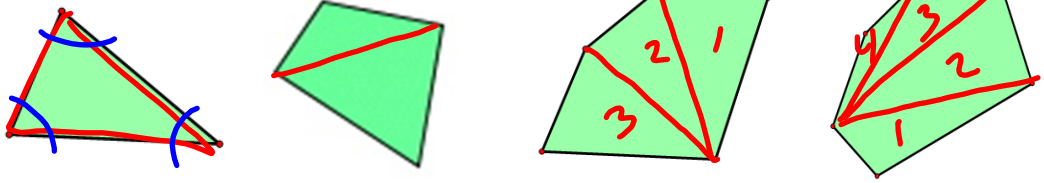
How many triangles can you create inside each of these polygons using only the existing vertices, WITHOUT any of the lines intersecting?

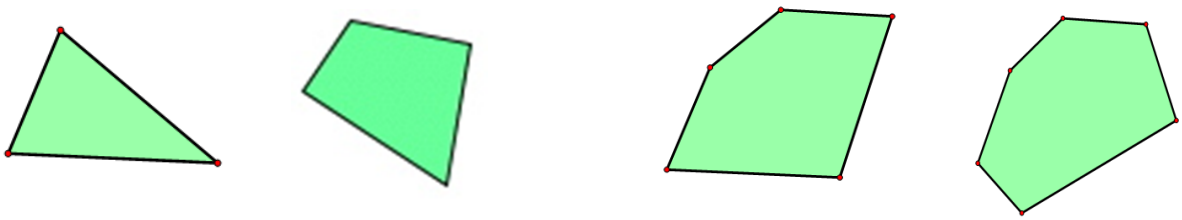


$= 180°$

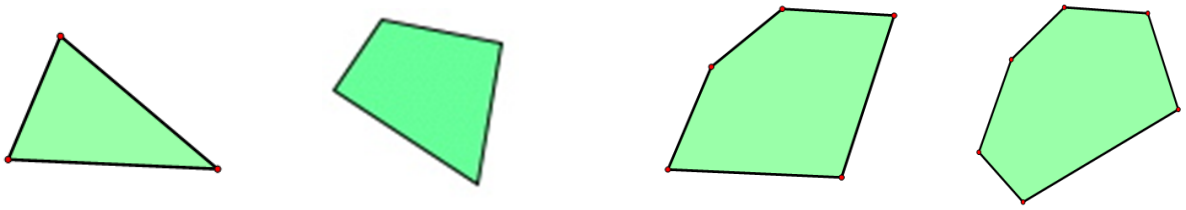
How many of these triangles can you create inside a polygon with 10 sides?

How many of these triangles can you create inside a polygon with 60 sides?

How many of these triangles can you create inside a polygon with ANY number sides?

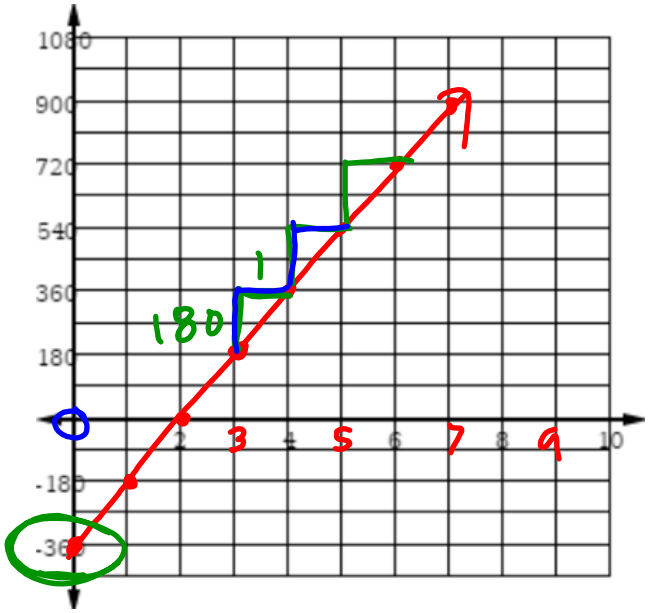


How could you use this information to find
the SUM of the INTERIOR ANGLES in a polygon
with ANY number of sides?



Polygon	Number of Sides	Number of Triangles	Sum of the Interior Angles
Triangle	3 -2	1 ×180	180°
Quadrilateral	4 -2	2 ×180	360°
Pentagon	5 -2	3 ×180	540°
Hexagon	6 -2	4 ×180	720
Heptagon	7 -2	5	900
Octagon	8	6	1080°
Nonagon	9	7	1260°
Decagon	10	8	1440

On the grid below, plot the relationship between the number of sides and the sum of the interior angles.



Slope
= 180

y-int
= -360

Use your graph to create a rule to determine the sum of the interior angles for a polygon with *n* sides.

