IGCSE MATHEMATICS • EXERCISE SHEET

E4.4 Similarity

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

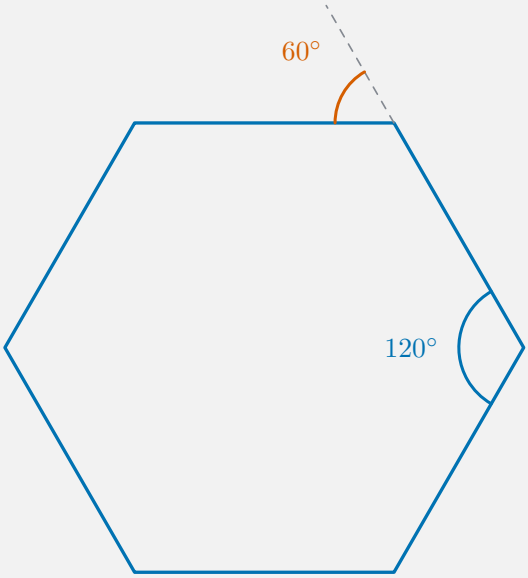
Build the skills to answer Extended exam questions on **similarity** 相似—**similar shapes** 相似形, the **scale factor** 比例因子, and the **area and volume** 面积和体积 ratios k^2 and k^3.

You must be able to:

- find a missing length in similar shapes
- use the area ratio k^2 for similar shapes
- use the volume ratio k^3 for similar solids

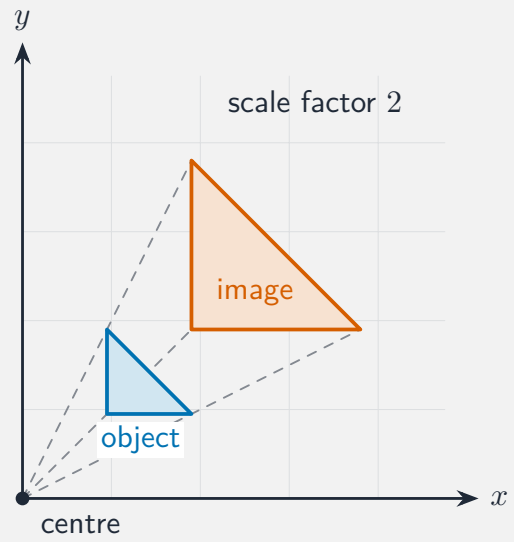
1 Worked examples

■ Similar shapes and solids



interior + exterior = 180°

Similar shapes have equal angles and sides in the same ratio



Similar shapes are linked by an enlargement

- **Similar** 相似: same angles, all sides × the **scale factor** 比例因子 k.
- $\dfrac{\text{area } A}{\text{area } B} = k^2$; $\dfrac{\text{volume } A}{\text{volume } B} = k^3$.
- **Worked:** lengths 2 : 3, smaller volume 40 cm^3 → ratio 8 : 27 → larger $= 40 \times \frac{27}{8} = 135$ cm^3.

Answer shapes: **M1** a correct method, **A1** the correct answer.

2 Practice

2.1 Two similar triangles have a scale factor of 3. A side of the small triangle is 4 cm. Find the matching side of the large triangle. [1]

2.2 Two similar shapes have lengths in the ratio 2 : 5. Write down the ratio of their areas. [1]

2.3 Two similar solids have lengths in the ratio 1 : 2. Write down the ratio of their volumes. [1]

3 Exam-style questions

3.1 Two similar shapes have lengths in the ratio $3 : 4$. The area of the smaller is $18\ \text{cm}^2$. Find the area of the larger. [3]

3.2 Two similar bottles have heights 10 cm and 15 cm. The smaller holds 400 ml. Find the volume of the larger. [3]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **E4.4 Similarity** past-paper sheet in the Library, or try these in **Practice mode**:

- 0580/22 N25 —Q11 (similar shapes)
- 0580/43 N25 —Q22 (similar solids)

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

2.1 $4 \times 3 = 12$ cm.

2.2 $2^2 : 5^2 = 4 : 25$.

2.3 $1^3 : 2^3 = 1 : 8$.

3.1 area ratio $= 3^2 : 4^2 = 9 : 16 \to$ larger $= 18 \times \frac{16}{9} = 32$ cm^2.

3.2 length ratio $10 : 15 = 2 : 3 \to$ volume ratio $2^3 : 3^3 = 8 : 27 \to$ larger $= 400 \times \frac{27}{8} = 1350$ ml.