4.18 Congruence and Similarity: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A vertical pole 3 m tall casts a shadow 5 m long. At the same time a tree casts a shadow 30 m long. Work out the height of the tree.

(3)

---

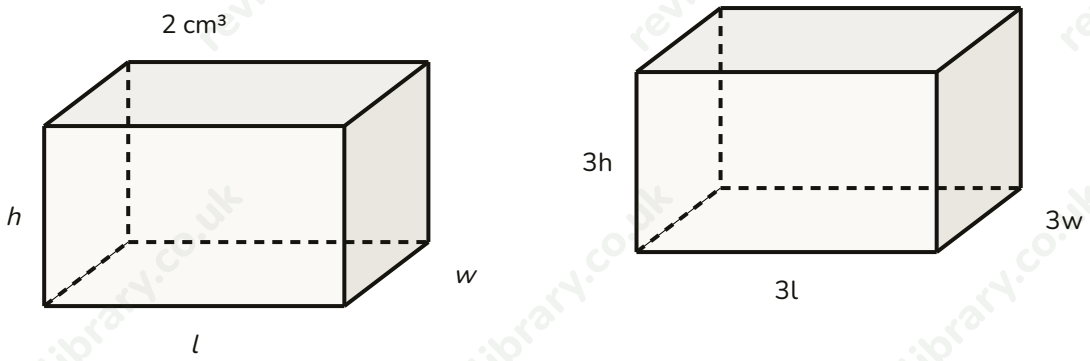
2 A photograph is 10 cm wide and 8 cm tall. It is enlarged so that it is 50 cm wide, keeping the same shape. How tall is the enlarged photograph?

(3)

© Revision Library | revisionlibrary.co.uk

3 Two similar cuboids have corresponding lengths in the ratio 1 : 3. The smaller has a volume of 2 cm³. Work out the volume of the larger cuboid.

Diagram NOT accurately drawn



(3)

---

4 A photograph is 12 cm wide and 4 cm tall. It is enlarged so that it is 96 cm wide, keeping the same shape. How tall is the enlarged photograph?

(3)

---

5 A shape of area 26 cm² is enlarged by scale factor 3. Work out the area of the image.

(2)

© Revision Library | revisionlibrary.co.uk

6 A photograph is 6 cm wide and 4 cm tall. It is enlarged so that it is 48 cm wide, keeping the same shape. How tall is the enlarged photograph?

(3)

---

7 A model car is 3 cm long and is a scale model of a real car 6 cm long. The model is 8 cm wide. How wide is the real car?

(3)

---

8 Two similar shapes have corresponding lengths in the ratio 1 : 5. The smaller shape has an area of 20 cm². Work out the area of the larger shape.

(3)

---

9 A vertical pole 1 m tall casts a shadow 4 m long. At the same time a tree casts a shadow 8 m long. Work out the height of the tree.

(3)

© Revision Library | revisionlibrary.co.uk

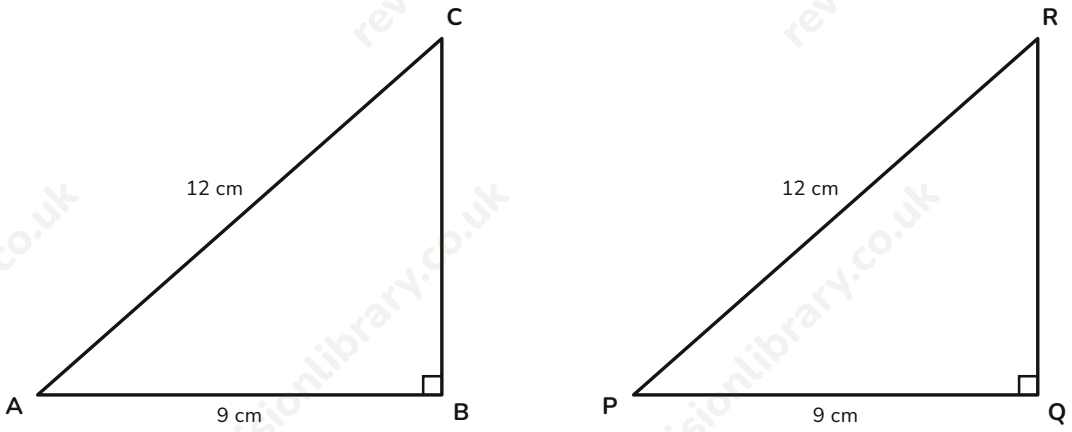
10 Two similar shapes have corresponding lengths in the ratio 1 : 3. The smaller shape has an area of 9 cm². Work out the area of the larger shape.

