HIGHER

3.3 Similarity: Length, Area and Volume Scale Factors: Test Pack

Total Marks

EDEXCEL 4MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer in full sentences for any question that asks to 'Show that' or to 'Explain'. Spend about 60 minutes on the paper.

1 Two similar model boats have surface areas 125 cm² and 245 cm².
Work out the ratio of their volumes in its simplest whole-number form.

(Total for Question 1 is 3 marks)

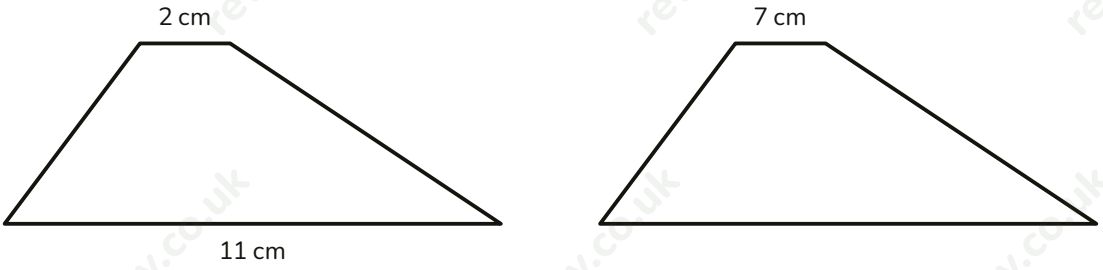
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2 Two bottles are mathematically similar. The large bottle is 15 cm tall and holds 10125 ml. The small bottle is 10 cm tall.
Work out how much the small bottle holds.

(Total for Question 2 is 3 marks)

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3 Two trapeziums are similar. The first has a side of length 2 cm that corresponds to a side of length 7 cm on the second. Another side of the first trapezium is 11 cm long.
Find the length of the corresponding side of the second trapezium.



(Total for Question 3 is 3 marks)

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4 Two bottles are mathematically similar. The large bottle is 9 cm tall and holds 2187 ml. The small bottle is 6 cm tall.
Work out how much the small bottle holds.

(Total for Question 4 is 3 marks)

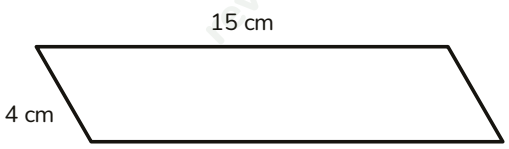
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5 Two similar statues have volumes 4 cm^3 and 32 cm^3.
Work out the ratio of their surface areas. Give your answer in the form 1 : n or in its simplest whole-number form.

(Total for Question 5 is 3 marks)

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6 Two parallelograms are similar. The first has a side of length 4 cm that corresponds to a side of length 5 cm on the second. Another side of the first parallelogram is 15 cm long.
Find the length of the corresponding side of the second parallelogram.





(Total for Question 6 is 3 marks)

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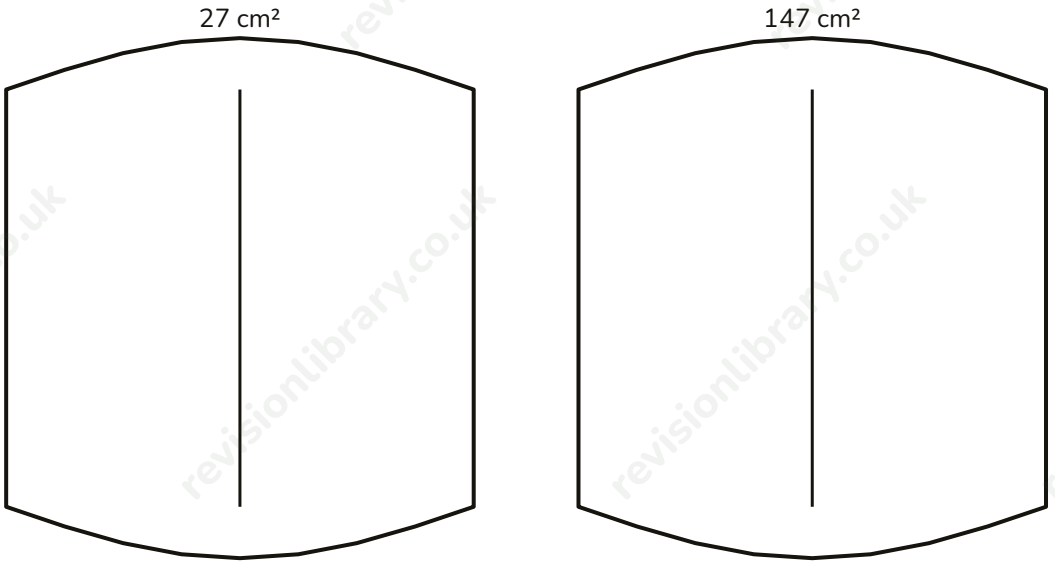
7 Two tins are mathematically similar. The large tin is 20 cm tall and holds 40000 ml. The small tin is 10 cm tall.
Work out how much the small tin holds.

