5.18 Similar Shapes (Lengths): 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

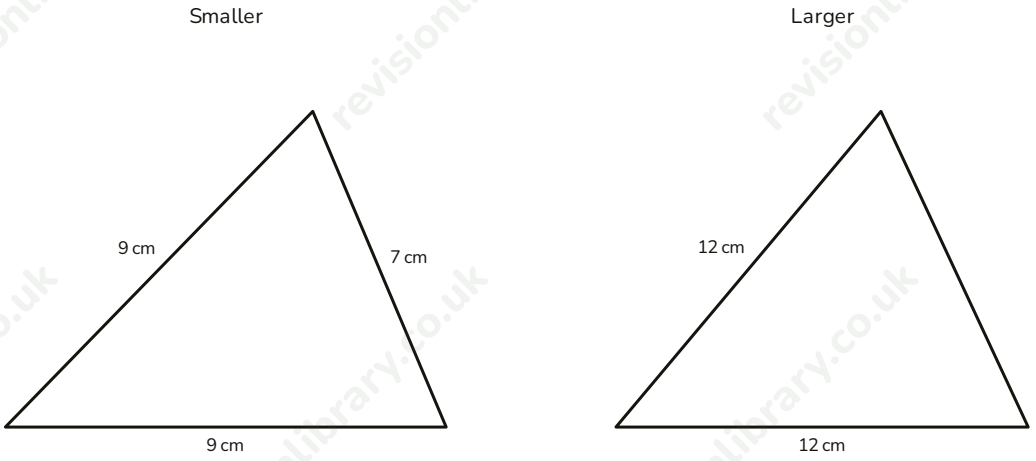
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Two similar isosceles triangles have corresponding equal sides 9 cm (small) and 12 cm (large). The base of the smaller triangle is 7 cm. Work out the length of the base of the larger triangle.

Diagram NOT accurately drawn

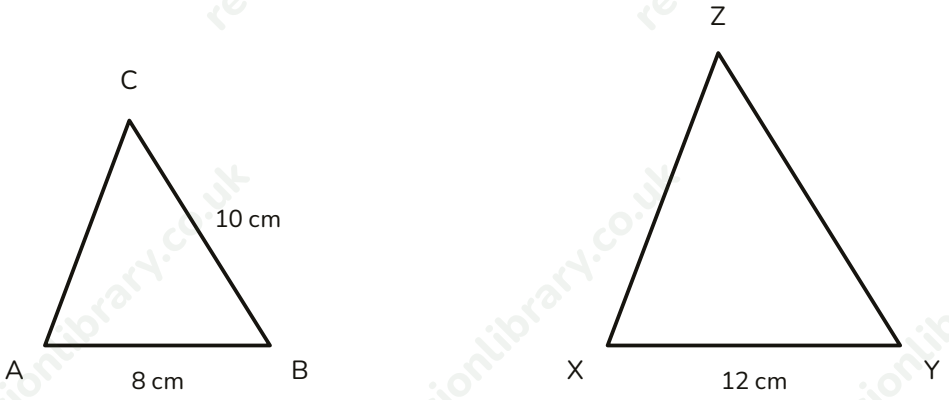


(Total for Question 1 is 3 marks)

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2 Triangle ABC is similar to triangle XYZ, with AB corresponding to XY and BC corresponding to YZ. AB = 8 cm, XY = 12 cm and BC = 10 cm. Work out the length of YZ.

Diagram NOT accurately drawn

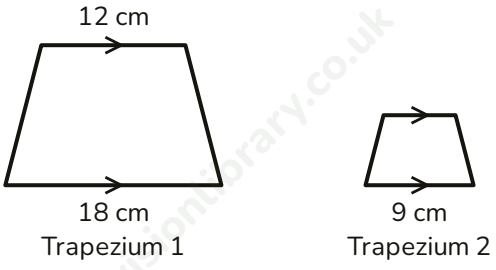


(Total for Question 2 is 3 marks)

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3 Trapezium 1 has parallel sides of length 12 cm and 18 cm. Trapezium 2 is mathematically similar to trapezium 1. The side in trapezium 2 corresponding to the 18 cm side has length 9 cm. Work out the length of the side in trapezium 2 that corresponds to the 12 cm side.