(3)

---

11 Triangle ABC has a right angle at B, hypotenuse AC = 12 cm and AB = 9 cm. Triangle PQR has a right angle at Q, hypotenuse PR = 12 cm and PQ = 9 cm.
Are the two triangles congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(2)

---

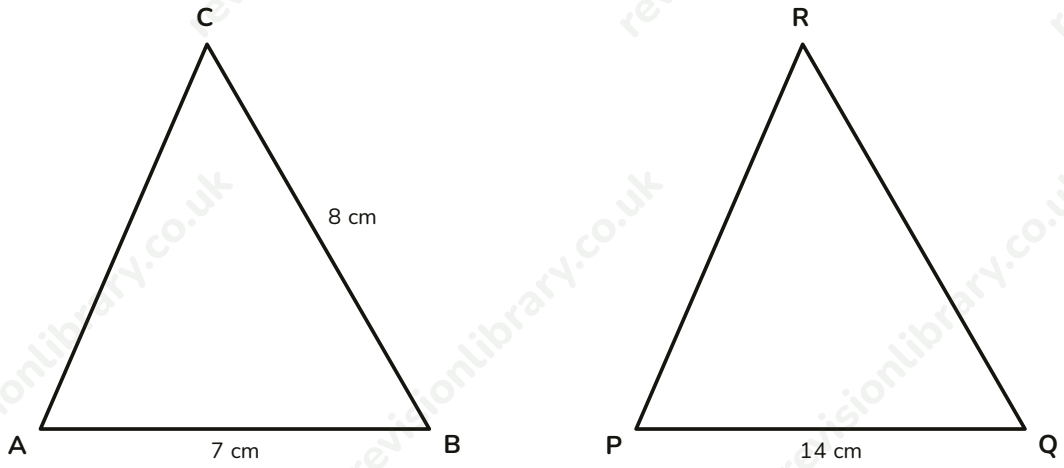
12 Two similar shapes have areas of 18 cm² and 72 cm². The smaller shape has a side of 3 cm. Work out the length of the matching side on the larger shape.

(3)

© Revision Library | revisionlibrary.co.uk

13 Triangle ABC is similar to triangle PQR. AB = 7 cm matches PQ = 14 cm. BC = 8 cm. Work out the length of QR.

Diagram NOT accurately drawn



(3)

---

14 Two similar shapes have areas of 16 cm² and 64 cm². The smaller shape has a side of 5 cm. Work out the length of the matching side on the larger shape.

(3)

---

15 A photograph is 4 cm wide and 4 cm tall. It is enlarged so that it is 8 cm wide, keeping the same shape. How tall is the enlarged photograph?

(3)

© Revision Library | revisionlibrary.co.uk

16 A vertical pole 2 m tall casts a shadow 2 m long. At the same time a tree casts a shadow 12 m long. Work out the height of the tree.

(3)

---

17 Triangle A has sides 7 cm, 8 cm and 9 cm. Triangle B is an enlargement of A with scale factor 5. Work out the perimeter of triangle B.

(3)

---

18 A shape of area 17 cm² is enlarged by scale factor 3. Work out the area of the image.

(2)

---

19 A vertical pole 3 m tall casts a shadow 2 m long. At the same time a tree casts a shadow 18 m long. Work out the height of the tree.

(3)

---

20 A photograph is 10 cm wide and 12 cm tall. It is enlarged so that it is 60 cm wide, keeping the same shape. How tall is the enlarged photograph?

(3)

© Revision Library | revisionlibrary.co.uk

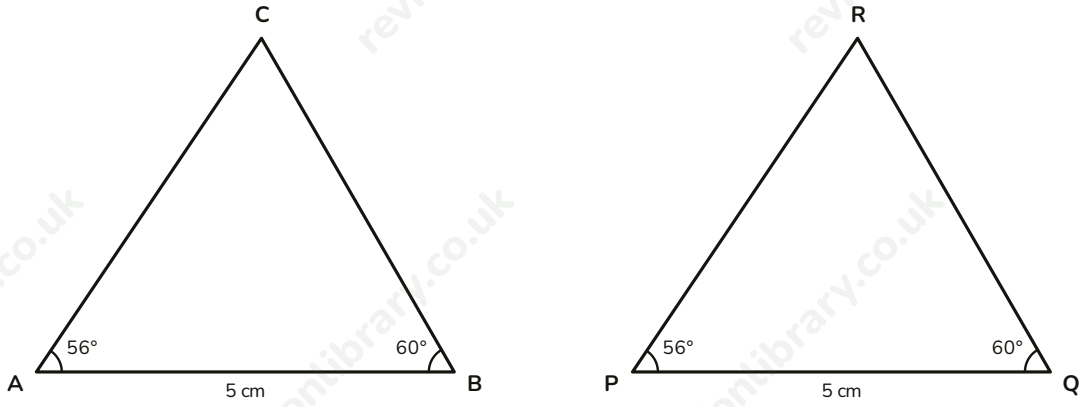
21 Two similar shapes have corresponding lengths in the ratio 1 : 3. The smaller shape has an area of 13 cm². Work out the area of the larger shape.

