

Exercise walk-through

Similarity ■ E4.4

eXercise

You must be able to

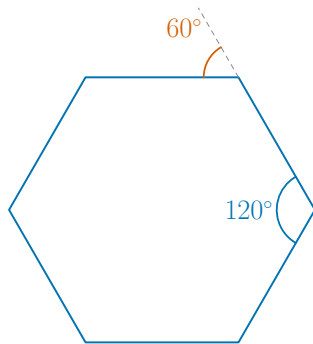
- find a missing length in similar shapes
- use the area ratio k^2 for similar shapes
- use the volume ratio k^3 for similar solids

Method — Similar shapes and solids

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

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

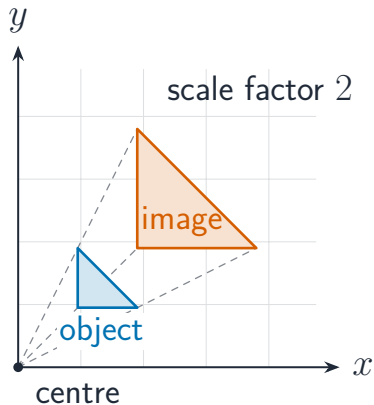
Method — Similar shapes and solids



$$\text{interior} + \text{exterior} = 180^\circ$$

Interior and exterior angles of a polygon

Method — Similar shapes and solids



Similar shapes are linked by an enlargement

Practice 2.1 ■ 1 mark

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.

Solution 2.1

Method: Similar shapes and solids

Worked steps

$$4 \times 3 = 12 \text{ cm } \text{B1}.$$

Practice 2.2 ■ 1 mark

Two similar shapes have lengths in the ratio $2 : 5$. Write down the ratio of their areas.

Solution 2.2

Method: Similar shapes and solids

Worked steps

$$2^2 : 5^2 = 4 : 25 \quad \text{B1}.$$

Practice 2.3 ■ 1 mark

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

Solution 2.3

Method: Similar shapes and solids

Worked steps

$$1^3 : 2^3 = 1 : 8 \quad \text{B1}.$$

Exam-style 3.1 ■ 3 marks

Two similar shapes have lengths in the ratio $3 : 4$. The area of the smaller is 18 cm^2 . Find the area of the larger.

Solution 3.1

Method: Similar shapes and solids

Worked steps

area ratio = $3^2 : 4^2 = 9 : 16 \rightarrow \text{larger} = 18 \times \frac{16}{9} = 32 \text{ cm}^2$ **M1** **M1** **A1** *for 9 : 16;
for $18 \times \frac{16}{9}$; for 32.*

Exam-style 3.2 ■ 3 marks

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

Solution 3.2

Method: Similar shapes and solids

Worked steps

length ratio $10 : 15 = 2 : 3 \rightarrow$ volume ratio $2^3 : 3^3 = 8 : 27 \rightarrow$ larger $= 400 \times \frac{27}{8} = 1350$ ml **M1** **M1** **A1** *for 8 : 27; for $400 \times \frac{27}{8}$; for 1350.*