Diagram NOT accurately drawn



(Total for Question 3 is 3 marks)

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4 Two mathematically similar shapes have sides in the ratio 3 : 8. A side on the smaller shape has length 12 cm. Work out the corresponding side length on the larger shape.

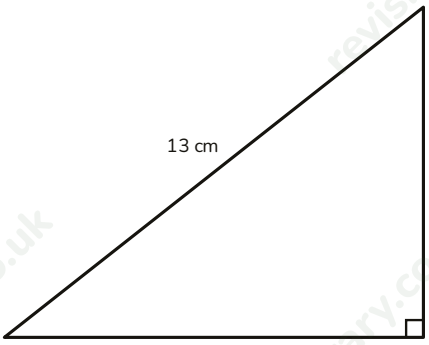
(Total for Question 4 is 2 marks)

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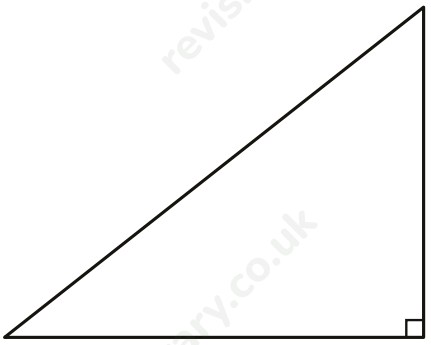
5 Two right-angled triangles are mathematically similar, with a scale factor of enlargement of 4. The hypotenuse of the smaller triangle is 13 cm. Work out the hypotenuse of the larger triangle.

Diagram NOT accurately drawn

smaller triangle



larger triangle, scale factor 4

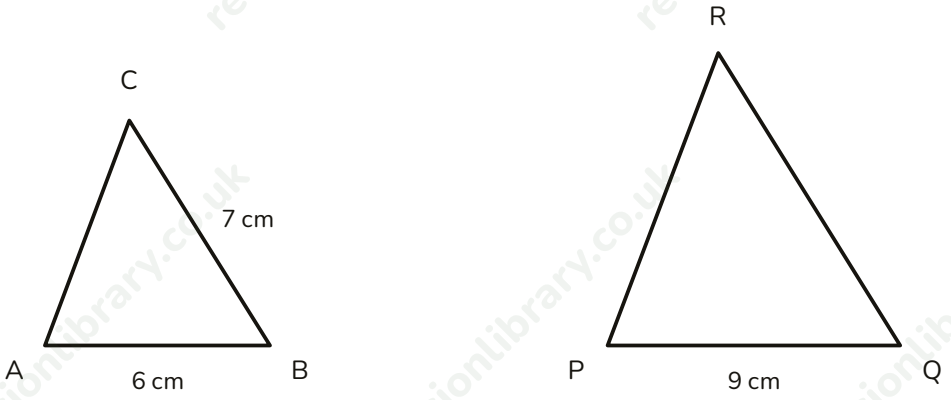


(Total for Question 5 is 1 mark)

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6 Triangle ABC is similar to triangle PQR, with AB corresponding to PQ and BC corresponding to QR. AB = 6 cm, PQ = 9 cm and BC = 7 cm. Work out the length of QR.

Diagram NOT accurately drawn



(Total for Question 6 is 2 marks)

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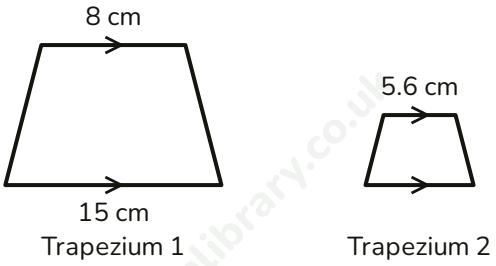
7 Two mathematically similar shapes have sides in the ratio 2 : 5. A side on the smaller shape has length 9 cm. Work out the corresponding length on the larger shape.