(3)

---

22 Triangle ABC has angle A = 56°, angle B = 60° and side AB = 5 cm. Triangle PQR has angle P = 56°, angle Q = 60° and side PQ = 5 cm.
Are the two triangles congruent? Give a reason for your answer.

Diagram NOT accurately drawn



(2)

© Revision Library | revisionlibrary.co.uk

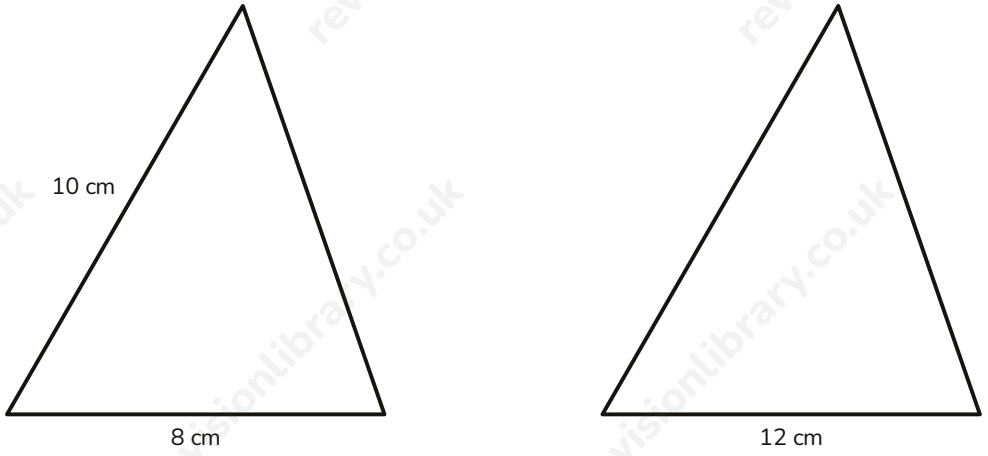
23 Two similar shapes have corresponding lengths in the ratio 1 : 5. The smaller shape has an area of 17 cm². Work out the area of the larger shape.

(3)

---

24 Two similar triangles have corresponding sides 8 cm and 12 cm. The small triangle has another side of length 10 cm. Find the matching side length in the larger triangle.

Diagram NOT accurately drawn

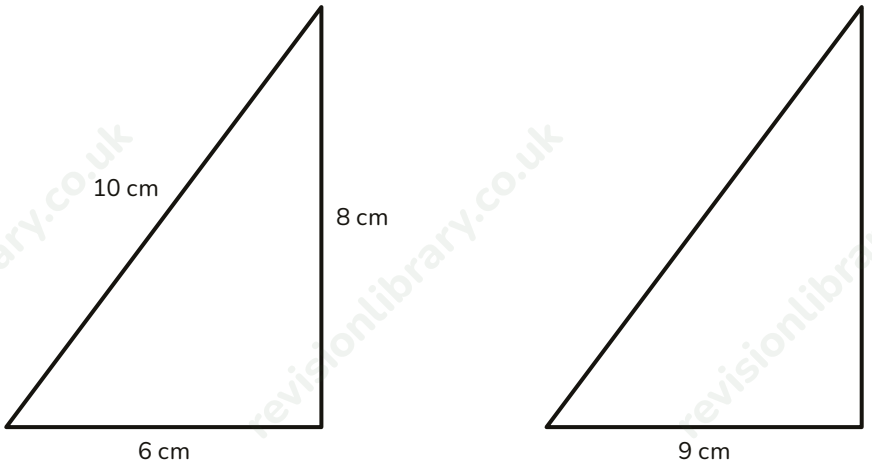


(3)

© Revision Library | revisionlibrary.co.uk

25 A triangle has sides 6 cm, 8 cm and 10 cm. A similar triangle has shortest side 9 cm. Find the other two sides of the similar triangle.

