Similar Shapes: exam questions

10 questions · 29 marks · mark schemes at the end

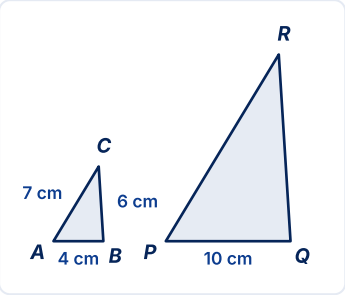
Name _____ Date _____ Score / 29

- Calculators are allowed on both 4MA1 Higher papers (1H and 2H). Show your working: most marks are for method.
- Mark schemes start after the questions. M marks are for a correct method, A marks for an accurate answer that follows a correct method, and B marks for a correct result on its own.
- Online, with more practice: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/similar-shapes

1. **2 marks**

Triangles ABC and PQR are similar. $AB = 4$ cm, $BC = 6$ cm and $AC = 7$ cm. $PQ = 10$ cm.

Work out the lengths of QR and PR.



2. **2 marks**

Two similar shapes have lengths in the ratio $2 : 5$. The area of the smaller shape is 12 cm².

Work out the area of the larger shape.

3. **3 marks**

Two similar cones have heights of 6 cm and 9 cm. The volume of the smaller cone is 160 cm^3.

Work out the volume of the larger cone.

4. **3 marks**

Two similar cylinders have surface areas of 45 cm^2 and 125 cm^2. The height of the smaller cylinder is 6 cm.

Work out the height of the larger cylinder.

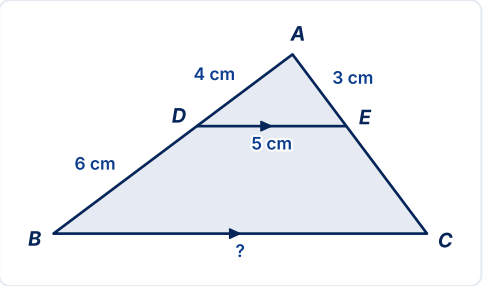
5. **3 marks**

Two similar solids have volumes of 64 cm^3 and 216 cm^3. The surface area of the smaller solid is 80 cm^2.

Work out the surface area of the larger solid.

6. **4 marks**

In triangle ABC, D is a point on AB and E is a point on AC so that DE is parallel to BC. $AD = 4$ cm, $DB = 6$ cm and $DE = 5$ cm.



(a) Work out the length of BC. **(2)**

(b) $AE = 3$ cm. Work out the length of EC. **(2)**

7. **4 marks**

A model of a car is made to a scale of $1 : 40$.

(a) The real car is 4.2 m long. Work out the length of the model in centimetres. **(2)**

(b) The area of the roof of the model is 30 cm². Work out the area of the roof of the real car in m². **(2)**

8. **3 marks**

Two similar statues are made of the same metal. One is 20 cm tall and the other is 50 cm tall. The smaller statue has a mass of 1.6 kg.

Work out the mass of the larger statue.

9. **2 marks**

Triangle X has sides 6 cm, 8 cm and 10 cm. Triangle Y has sides 9 cm, 12 cm and 15 cm.

Show that the triangles are similar.

10. **3 marks**

Two bottles are similar. The larger bottle holds 1.5 litres and is 30 cm tall. The smaller bottle holds 0.4 litres.

Work out the height of the smaller bottle.

Answers and worked solutions

Question 1 — 2 marks

M1 scale factor $10 \div 4 = 2.5$

A1 $QR = 15$ cm and $PR = 17.5$ cm

Answer: $QR = 15$ cm, $PR = 17.5$ cm

Question 2 — 2 marks

M1 $12 \times \left(\frac{5}{2}\right)^2$

A1 $75\,\text{cm}^2$

Answer: $75\,\text{cm}^2$

Question 3 — 3 marks

M1 length scale factor $\frac{9}{6} = 1.5$

M1 160×1.5^3

A1 $540\,\text{cm}^3$

Answer: $540\,\text{cm}^3$

Question 4 — 3 marks

M1 area scale factor $\frac{125}{45} = \frac{25}{9}$

M1 length scale factor $\frac{5}{3}$

A1 10 cm

Answer: 10 cm

Question 5 — 3 marks

M1 length scale factor $\sqrt[3]{\frac{216}{64}} = 1.5$

M1 area scale factor $1.5^2 = 2.25$

A1 $180\,\text{cm}^2$

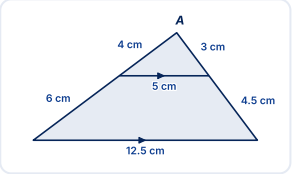
Answer: $180\,\text{cm}^2$

Question 6 — 4 marks

(a)

M1 scale factor $\frac{10}{4} = 2.5$

A1 12.5 cm



(b)

M1 $AC = 3 \times 2.5 = 7.5$

A1 4.5 cm

Answer: (a) 12.5 cm; (b) 4.5 cm

Question 7 — 4 marks

(a)

M1 $420 \div 40$

A1 10.5 cm

(b)

M1 $30 \times 40^2 = 48\,000\,\text{cm}^2$

A1 $4.8\,\text{m}^2$

Answer: (a) 10.5 cm; (b) $4.8\,\text{m}^2$

Question 8 — 3 marks

M1 length scale factor 2.5

M1 1.6×2.5^3

A1 25 kg

Answer: 25 kg

Question 9 — 2 marks

M1 $\frac{9}{6}, \frac{12}{8}, \frac{15}{10}$

A1 all equal 1.5, so the triangles are similar

Answer: shown

Question 10 — 3 marks

M1 volume scale factor $\frac{0.4}{1.5}$

M1 length scale factor $\sqrt[3]{\frac{0.4}{1.5}} = 0.643\ldots$

A1 19.3 cm

Answer: 19.3 cm

Online, with every solution: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/similar-shapes
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