# The Panda Math Tutor

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# Polygons

IGCSE Mathematics

The Panda Math Tutor

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# 1 Introduction to Polygons

**Note**

Polygons are closed two-dimensional shapes made up of straight line segments. They are one of the most important topics in geometry and appear frequently in IGCSE examinations. Understanding the properties of polygons is essential for solving problems involving angles, symmetry, and area.
**In this chapter, we will explore:**

- What polygons are and how to classify them
- Naming polygons by the number of sides
- Regular and irregular polygons
- Interior and exterior angles of polygons
- Angle sum formulas and their applications
- Symmetry in regular polygons
- Real-world problem solving with polygons

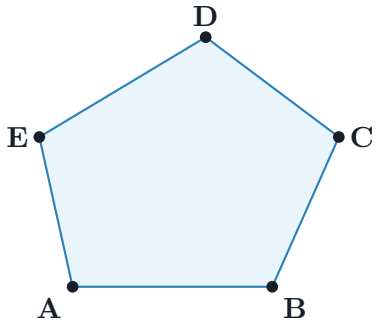
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# 2 What is a Polygon?

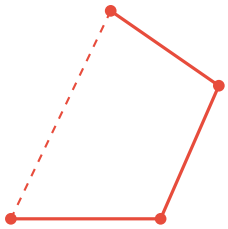
**Definition**

A **polygon** is a closed, flat (two-dimensional) shape made up of three or more straight line segments that do not cross each other.
**Key properties:**

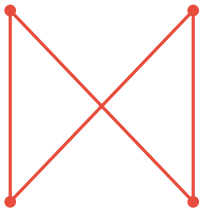
- The line segments are called **sides** (or edges)
- The points where two sides meet are called **vertices** (singular: vertex)
- The number of sides always equals the number of vertices and the number of interior angles




**A polygon (pentagon)**



**Not a polygon**
(not closed)



**Not a polygon**
(sides cross)

**Warning**

**These shapes are NOT polygons:**

- Shapes that are not closed (have a gap)
- Shapes with curved sides (like circles or semicircles)
- Shapes where sides cross each other (self-intersecting shapes)

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# 3 Naming Polygons

**Definition**

Polygons are named according to the number of sides they have.

| Sides | Name | Sides | Name |
|---|---|---|---|
| 3 | Triangle | 8 | Octagon |
| 4 | Quadrilateral | 9 | Nonagon |
| 5 | Pentagon | 10 | Decagon |
| 6 | Hexagon | 12 | Dodecagon |
| 7 | Heptagon | $n$ | $n$-gon |

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