Diagram NOT accurately drawn



(3)

---

26 Rectangle R is similar to rectangle S. R measures 5 cm by 11 cm. S has a width of 8 cm. Find the length of S, to 1 decimal place.

(2)

---

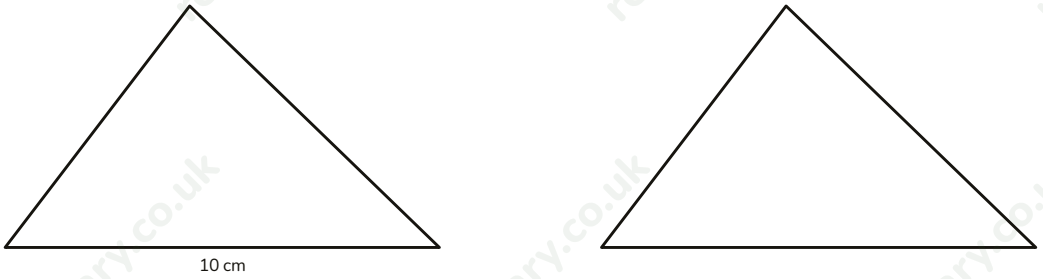
27 Give the congruence condition name for the following: a right-angled triangle where the hypotenuse and one other side match another right-angled triangle.

(1)

© Revision Library | revisionlibrary.co.uk

28 Two similar triangles have a ratio of areas of 25:36. The smaller triangle has a side of length 10 cm.

Diagram NOT accurately drawn



(a) Find the scale factor for lengths from the larger triangle to the smaller triangle. **(2)**

.....

(b) Hence find the corresponding side of the larger triangle. **(1)**

.....

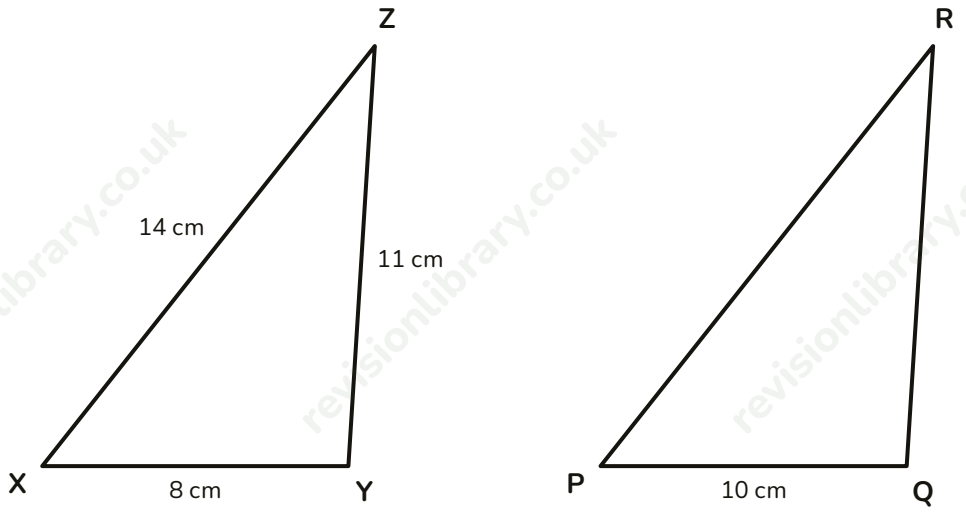
29 Two similar polygons have perimeters in the ratio 6:11. Find the ratio of their corresponding side lengths and the ratio of their areas.

(3)

© Revision Library | revisionlibrary.co.uk

30 Triangles XYZ and PQR are similar. In triangle XYZ, XY = 8 cm, YZ = 11 cm. In triangle PQR, PQ = 10 cm and QR corresponds to YZ. Find PR in triangle PQR given that PR corresponds to XZ which is 14 cm in triangle XYZ.

Diagram NOT accurately drawn



(3)

---

31 Stretch question. A garden planter is an enlargement of a smaller template by a scale factor of 5/3. The template has area 45 cm². Find the area of the planter. Then, if the planter has a side that measures 20 cm, find the matching side length on the template. Show your working.

