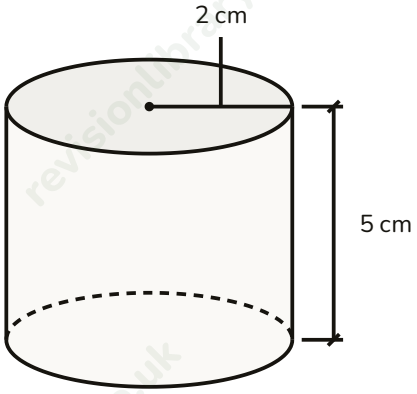
4.12 Volume and Surface Area of Prisms: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A cylinder has radius 2 cm and height 5 cm. Work out its volume. Use π = 3.14.



(3)

---

2 A tank holds 13500 cm³ of water. How many litres is this? (1 litre = 1000 cm³)

(2)

---

3 A tank is 51 cm long and 14 cm wide. Water is poured into it to a depth of 17 cm. How many litres of water are in the tank? (1 litre = 1000 cm³)

(3)

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4 A fish tank is 31 cm long, 22 cm wide and 17 cm high. How many litres of water does it hold when it is full? (1 litre = 1000 cm^3)

(3)

---

5 A tank is 35 cm long and 49 cm wide. Water is poured into it to a depth of 20 cm. How many litres of water are in the tank? (1 litre = 1000 cm^3)

(3)

---

6 A rectangular pool is 8 m long, 2 m wide and 1.5 m deep. How many litres of water does it hold when full? (1 m^3 = 1000 L)

(1)

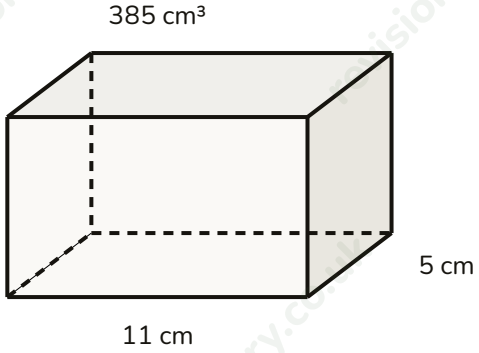
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7 A tank is 54 cm long and 47 cm wide. Water is poured into it to a depth of 12 cm. How many litres of water are in the tank? (1 litre = 1000 cm^3)

(3)

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8 A cuboid has volume 385 cm³. Its length is 11 cm and its width is 5 cm. Work out its height.



(3)

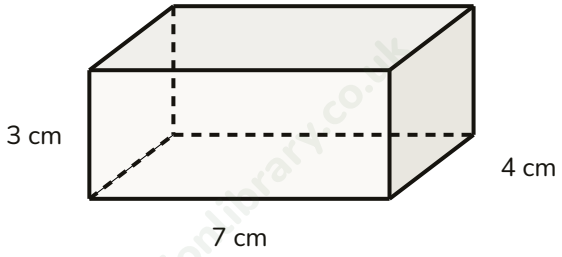
---

9 Convert 125000 cm² into m^2.

(2)

---

10 A cuboid measures 4 cm by 7 cm by 3 cm. Work out its total surface area.



(3)

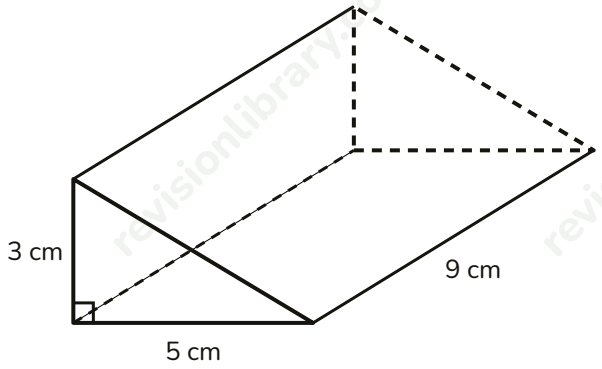
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11 Convert 1.1 m² into cm^2.

(2)

---

12 A triangular prism has a right-angled triangle for its cross-section, with base 5 cm and height 3 cm. The prism is 9 cm long. Work out its volume.