(Total for Question 7 is 2 marks)

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8 Trapezium 1 has parallel sides of length 8 cm and 15 cm. Trapezium 2 is mathematically similar to trapezium 1. The side in trapezium 2 corresponding to the 8 cm side has length 5.6 cm. Work out the length of the side in trapezium 2 corresponding to the 15 cm side.

Diagram NOT accurately drawn



(Total for Question 8 is 2 marks)

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9 Shape M and shape N are mathematically similar. The scale factor of enlargement from shape M to shape N is 3/4. A side on shape M has length 20 cm. Work out the corresponding side length on shape N.

(Total for Question 9 is 2 marks)

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10 Shape 1 has sides of length 4.5 cm and 6 cm. Shape 2 is mathematically similar to shape 1. The side on shape 2 corresponding to the 4.5 cm side has length 3 cm. Work out the length of the side on shape 2 corresponding to the 6 cm side.

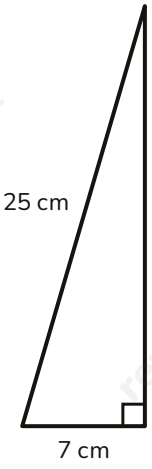
(Total for Question 10 is 2 marks)

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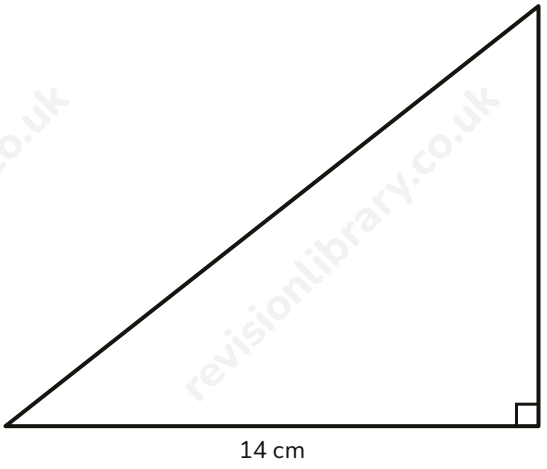
11 Two similar right-angled triangles have corresponding shorter sides 7 cm (small triangle) and 14 cm (large triangle). The hypotenuse of the small triangle is 25 cm. Work out the hypotenuse of the large triangle.

Diagram NOT accurately drawn

Small triangle



Large triangle



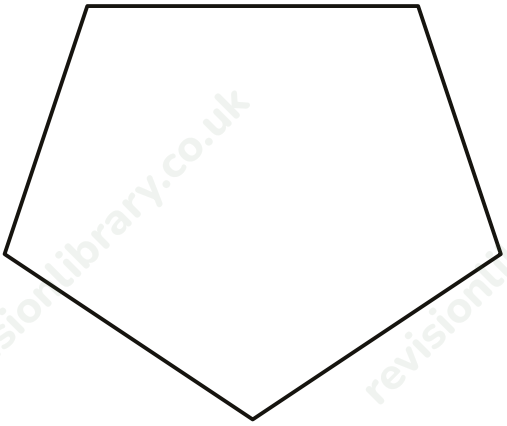
(Total for Question 11 is 4 marks)

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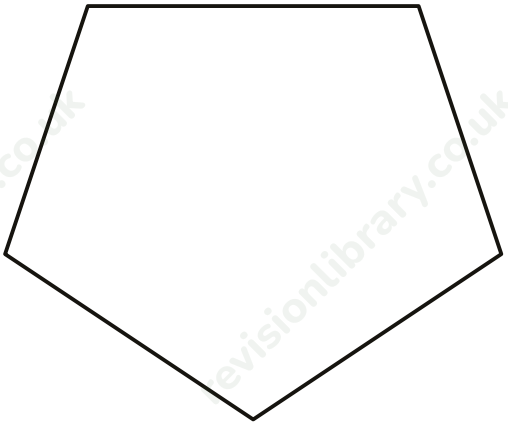
12 Two similar pentagons have corresponding side lengths in the ratio 5:8. The perimeter of the smaller pentagon is 55 cm.
Work out the perimeter of the larger pentagon.