(Total for Question 7 is 3 marks)

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8 Two similar cylinders have surface areas 27 cm² and 147 cm².
Work out the ratio of their volumes in its simplest whole-number form.

Diagram NOT accurately drawn

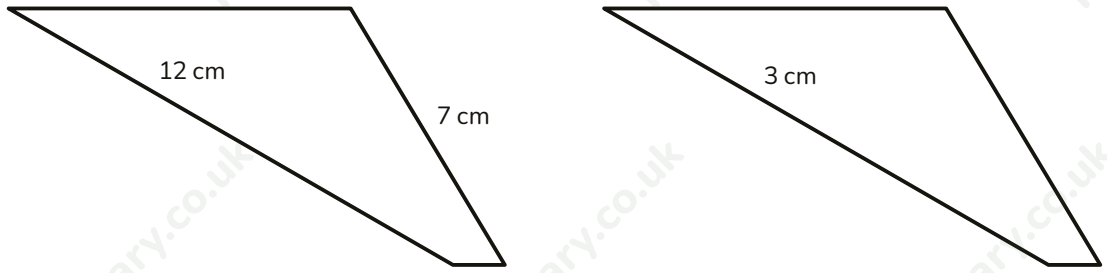


(Total for Question 8 is 3 marks)

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9 Two trapeziums are similar. The first has a side of length 12 cm that corresponds to a side of length 3 cm on the second. Another side of the first trapezium is 7 cm long.
Find the length of the corresponding side of the second trapezium.

Diagram NOT accurately drawn



(Total for Question 9 is 3 marks)

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10 Two tins are mathematically similar. The small tin is 10 cm tall and holds 1000 ml. The large tin is 15 cm tall.
Work out how much the large tin holds.

(Total for Question 10 is 3 marks)

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11 Two rectangles are similar. The first has a side of length 8 cm that corresponds to a side of length 13 cm on the second. Another side of the first rectangle is 10 cm long.
Find the length of the corresponding side of the second rectangle.

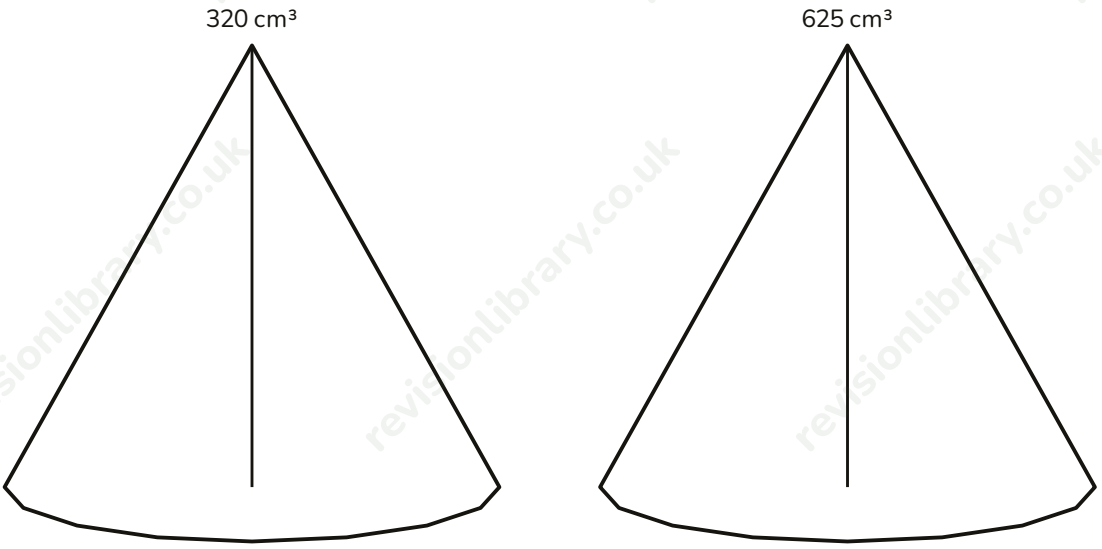
(Total for Question 11 is 3 marks)