(3)

---

13 Convert 75000 cm² into m^2.

(2)

---

14 A tank is 59 cm long and 18 cm wide. Water is poured into it to a depth of 17 cm. How many litres of water are in the tank? (1 litre = 1000 cm^3)

(3)

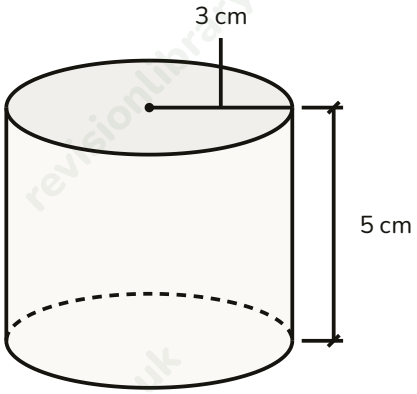
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15 Show the net of a triangular prism has three rectangular faces and two triangular faces. If each triangular end has area 9 cm² and the rectangles have areas 18 cm², 30 cm² and 24 cm², calculate the total surface area of the prism.

(2)

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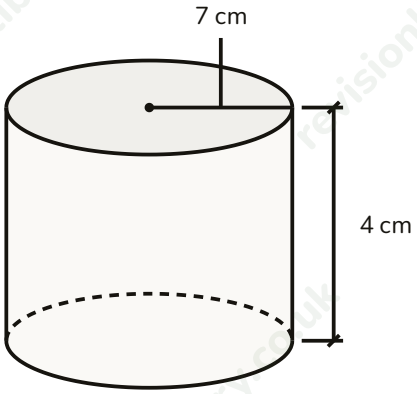
16 A cylinder has radius 3 cm and height 5 cm. Work out its volume. Use π = 3.14.



(3)

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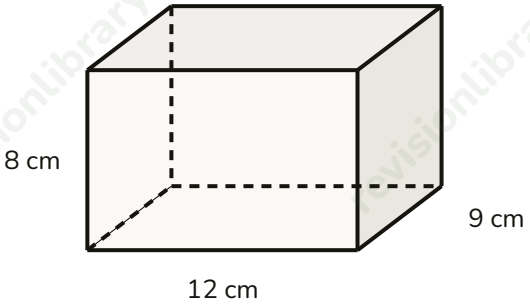
17 A cylinder has radius 7 cm and height 4 cm. Work out its volume. Use π = 3.14.



(3)

---

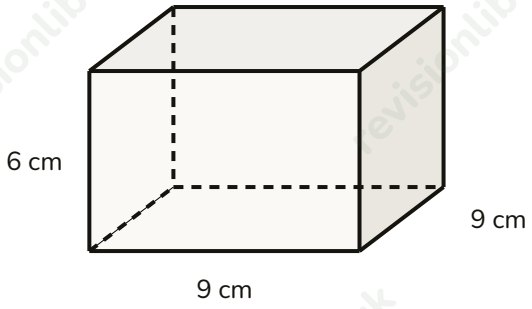
18 A cuboid measures 12 cm by 9 cm by 8 cm. Work out its total surface area.



(3)

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19 A cuboid measures 9 cm by 9 cm by 6 cm. Work out its total surface area.



(3)

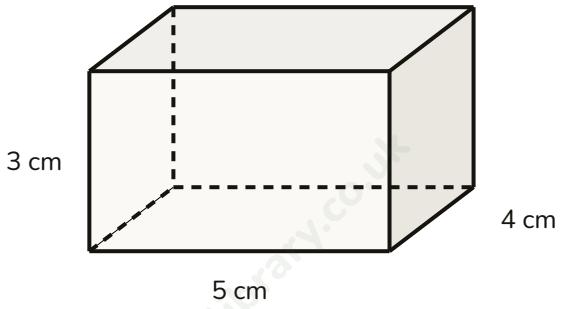
---

20 Convert 4 m² into cm^2.

(2)

---

21 A cuboid measures 5 cm by 4 cm by 3 cm. Work out its total surface area.



(3)

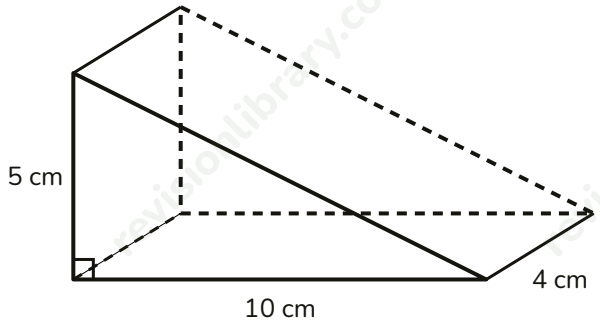
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22 Convert 2 m² into cm^2.