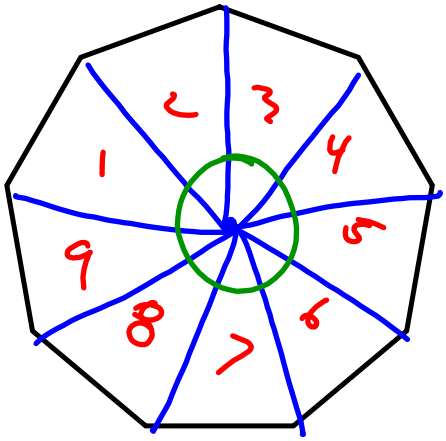
$y = 180x - 360$

$\text{Angle} = (n-2) \times 180$

$= 180n - 360$

$2(x+5)$

$2x+10$

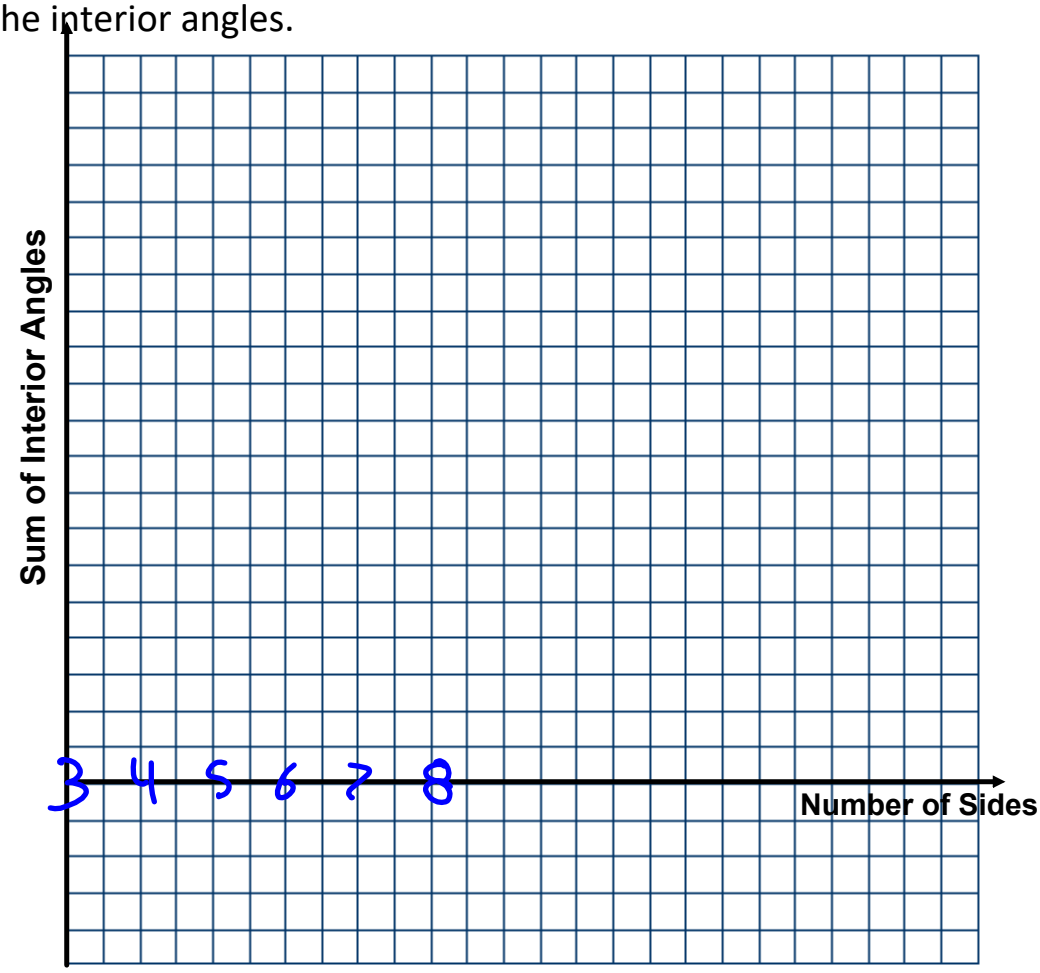


Shape
= 9 sides

9 triangles
-360 middle

Sum = $n(180) - 360$

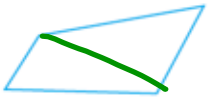
On the grid below, plot the relationship between the number of sides and the sum of the interior angles.



Use your graph to create a rule to determine the sum of the interior angles for a polygon with *n* sides.

Polygon Practice

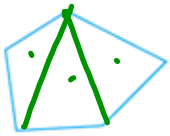
1. Draw as many non-intersection diagonals as possible to create non-overlapping triangles. What is the sum of the interior angles in each case?

a) 

360°

b)

720°

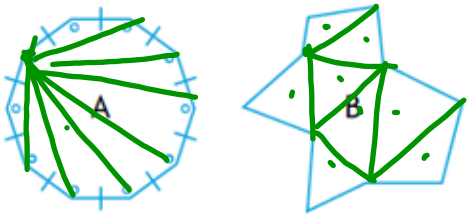
c) 

540°

d)

1260°

2. Polygon A is a regular 10-gon and polygon B is an irregular 10-gon. Are the sums of their interior angles equal? Explain.



3. What is the measure of each interior angle of a regular 14-gon?

$(14-2)\times 180 = 2160°$

$\frac{2160}{14}$

EACH ANGLE $= 154°$

4. The sum of the interior angles in a polygon is 1440. How many sides does the polygon have?

Sum $= (n-2)\times 180$

$1440 = (n-2)180$

$1440 = 180n - 360$

$10 = n$

Sum $= 180n - 360$

$1440 = 180n - 360$

$+360$

$1800 = 180n$

$\frac{1800}{180} = \frac{180n}{180}$

$10 = n$