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Polygons

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Polygons — Student Worksheet*. Question numbers match exactly: naming and classification N1–N7, interior angle sums I1–I8, regular interior angles Q1–Q5, exterior angles X1–X7, diagonals D1–D5, symmetry Y1–Y4, algebra and applications A1–A6, the Mixed Review MR1–MR10, and the examination questions Q1–Q8 of Part III. Each solution states the formula before substituting and explains why that formula applies. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution states the formula before substituting, exactly as the notes recommend, and explains *why* that formula is the right one. Depth is scaled to difficulty — brief for basic questions, fuller for the harder ones.

4.1 Solutions — Polygons, Naming and Classification

Solution N1

(a) 7 sides = $\boxed{\text{heptagon}}$ **(b)** 9 sides = $\boxed{\text{nonagon}}$ **(c)** 12 sides = $\boxed{\text{dodecagon}}$

Solution N2

A decagon has 10 sides, and in any polygon the number of vertices equals the number of sides. So a decagon has $\boxed{10}$ vertices (and also 10 interior angles).

Solution N3

(a) Yes — it is closed, flat, made of straight sides, and the sides do not cross.
(b) No — a semicircle has a curved edge, and polygons must have only straight sides.
(c) No — the sides cross each other, so the shape is self-intersecting.

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Solution N4

A **regular** polygon has all sides equal in length *and* all interior angles equal in size. An **irregular** polygon fails at least one of these conditions.
Example of regular: a square (four equal sides, four angles of 90°).
Example of irregular: a rectangle that is not a square (equal angles, but sides not all equal).

Solution N5

A rhombus satisfies the *first* condition (all four sides equal) but not necessarily the *second*: its interior angles are not all equal unless it happens to be a square.
Since a polygon must satisfy **both** conditions to be regular, a general rhombus is $\boxed{\text{not regular}}$.

Common Mistake

Equal sides alone do not make a polygon regular. Always check the angles as well.

Solution N6

An interior angle of 215° is greater than 180° (it is a reflex angle), which creates a "dent" in the shape. A polygon with at least one interior angle above 180° is $\boxed{\text{concave}}$.

Solution N7

(a) A regular triangle is an $\boxed{\text{equilateral triangle}}$, with each angle 60°.
(b) A regular quadrilateral is a $\boxed{\text{square}}$, with each angle 90°.

4.2 Solutions — Interior Angle Sums

Solution I1

$$\text{Sum} = (n-2) \times 180^\circ = (11-2) \times 180^\circ = 9 \times 180^\circ = \boxed{1620^\circ}.$$

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