(2)

---

23 A triangular prism has a right-angled triangle for its cross-section, with base 10 cm and height 5 cm. The prism is 4 cm long. Work out its volume.

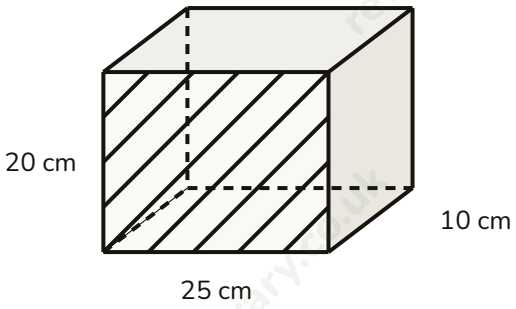


(3)

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24 A cuboid box measures 25 cm by 20 cm by 10 cm. A label covers the whole of one of the 25 cm by 20 cm faces. Calculate the area of that face and then the fraction of the total surface area that the label covers. Give the fraction in its simplest form.

Diagram NOT accurately drawn

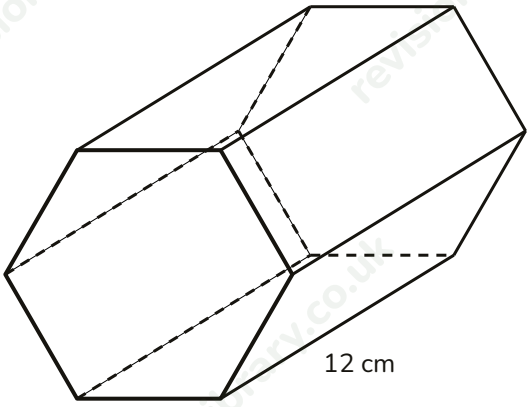


(3)

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25 A prism has a regular hexagon cross section of area 20 cm² and length 12 cm. Calculate its volume. Then convert your answer to litres.

Diagram NOT accurately drawn

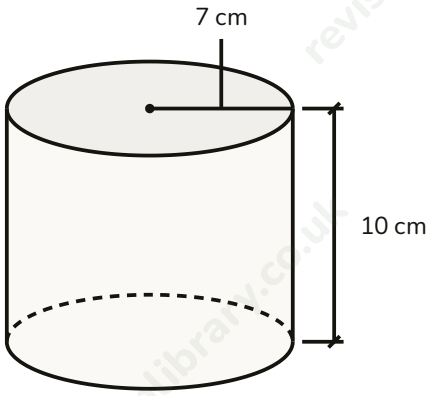


Cross-section area: 20 cm²

(3)

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26 Calculate the volume of a cylinder approximated as a prism by using area of circular cross section. A cylinder has radius 7 cm and height 10 cm. Use π = 3.14. Give your answer to 1 decimal place in cm3.



(2)

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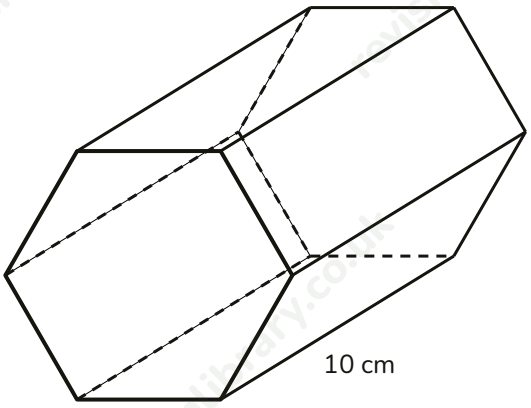
27 A rectangular pool is 10 m long, 3 m wide and 2 m deep. How many litres of water does it hold when full? (1 m^3 = 1000 litres)

(2)

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28 A prism has a regular hexagon cross-section of area 24 cm² and length 10 cm. Calculate its volume, then convert your answer to litres.

Diagram NOT accurately drawn



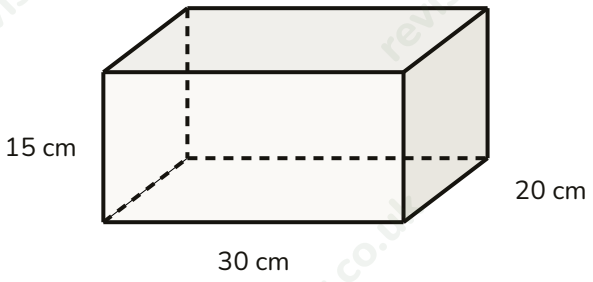
Cross-section area: 24 cm²

(2)

---

29 A cuboid box measures 30 cm by 20 cm by 15 cm. A label is stuck on one of the 30 cm by 20 cm faces. Calculate the fraction of the total surface area that the label's face covers.

