POLYGON SUM CONJECTURE

What is a polygon?

A polygon is a closed figure made up of segments. A polygon with three sides is called a triangle. Polygons with four sides are called quadrilaterals. Quadrilaterals have different types. Some quadrilaterals are defined based on some properties.

Rectangles, squares, parallelograms, and some other quadrilaterals are of these types. A polygon with five sides called pentagon. Hexagon is a polygon with six sides. In Figure 6.1, some of the polygons are shown.

![Polygons](image)

Figure 6.1

Polygon Sum Conjecture

In any convex polygon, the sum of the interior angles determined by the following formula. In this formula, \( n \) represents the number of the sides of a polygon. This formula is called Polygon Sum Conjecture.

\[
\text{Sum of the interior angles of a convex polygon} = (n - 2) \times 180^
\]
**Practice 1.** A convex polygon consists of seven sides. Find the sum of the interior angles of the polygon.

**Solution.** Let use the Polygon Sum Conjecture formula.

\[
\text{Sum of the interior angles of a polygon} = (n - 2) \times 180^\circ
\]

The number of sides \( n \) in this problem is 7. Replace \( n \) by 7.

\[
\text{Sum of the interior angles} = (7 - 2) \times 180^\circ
\]

\[
= 5 \times 180^\circ
\]

\[
= 900^\circ.
\]

**Practice 2.** Using Polygon Sum Conjecture, show that the Triangle Sum Conjecture is true.

**Solution.** In any triangle, the number of the sides is three. Replace \( n \) by 3 in Polygon Sum Conjecture.

\[
\text{Sum of the interior angles in any triangle} = (3 - 2) \times 180^\circ
\]

\[
= 1\times 180^\circ
\]

\[
= 180^\circ.
\]

**Practice 3.** Using Polygon Sum Conjecture, show that the sum of the interior angles in any quadrilateral is 360\(^\circ\).

**Solution.** In any quadrilateral, the number of the sides is four. Replace \( n \) by 4 in Polygon Sum Conjecture.

\[
\text{Sum of the interior angles in a quadrilateral} = (4 - 2) \times 180^\circ
\]

\[
= 2 \times 180^\circ
\]

\[
= 360^\circ.
\]
Practice 4. The sum of the interior angles of a polygon is 1800°. Find the number of the sides of this polygon.

Solution. Replace 1800° in Polygon Sum Conjecture formula.

\[(1) \quad 1800 = (n - 2) \times 180\]

Simplify (1), and solve it for \(n\).

\[(2) \quad 1800 = 180n - 360\]
\[(3) \quad 1800 + 360 = 180n - 360 + 360\]
\[(4) \quad 2160 = 180n\]
\[(5) \quad n = 12.\]

That is, the number of the sides is 12.