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12 Two similar cones have volumes 320 cm³ and 625 cm³.

Work out the ratio of their surface areas. Give your answer in the form 1 : n or in its simplest whole-number form.

Diagram NOT accurately drawn



(Total for Question 12 is 3 marks)

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13 Two rectangles are similar. The first has a side of length 5 cm that corresponds to a side of length 14 cm on the second. Another side of the first rectangle is 6 cm long.
Find the length of the corresponding side of the second rectangle.

(Total for Question 13 is 3 marks)

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14 Two bottles are mathematically similar. The small bottle is 12 cm tall and holds 1728 ml. The large bottle is 18 cm tall.
Work out how much the large bottle holds.

(Total for Question 14 is 3 marks)

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Mark scheme · 3.3 Similarity: Length, Area and Volume Scale Factors: Test Pack

Question 1

area ratio = 25:49	**M1**
length ratio = 5:7 (square root of each)	**M1**
volume ratio = 125:343 (cubes of the length ratio)	**A1**

Answer: 125 : 343

Question 2

length scale factor large to small = 10/15 = 2/3	**M1**
volume scale factor = $(2/3)^3$	**M1**
3000 ml	**A1**

Answer: 3000 ml

Question 3

scale factor = 7/2 = 7/2	**M1**
11 x 7/2	**M1**
38.5 cm	**A1**

Answer: 38.5 cm

Question 4

length scale factor large to small = 6/9 = 2/3	**M1**
volume scale factor = $(2/3)^3$	**M1**
648 ml	**A1**

Answer: 648 ml

Question 5

volume ratio = 1:8	**M1**
length ratio = 1:2 (cube root of each)	**M1**
area ratio = 1:4 (squares of the length ratio)	**A1**

Answer: 1 : 4

Question 6

scale factor = 5/4 = 5/4	**M1**
15 x 5/4	**M1**
18.75 cm	**A1**

Answer: 18.75 cm

Question 7

length scale factor large to small = 10/20 = 1/2	**M1**
volume scale factor = $(1/2)^3$	**M1**
5000 ml	**A1**

Answer: 5000 ml

Question 8

area ratio = 9:49	**M1**
length ratio = 3:7 (square root of each)	**M1**
volume ratio = 27:343 (cubes of the length ratio)	**A1**

Answer: 27 : 343

Question 9

scale factor = 3/12 = 1/4	**M1**
7 x 1/4	**M1**
1.75 cm	**A1**

Answer: 1.75 cm

Question 10

length scale factor = 15/10 = 3/2	**M1**
volume scale factor = $(3/2)^3$ = 27/8	**M1**
3375 ml	**A1**

Answer: 3375 ml

Question 11

scale factor = 13/8 = 13/8	**M1**
10 x 13/8	**M1**
16.25 cm	**A1**

Answer: 16.25 cm

Question 12

volume ratio = 64:125	**M1**
length ratio = 4:5 (cube root of each)	**M1**
area ratio = 16:25 (squares of the length ratio)	**A1**

Answer: 16 : 25

Question 13

scale factor = 14/5 = 14/5	**M1**
6 x 14/5	**M1**
16.8 cm	**A1**

Answer: 16.8 cm

Question 14

length scale factor = 18/12 = 3/2	**M1**
volume scale factor = $(3/2)^3$ = 27/8	**M1**
5832 ml	**A1**

Answer: 5832 ml

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