Diagram NOT accurately drawn

Smaller



Larger



(Total for Question 12 is 3 marks)

13 A model car is similar to a real car. The model's length is 18 cm and the real car's length is 4.5 m.

(a) Find the scale factor from the model to the real car. (Write the factor as a ratio model : real.) **(2)**

(b) Using this scale factor, find the real car's width if the model's width is 5 cm. **(2)**

(Total for Question 13 is 4 marks)

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14 Two similar triangles have corresponding sides in the ratio 5:8. A side of the smaller triangle is 15 cm. Work out the length of the corresponding side in the larger triangle.

(Total for Question 14 is 2 marks)

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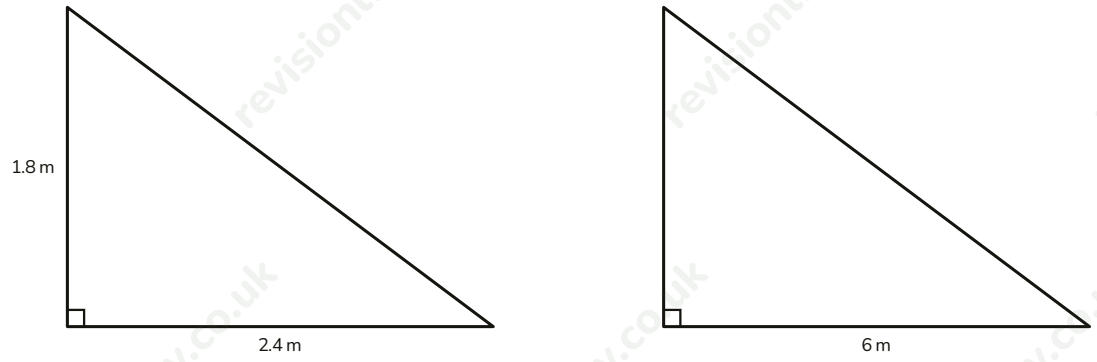
15 A model car is made using a scale of 1 : 24. The real car has a length of 4.8 m. Work out the length of the model car in cm.

(Total for Question 15 is 3 marks)

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16 Deepak measures the shadow of a tent pole of height 1.8 m and finds it is 2.4 m long. At the same moment, a nearby flagpole casts a shadow of length 6 m. The pole, the flagpole and their shadows form similar right-angled triangles. Calculate the height of the flagpole.

Diagram NOT accurately drawn

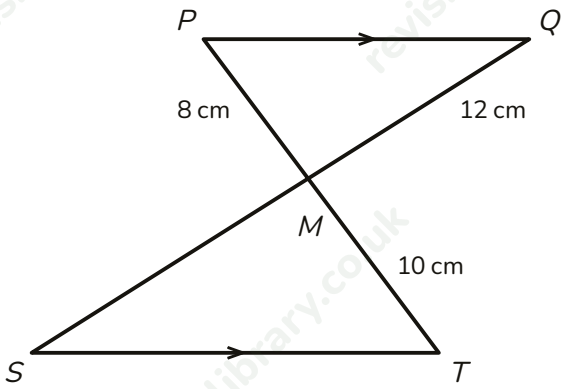


(Total for Question 16 is 3 marks)

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17 In the diagram, PQ is parallel to ST. The straight lines PT and QS intersect at M. PM = 8 cm, MT = 10 cm and QM = 12 cm.

