FOUNDATION & HIGHER

SAME AT BOTH TIERS

Name ..... Class .....

R12: Similarity and scale

Compare lengths, areas and volumes using ratio; similarity and trigonometric ratios

20 marks · 25 minutes · Non-calculator

1) Two similar shapes have lengths in the ratio 2 : 5.

(a) Write the ratio of their areas.

.....

(1)

(b) If they are solids, write the ratio of their volumes.

.....

(1)

[Question 1: 2 marks]

2) Two rectangles are similar. The small one is 4 cm by 6 cm. The large one is 10 cm wide (matching the 4 cm side). How long is the large rectangle?

..... cm

[Question 2: 2 marks]

3) Shape B is an enlargement of shape A with scale factor 3. Shape A has area 12 cm^2. Find the area of shape B.

..... cm^2

[Question 3: 2 marks]

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4) Two similar solids have volumes in the ratio 27 : 125. Find the ratio of their lengths.

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[Question 4: 2 marks]

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5) Two similar cones have heights 6 cm and 9 cm. The small cone has a volume of 80 cm^3. Find the volume of the large cone.

..... cm^3

[Question 5: 2 marks]

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6) Two similar shapes have areas in the ratio 9 : 49. Write the ratio of their lengths.

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[Question 6: 1 marks]

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7) Two similar triangles have corresponding sides 5 cm and 7.5 cm. An angle in the small triangle is 40°. What is the matching angle in the large triangle?

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[Question 7: 1 marks]

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8) Two similar solids have surface areas 50 cm^2 and 200 cm^2. The smaller solid has volume 30 cm^3. Find the volume of the larger solid.

..... cm^3

[Question 8: 3 marks]

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9) A right-angled triangle has sides 3 cm, 4 cm and 5 cm. Angle x is opposite the 3 cm side. Write as a fraction

(a) $\tan x$

.....

(1)

(b) $\sin x$

.....

(1)

(c) $\cos x$

.....

(1)

[Question 9: 3 marks]

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10) A map has a scale of 1 : 1000. A garden has an area of 6 cm^2 on the map. Find its real area in m^2.

..... m^2

[Question 10: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	(a) 4 : 25 (b) 8 : 125	B1 each.
2	15	Scale factor 2.5 (M1); A1.
3	108	12×3^2 (M1); A1.
4	3 : 5	Cube roots (M1); A1.
5	270	$\left(\frac{3}{2}\right)^3 = 3.375$ (M1); A1.
6	3 : 7	B1.
7	40°	B1.
8	240	Area factor 4 so length factor 2 (M1); volume factor 8 (M1); A1.
9	(a) $\frac{3}{4}$ (b) $\frac{3}{5}$ (c) $\frac{4}{5}$	B1 each.
10	600	Area factor 1000^2 (M1); $6\,000\,000\,\text{cm}^2 = 600\,\text{m}^2$ (A1).