FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

R12: Similarity and scale

Solve problems using lengths, areas and volumes of similar shapes

20 marks · 25 minutes · Non-calculator

1) Two similar cylinders have heights 8 cm and 12 cm. The small one has surface area 120 cm^2 and volume 200 cm^3. Find the surface area and volume of the large one.

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[Question 1: 4 marks]

2) A 1.5 m post casts a 2 m shadow. At the same time a tree casts a 14 m shadow. How tall is the tree?

..... m

[Question 2: 2 marks]

3) A model is made to a scale of 1 : 20. It needs 30 ml of paint. How many litres of paint does the real object need?

..... litres

[Question 3: 3 marks]

4) A 500 ml bottle costs £1.20. A similar bottle is 1.2 times as tall and costs £2. Which bottle is better value? Show your working.

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[Question 4: 4 marks]

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5) In triangle ADE, B is on AD and C is on AE with BC parallel to DE. $AB = 6$ cm, $AD = 15$ cm and $BC = 4$ cm. Find DE and the ratio of the areas of triangles ABC and ADE.

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[Question 5: 3 marks]

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6) A field has an area of 6 cm^2 on a map with scale 1 : 50 000. Find its real area in km^2.

..... km^2

[Question 6: 2 marks]

7) A ramp rises 1 m over a horizontal distance of 8 m. A similar ramp rises 1.5 m. What horizontal distance does it cover?

..... m

[Question 7: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	270 cm^2; 675 cm^3	Scale factor 1.5 (P1); $\times$2.25 (P1); 270 (A1); $\times$3.375 gives 675 (A1).
2	10.5	Scale factor 7 (P1); A1.
3	12	Area factor 400 (P1, P1); 12 000 ml (A1).
4	Large	Volume 500 $\times$ 1.728 = 864 ml (P1, P1); 0.24p and 0.23p per ml (P1); large (A1).
5	10 cm; 4 : 25	Scale factor 2.5 (P1); DE = 10 (A1); 4 : 25 (A1).
6	1.5	1 cm^2 = 0.25 km^2 (P1); A1.
7	12	Scale factor 1.5 (P1); A1.