Diagram NOT accurately drawn

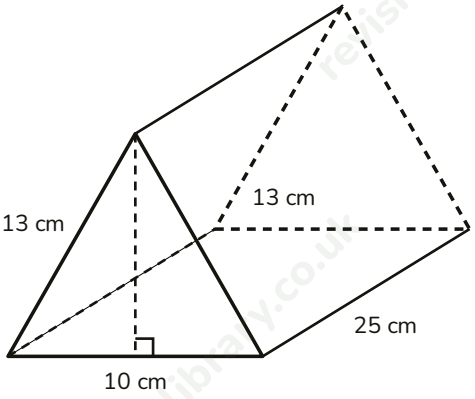


(2)

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30 A metal beam is a triangular prism. The triangular end is isosceles with base 10 cm and equal sides 13 cm. The beam is 25 cm long. Calculate the volume of the beam.

Diagram NOT accurately drawn



(3)

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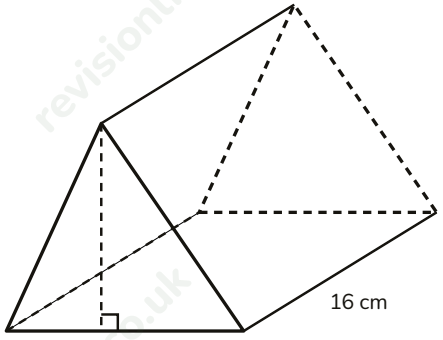
31 A manufacturer makes an open-top box by cutting 5 cm squares from the corners of a 40 cm by 25 cm sheet of card and folding up the sides. Calculate the volume of the box.

(3)

---

32 A prism has a triangular cross-section with base 14 cm and area 63 cm². Calculate the height of the triangle, then the volume of the prism if its length is 16 cm.

Diagram NOT accurately drawn



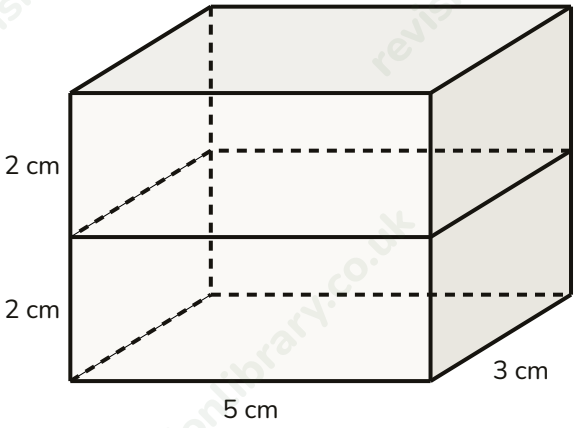
Cross-section area: 63 cm²

(3)

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33 A solid is made by joining two identical rectangular prisms, each 5 cm by 3 cm by 2 cm, along a 5 cm by 3 cm face.

Diagram NOT accurately drawn



(a) Calculate the total volume of the solid. **(2)**

.....

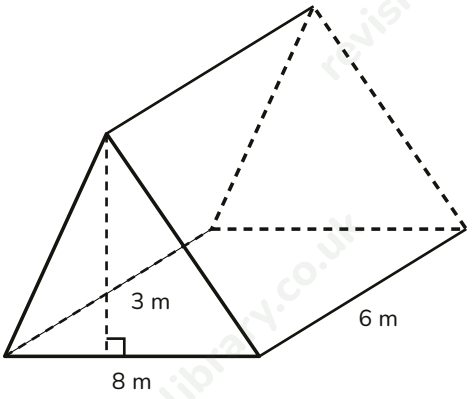
(b) Calculate the total external surface area of the solid. **(2)**

.....

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34 Aiden pours water into a triangular-prism-shaped tank. The triangular cross-section has base 8 m and height 3 m. The tank is 6 m long. Aiden pours in 54000 litres of water.

Diagram NOT accurately drawn



(a) Find the cross-sectional area of the triangular end. **(1)**

.....

