

Exercise walk-through

4.1.1

Plane Shapes

AQA · GCSE · Mathematics

125. Areas, perimeters and composite plane shapes · Foundation

Areas, perimeters and composite plane shapes · Foundation

A triangle with base 8 cm and height 5 cm has area 20 cm^2 ; a parallelogram with the same base/height has area 40 cm^2 . A trapezium with parallel sides 6 and 10 cm and height 4 cm has area $(6+10) \times 4 / 2 = 32 \text{ cm}^2$. A rectangular 8 by 6 cm sheet with a 3 by 2 cm corner removed has area $48 - 6 = 42 \text{ cm}^2$. Its perimeter is still 28 cm: the two removed outside segments total 5 cm and the two new notch edges also total 5 cm. This perimeter equality depends on a corner rectangular cut; an internal hole adds a separate boundary. Rearranging triangle area gives $h = 2A/b$.

168. Right triangles in three-dimensional shapes · Higher

Right triangles in three-dimensional shapes · Higher

Identify a plane containing the wanted length or angle. Calculate a base diagonal first, then combine it with the perpendicular height. For an angle between a line and a plane, use the angle between the line and its orthogonal projection onto that plane. Mark right angles; general-triangle rules are used only when the selected triangle is not right-angled.

170. Right triangles in three-dimensional shapes · Higher

Right triangles in three-dimensional shapes · Higher

A cuboid of width 3, depth 4 and height 12 has base diagonal $\sqrt{9+16}=5$ and space diagonal $\sqrt{25+144}=13$. The angle α of the space diagonal to the horizontal base satisfies $\tan\alpha=12/5$, giving about 67.4° . Its sine is $12/13$; its cosine is $5/13$. In a square-based pyramid of side 6 and vertical height 4, the base centre-to-side-midpoint distance is 3, giving face slant height 5. The centre-to-corner distance is $3\sqrt{2}$, giving edge length $\sqrt{18+16}=\sqrt{34}$. The face slant and edge lengths differ because their base projections differ.

Exercises 2.1·2.3

2.1 (Foundation) Find the rotational symmetry order of a square.

2.2 (Foundation) Find the number of reflection axes of an equilateral triangle.

2.3 (Foundation) How many sides does a decagon have?

3 Exam-style questions

Exercises 2.1·2.3

2.1 (Foundation) Find the rotational symmetry order of a square.

2.1 It matches every 90° : four matches in 360° .

2.2 (Foundation) Find the number of reflection axes of an equilateral triangle.

2.2 Each vertex-to-opposite-midpoint line is an axis.

2.3 (Foundation) How many sides does a decagon have?

3 Exam-style questions

2.3 The prefix deca names ten sides.

Exercise 3.1

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Every rectangle has four equal sides.

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3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Every rectangle has four equal sides.

3.1 False. A 3 by 4 rectangle has four right angles but side lengths 3,4,3,4. Four equal sides additionally make it a square.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.