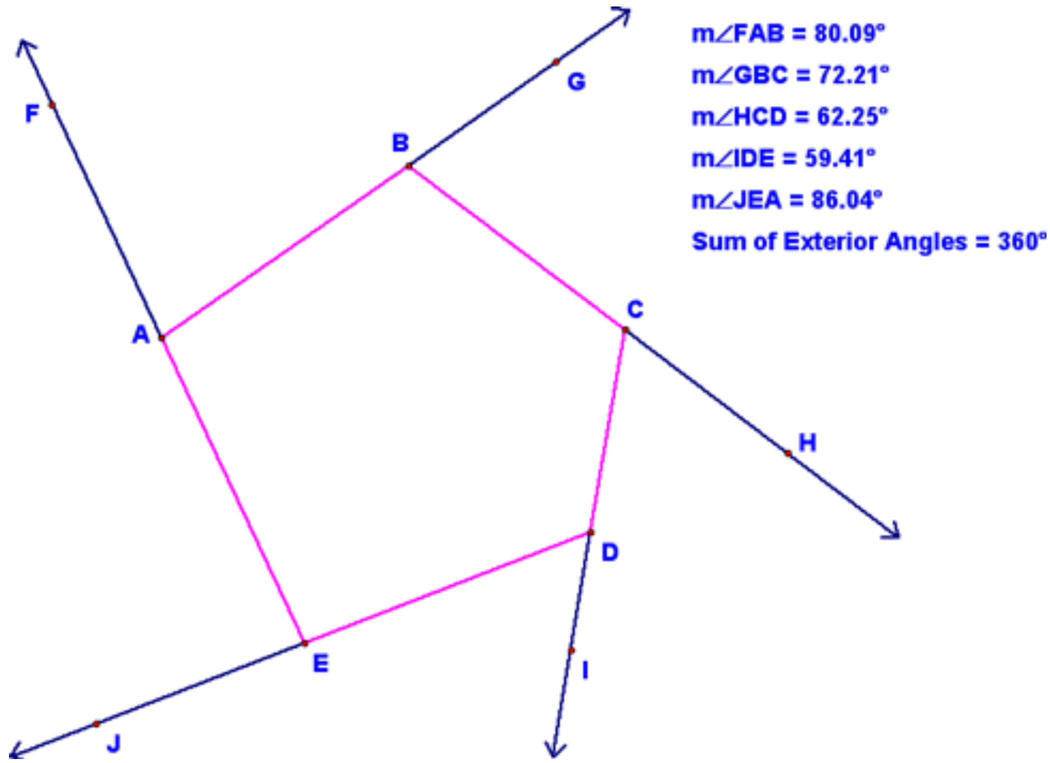
Next, let's look at the diagonals of polygons with different numbers of sides. By drawing as many diagonals as we could from one diagonal, you should be able to see a pattern...we can make **n-2** triangles in a **n**-sided polygon. Given this information and the fact that the sum of the interior angles of a polygon is 180°, we can come up with a theorem that helps us to figure out the sum of the measures of the interior angles of any n-sided polygon!

What is the sum of the measure of the interior angles in the figures below?



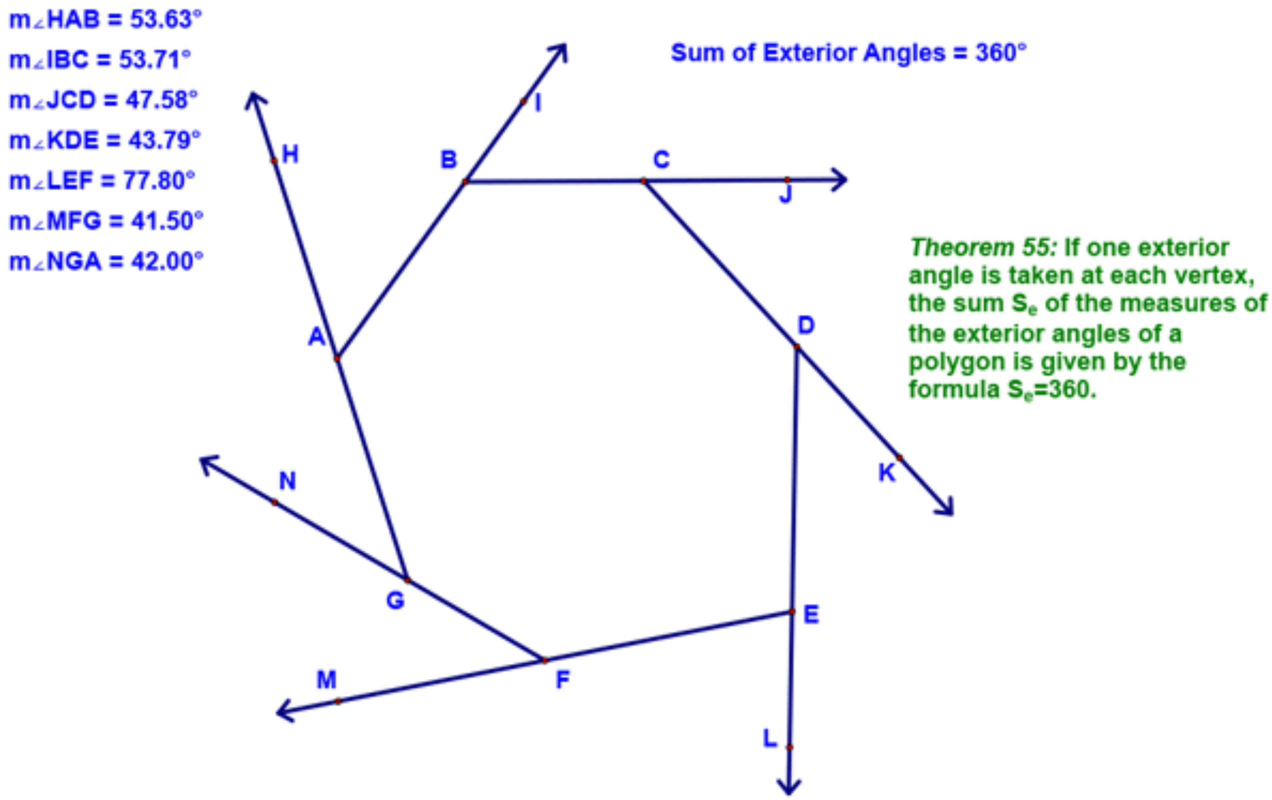
Theorem 54: **The sum S_i of the measures of the interior angles of a polygon with n sides is given by the formula $S_i = (n-2)180$.**

Next, let's look at exterior angles in a polygon. First, consider the exterior angles of a pentagon as shown below:



Note that the sum of the exterior angles is 360°. Remember that I can move the sides of the pentagon around, thereby changing the measure of the exterior angles, but that the sum always stays 360°.

Now look at a heptagon – you'll find the same to be true. In fact, this is true of all polygons and can be written as a theorem:



Lastly, if asked to find the number of diagonals of a polygon with n sides, use the following formula!

Theorem 56: **The number *d* of diagonals that can be drawn in a polygon of *n* sides is given by the formula** $d = \frac{n(n-3)}{2}$**.**