(4)

© Revision Library | revisionlibrary.co.uk

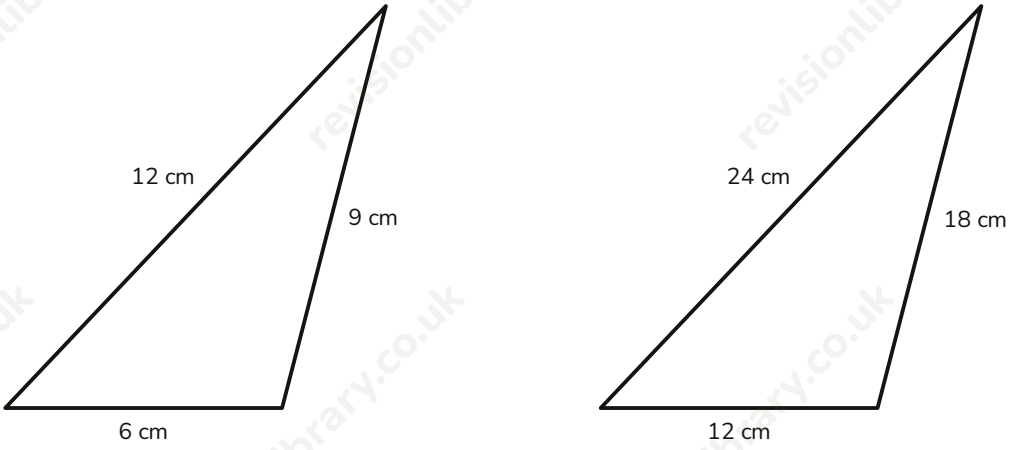
32 Give the congruence condition name for the following: two triangles with two sides equal and the included angle equal.

(1)

---

33 A triangle has sides 6 cm, 9 cm and 12 cm. A second triangle has sides 12 cm, 18 cm and 24 cm. Are the triangles similar? Explain briefly.

Diagram NOT accurately drawn

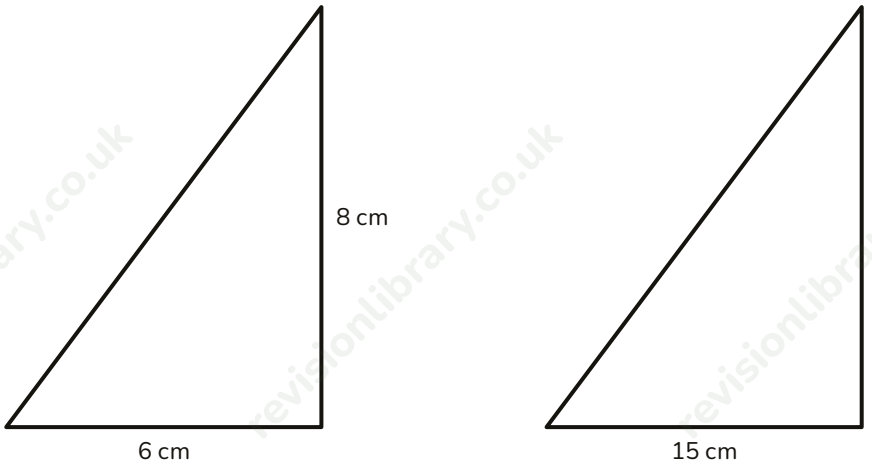


(2)

© Revision Library | revisionlibrary.co.uk

34 Two similar triangles have corresponding sides 6 cm and 15 cm. The small triangle has another side of length 8 cm. Find the matching side length in the larger triangle.

Diagram NOT accurately drawn



(2)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 4.18 Congruence and Similarity: 2-hour Pack

Question 1

similar triangles identified, scale factor from the shadows	M1
3 x 6	M1
18 m cao	A1

Answer: **18 m**

Question 2

scale factor from the widths	M1
8 x 5	M1
40 cm cao	A1

Answer: **40 cm**

Question 3

volume scale factor $3^3 = 27$	M1
2 x 27	M1
54 cm³ cao	A1

Answer: **54 cm^3**

Question 4

scale factor from the widths	M1
4 x 8	M1
32 cm cao	A1

Answer: **32 cm**

Question 5

$3^2 = 9$	M1
234 cm² cao	A1

Answer: **234 cm^2**

Question 6

scale factor from the widths	M1
4 x 8	M1
32 cm cao	A1

Answer: **32 cm**

Question 7

6 ÷ 3	M1
x 8	M1
16 cm cao	A1

Answer: **16 cm**

Question 8

area scale factor $5^2 = 25$	M1
20 x 25	M1
500 cm² cao	A1

Answer: **500 cm^2**

Question 9

similar triangles identified, scale factor from the shadows	M1
1 x 2	M1
2 m cao	A1

