2.4 Angle Properties in Polygons

convex polygon

Up a polygon in which each interior angle measures less than 180°

concave

C. Draw the polygons listed in the table below. Create triangles to help you determine the sum of the measures of their interior angles. Record your results in a table like the one below.

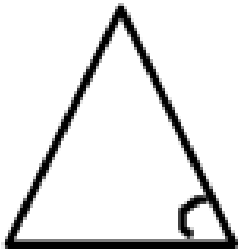
Polygon	Number of Sides (n)	Number of Triangles	Sum of Angle Measures (S)
triangle	3	1	180°
quadrilateral	4	2	360°
pentagon	5	3	540°
hexagon	6	4	720°
heptagon	7	5	900°
octagon	8	6	1080°

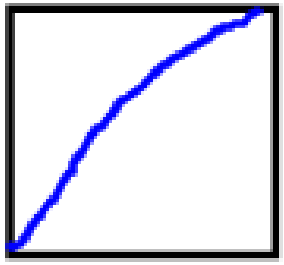
D. Make a conjecture about the relationship between the sum of the measures of the interior angles of a polygon, S, and the number of sides of the polygon, n.

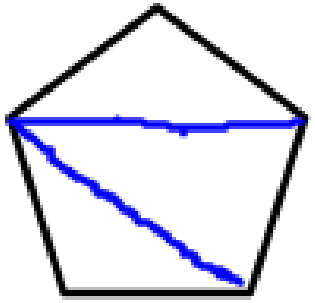
$n-2$ $S = 180(n-2)$

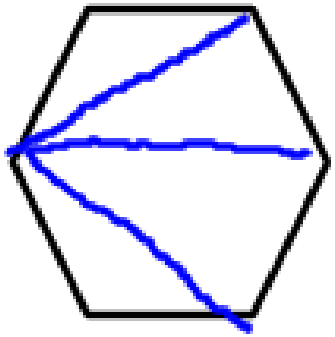
E. Use your conjecture to predict the sum of the measures of the interior angles of a dodecagon (12 sides). Verify your prediction using triangles.

p. 96 ex 1,





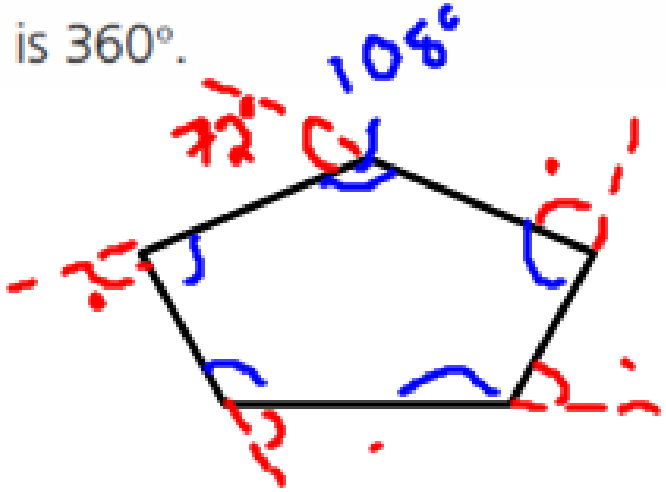




$S = 180(n-2)$ *

Need to Know

- The sum of the measures of the interior angles of a convex polygon with n sides can be expressed as $180°(n - 2)$.
- The measure of each interior angle of a regular polygon is $\frac{180°(n - 2)}{n}$. *
- The sum of the measures of the exterior angles of any convex polygon is 360°.



$S = 180(n-2)$

$S = 180(5-2)$

$S = 180(3)$

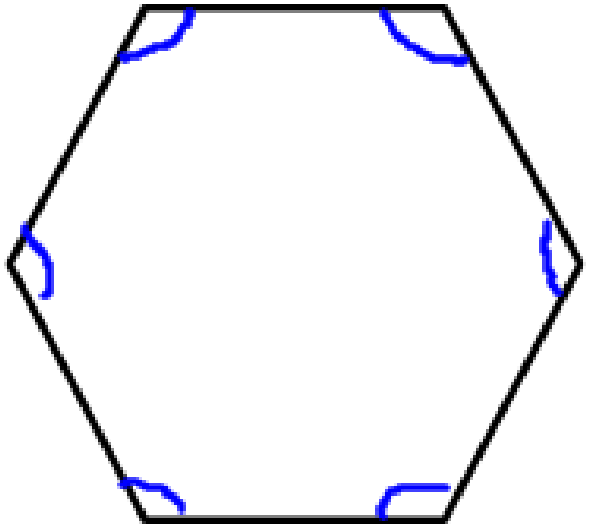
$S = 540$

$\frac{540}{5}$

$108°$

EXAMPLE 2 Reasoning about angles in a regular polygon

Outdoor furniture and structures like gazebos sometimes use a regular hexagon in their building plan. Determine the measure of each interior angle of a regular hexagon.



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

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

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

$$S = 120^\circ$$

$n = ?$

Determine the number of sides of a polygon whose interior angles sum 4140 degrees

$$S = 4140$$

$$S = 180(n-2)$$

$$\frac{4140}{180} = \frac{180(n-2)}{180}$$

$$23 = n - 2$$

$$+2 \qquad +2$$

$$25 = n$$

Determine the number of sides of regular polygon whose interior angle measures 170 degrees

$n = ?$

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

$$n \cdot 170 = \frac{180(n-2)}{n} \cdot n$$

$$170n = 180n - 360$$

$$360 = 10n$$

$$n = 36$$

p. 99-100 - #1-8
use example 3 (p. 98) as a template for #4 (p. 99)