HIGHER

6.8 Similar Shapes (Area and Volume): 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Container J and container K are mathematically similar. The surface area of container J is 96 cm^2 and the surface area of container K is 216 cm^2. The volume of container J is 64 cm^3. Work out the volume of container K.

(Total for Question 1 is 4 marks)

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2 The length of every edge of a solid shape is increased by 40% to make a similar, larger solid.

(a) Work out the percentage increase in the surface area of the solid. **(2)**

(b) Work out the percentage increase in the volume of the solid. **(2)**

(Total for Question 2 is 4 marks)

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3 Two similar vases have volumes 24 cm^3 and 81 cm^3. The first vase is 6 cm high. Work out the height of the second vase.

(Total for Question 3 is 3 marks)

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4 Two swimming pools are mathematically similar. Corresponding lengths of the first and second are in the ratio 5:3. The area of the first is 125 cm². Work out the area of the second.

(Total for Question 4 is 3 marks)

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5 Two mathematically similar solids have surface areas 224 cm² and 350 cm². The second solid has volume 375 cm³. Work out the volume of the first solid.

(Total for Question 5 is 4 marks)

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6 Two similar toy models have areas 72 cm² and 128 cm². A length on the first is 6 cm. Work out the corresponding length on the second.

(Total for Question 6 is 3 marks)

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7 Two photograph frames are mathematically similar. Corresponding lengths of the first and second are in the ratio 4:5. The area of the first is 48 cm². Work out the area of the second.

(Total for Question 7 is 3 marks)

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8 A model statue is 10 cm tall and needs 4 ml of paint for its surface. A similar statue is 30 cm tall. How much paint is needed for the taller statue?

(Total for Question 8 is 3 marks)

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9 Two mathematically similar solids have surface areas 6 cm^2 and 24 cm^2. The second solid has volume 8 cm^3. Work out the volume of the first solid.

(Total for Question 9 is 4 marks)

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10 Two garden lawns are mathematically similar. Corresponding lengths of the first and second are in the ratio 5:2. The area of the first is 25 cm^2. Work out the area of the second.

(Total for Question 10 is 3 marks)

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11 Two mathematically similar solids have surface areas 56 cm^2 and 350 cm^2. The second solid has volume 375 cm^3. Work out the volume of the first solid.

(Total for Question 11 is 4 marks)

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12 Solid A and solid B are mathematically similar. The linear scale factor from solid A to solid B is 1.5. The volume of solid A is 40 cm^3. Work out the volume of solid B.

(Total for Question 12 is 3 marks)

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13 Two mathematically similar spheres have radii in the ratio 2:5. Find the ratio of their volumes.

(Total for Question 13 is 2 marks)

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14 Two mathematically similar solids have volumes of 12 cm^3 and 40.5 cm^3. Find the linear scale factor from the smaller solid to the larger solid.

(Total for Question 14 is 2 marks)

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15 The linear scale factor between two mathematically similar solids is 2.5. Work out the volume scale factor.

(Total for Question 15 is 2 marks)

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Mark scheme · 6.8 Similar Shapes (Area and Volume): 1-hour Pack

Question 1

area ratio = 216/96 (=2.25) oe	**M1**
linear scale factor = $\sqrt{2.25}$ (=1.5)	**M1**
volume scale factor = 1.5^3 (=3.375); 64 x 3.375	**M1**
216 cao (cm^3)	**A1**

Answer: 216 cm^3

Question 2

(a) linear scale factor = 1.4; area scale factor = 1.4^2 (=1.96)	**M1**
(a) 96% increase cao	**A1**

(a) Answer: 96% increase

(b) volume scale factor = 1.4^3 (=2.744)	**M1**
(b) 174.4% increase cao, awrt 174%	**A1**

(b) Answer: 174.4% increase

Question 3

cube root of (81/24) = 3/2	**M1**
6 x 3/2	**M1**
9 cm cao	**A1**

Answer: 9 cm

Question 4

area scale factor $(3/5)^2$ oe	**M1**
125 x 9/25 oe	**M1**
45 cm^2 cao	**A1**

Answer: 45 cm^2

Question 5

length scale factor $\sqrt{224/350}$ = 4/5	**M1**
4/5 oe	**A1**
volume scale factor $(4/5)^3$	**M1**
192 cm^3 cao	**A1**

Answer: 192 cm^3

Question 6

length scale factor $\sqrt{128/72}$ = 4/3	**M1**
6 x 4/3 oe	**M1**
8 cm cao	**A1**

Answer: 8 cm

Question 7

area scale factor $(5/4)^2$ oe	**M1**
48 x 25/16 oe	**M1**
75 cm^2 cao	**A1**

Answer: 75 cm^2

Question 8

area scale factor $(30/10)^2$ oe	**M1**
4 x 9	**M1**
36 ml cao	**A1**

Answer: 36 ml

Question 9

length scale factor $\sqrt{6/24}$ = 1/2	**M1**
1/2 oe	**A1**
volume scale factor $(1/2)^3$	**M1**
1 cm^3 cao	**A1**

Answer: 1 cm^3

Question 10

area scale factor $(2/5)^2$ oe	**M1**
25 x 4/25 oe	**M1**
4 cm^2 cao	**A1**

Answer: 4 cm^2

Question 11

length scale factor $\sqrt{56/350}$ = 2/5	**M1**
2/5 oe	**A1**
volume scale factor $(2/5)^3$	**M1**
24 cm^3 cao	**A1**

Answer: 24 cm^3

Question 12

volume scale factor = 1.5^3 oe	**M1**
40 x their volume scale factor	**M1**
135 cao, units cm^3	**A1**

Answer: 135 cm^3

Question 13

$2^3 : 5^3$ set up	**M1**
8:125 cao oe	**A1**

Answer: 8:125

Question 14

volume ratio = 40.5/12 (=3.375) oe	**M1**
1.5 cao	**A1**

Answer: 1.5

Question 15

2.5^3 set up	**M1**
15.625 cao	**A1**

Answer: 15.625

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