Answer: **2 m**

Question 10

area scale factor $3^2 = 9$	M1
9 x 9	M1
81 cm² cao	A1

Answer: **81 cm^2**

Question 11

compares corresponding sides and angles	M1
Yes, RHS (right angle, hypotenuse and one other side)	A1

Answer: **Yes, RHS (right angle, hypotenuse and one other side)**

Question 12

area ratio 4 : 1	M1
length scale factor $\sqrt{4} = 2$	M1
6 cm cao	A1

Answer: **6 cm**

Question 13

scale factor 2	M1
8 x 2	M1
16 cm cao	A1

Answer: **16 cm**

Question 14

area ratio 4 : 1	M1
length scale factor $\sqrt{4} = 2$	M1
10 cm cao	A1

Answer: **10 cm**

Question 15

scale factor from the widths	M1
4 x 2	M1
8 cm cao	A1

Answer: **8 cm**

Question 16

similar triangles identified, scale factor from the shadows	M1
2 x 6	M1
12 m cao	A1

Answer: **12 m**

Question 17

perimeter of A = 24	M1
x 5	M1
120 cm cao	A1

Answer: **120 cm**

Question 18

$3^2 = 9$	M1
153 cm² cao	A1

Answer: **153 cm^2**

© Revision Library | revisionlibrary.co.uk

Question 19

similar triangles identified, scale factor from the shadows	M1
3 x 9	M1
27 m cao	A1

Answer: **27 m**

Question 20

scale factor from the widths	M1
12 x 6	M1
72 cm cao	A1

Answer: **72 cm**

Question 21

area scale factor $3^2 = 9$	M1
13 x 9	M1
117 cm² cao	A1

Answer: **117 cm^2**

Question 22

compares corresponding sides and angles	M1
Yes, ASA (two angles and a corresponding side)	A1

Answer: **Yes, ASA (two angles and a corresponding side)**

Question 23

area scale factor $5^2 = 25$	M1
17 x 25	M1
425 cm² cao	A1

Answer: **425 cm^2**

Question 24

Method: state scale factor = 12/8 = 3/2 or 1.5	M1
Multiply 10 by scale factor to get 15 (allow equivalent method)	M1
Answer 15 cm cao	A1

Answer: **15 cm**

Question 25

Find scale factor: 9/6 = 3/2	M1
Multiply 8 and 10 by 3/2 to get 12 and 15	M1
Correct pair: 12 cm and 15 cm cao	A1

Answer: **12 cm and 15 cm**

Question 26

Find scale factor: 8/5 = 1.6	M1
Answer 17.6 cm cao	A1

Answer: **17.6 cm**

Question 27

Correct name: RHS cao	B1

Answer: **RHS**

Question 28

(a) Recognise that area ratio = (scale factor)^2 and take square roots: $\sqrt{25/36} = 5/6$	M1
(a) State scale factor 5:6 or 5/6 cao	A1

(a) Answer: **5/6**

(b) 12 cm cao ft, using 10 x 6/5	B1

(b) Answer: **12 cm**

Question 29

Recognise perimeter ratio equals linear scale factor: 6:11	M1
State scale factor 6/11 or 6:11 for lengths	M1
Area ratio = $(6/11)^2 = 36/121$ cao	A1

Answer: **Lengths 6:11; areas 36:121**

Question 30

Find scale factor using corresponding sides: PQ/XY = 10/8 = 5/4	M1
Apply same scale factor to XZ: PR = 14 x 5/4 = 17.5	M1
Final answer PR = 17.5 cm cao	A1

Answer: **17.5 cm**

Question 31

Compute area scale factor = $(5/3)^2 = 25/9$	M1
Multiply template area 45 by 25/9 to get planter area: 45 x 25/9 = 125, state planter area 125 cm² cao	A1
For linear matching side, use inverse scale factor: template length = planter length x (3/5) or show method	M1
Compute template length: 20 x 3/5 = 12, state template side 12 cm cao	A1

Answer: **Planter area: 125 cm^2; template side: 12 cm**

Question 32

Correct name: SAS cao	B1

Answer: **SAS**

Question 33

Shows side ratios are equal: 12/6 = 18/9 = 24/12 = 2 or equivalent	M1
States they are similar with scale factor 2 cao	A1

Answer: **Yes. All corresponding sides have ratio 2, so similar with scale factor 2.**

Question 34

Method: state scale factor = 15/6 = 2.5	M1
Answer 20 cm cao	A1

Answer: **20 cm**

© Revision Library | revisionlibrary.co.uk