Diagram NOT accurately drawn



(a) Explain why triangle PMQ is similar to triangle TMS. **(1)**

(b) Work out the length of MS. **(3)**

(Total for Question 17 is 4 marks)

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Mark scheme · 5.18 Similar Shapes (Lengths): 1-hour Pack

Question 1

find scale factor 12/9 = 4/3 and apply to base: 7 x 4/3	**M1**
calculate 28/3 or 9.333... (method shown)	**M1**
28/3 cm or 9.33... cm awrt	**A1**

Answer: 28/3 cm (9.33... cm awrt 9.33 cm).

Question 2

scale factor = 12/8 oe (= 1.5 or 3/2)	**M1**
10 x their scale factor	**M1**
15 (cm) cao	**A1**

Answer: 15 cm

Question 3

scale factor = 9/18 oe (= 0.5 or 1/2)	**M1**
12 x their scale factor	**M1**
6 (cm) cao	**A1**

Answer: 6 cm

Question 4

12 x 8/3 oe	**M1**
32 (cm) cao	**A1**

Answer: 32 cm

Question 5

52 (cm) cao	**B1**

Answer: 52 cm

Question 6

scale factor = 9/6 oe (= 1.5)	**M1**
10.5 (cm) cao	**A1**

Answer: 10.5 cm

Question 7

9 x 5/2 oe	**M1**
22.5 (cm) cao	**A1**

Answer: 22.5 cm

Question 8

scale factor = 5.6/8 oe (= 0.7)	**M1**
10.5 (cm) cao	**A1**

Answer: 10.5 cm

Question 9

20 x 3/4 oe	**M1**
15 (cm) cao	**A1**

Answer: 15 cm

Question 10

scale factor = 3/4.5 oe (= 2/3)	**M1**
4 (cm) cao	**A1**

Answer: 4 cm

Question 11

find scale factor 14/7 = 2 and apply to hypotenuse: 25 x 2	**M1**
calculate 50	**M1**
50 cm cao	**A1**
state method: corresponding sides scale equally	**B1**

Answer: 50 cm.

Question 12

use scale factor 8/5 on perimeter: 55 x 8/5	**M1**
compute 55 x 8/5 = 11 x 8 = 88	**M1**
88 cm cao	**A1**

Answer: 88 cm.

Question 13

(a) convert 4.5 m to 450 cm and form ratio 18 : 450 or simplify 18/450	**M1**
(a) 1 : 25 cao	**A1**

(a) Answer: 1 : 25

(b) use scale factor 1:25 so width = 5 x 25	**M1**
(b) 125 cm or 1.25 m cao	**A1**

(b) Answer: 125 cm (1.25 m).

Question 14

multiply 15 by scale factor 8/5 or show equivalent method	**M1**
24 cm cao	**A1**

Answer: 24 cm, because 15 x (8/5) = 24 (scale factor 8/5).

Question 15

4.8 m converted to 480 cm oe	**M1**
480 / 24	**M1**
20 (cm) cao	**A1**

Answer: 20 cm

Question 16

scale factor = 6/2.4 oe (= 2.5)	**M1**
1.8 x their 2.5	**M1**
4.5 (m) cao	**A1**

Answer: 4.5 m

Question 17

(a) angle QPM = angle STM and angle PQM = angle TSM (alternate angles, PQ parallel to ST), and angle PMQ = angle SMT (vertically opposite angles), so the triangles are similar (AA)	**B1**

(a) Answer: Alternate angles (PQ parallel to ST) and vertically opposite angles at M give two pairs of equal angles, so the triangles are similar (AA).

(b) PM/MT = QM/MS oe (correct ratio equation set up, e.g. 8/10 = 12/MS)	**M1**
(b) MS = 12 x 10/8 oe (correct rearrangement)	**M1**
(b) 15 (cm) cao	**A1**

(b) Answer: 15 cm

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