(b) Convert 54000 litres of water to m^3. **(1)**

(c) The water forms a smaller prism with the same triangular cross-section as the tank. Find how far along the 6 m length of the tank the water reaches. **(3)**

.....

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Mark scheme · 4.12 Volume and Surface Area of Prisms: 2-hour Pack

Question 1

3.14×2^2	M1
$\times 5$	M1
62.8 cm³ cao	A1

Answer: **62.8 cm³**

Question 2

$13500 \div 1000$	M1
13.5 litres cao	A1

Answer: **13.5 litres**

Question 3

$51 \times 14 \times 17$	M1
$\div 1000$	M1
12.138 litres cao	A1

Answer: **12.138 litres**

Question 4

$31 \times 22 \times 17 = 11594$	M1
$11594 \div 1000$	M1
11.594 litres cao	A1

Answer: **11.594 litres**

Question 5

$35 \times 49 \times 20$	M1
$\div 1000$	M1
34.3 litres cao	A1

Answer: **34.3 litres**

Question 6

24000 L cao	B1

Answer: **24000 L**

Question 7

$54 \times 47 \times 12$	M1
$\div 1000$	M1
30.456 litres cao	A1

Answer: **30.456 litres**

Question 8

$11 \times 5 = 55$	M1
$385 \div 55$	M1
7 cm cao	A1

Answer: **7 cm**

Question 9

$125000 \div 10\,000$	M1
12.5 m² cao	A1

Answer: **12.5 m²**

Question 10

area of at least two different faces found	M1
all three pairs of faces: 2(28) + 2(12) + 2(21)	M1
122 cm² cao	A1

Answer: **122 cm²**

Question 11

1 m² = 10 000 cm² used	M1
11000 cm² cao	A1

Answer: **11000 cm²**

Question 12

cross-section area $1/2 \times 5 \times 3$	M1
$\times 9$	M1
67.5 cm³ cao	A1

Answer: **67.5 cm³**

Question 13

$75000 \div 10\,000$	M1
7.5 m² cao	A1

Answer: **7.5 m²**

Question 14

$59 \times 18 \times 17$	M1
$\div 1000$	M1
18.054 litres cao	A1

Answer: **18.054 litres**

Question 15

method: add areas of two triangles and three rectangles	M1
90 cm² cao	A1

Answer: **90 cm²**

Question 16

3.14×3^2	M1
$\times 5$	M1
141.3 cm³ cao	A1

Answer: **141.3 cm³**

Question 17

3.14×7^2	M1
$\times 4$	M1
615.44 cm³ cao	A1

Answer: **615.44 cm³**

Question 18

area of at least two different faces found	M1
all three pairs of faces: 2(108) + 2(96) + 2(72)	M1
552 cm² cao	A1

Answer: **552 cm²**

Question 19

area of at least two different faces found	M1
all three pairs of faces: 2(81) + 2(54) + 2(54)	M1
378 cm² cao	A1

Answer: **378 cm²**

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Question 20

1 m² = 10 000 cm² used	M1
40000 cm² cao	A1

Answer: **40000 cm²**

Question 21

area of at least two different faces found	M1
all three pairs of faces: 2(20) + 2(15) + 2(12)	M1
94 cm² cao	A1

Answer: **94 cm²**

Question 22

1 m² = 10 000 cm² used	M1
20000 cm² cao	A1

Answer: **20000 cm²**

Question 23

cross-section area 1/2 x 10 x 5	M1
x 4	M1
100 cm³ cao	A1

Answer: **100 cm³**

Question 24

area of face = 25 x 20 = 500 cm²	M1
total surface area = 2(25x20 + 25x10 + 20x10) = 2(500 + 250 + 200) = 2 x 950 = 1900 cm²	M1
fraction 500/1900 = 5/19 cao	A1

Answer: **500 cm²; 5/19**

Question 25

volume method: area cross section x length = 20 x 12 = 240 cm³	M1
convert cm3 to litres: 240 cm³ = 0.24 L or show 240/1000	M1
240 cm³ and 0.24 L cao	A1

Answer: **240 cm³; 0.24 L**

Question 26

area = πr^2 = 3.14 x 7^2 = 3.14 x 49 = 153.86; volume = area x height = 153.86 x 10	M1
1538.6 cm³ cao	A1

Answer: **1538.6 cm³**

Question 27

find volume, 10 x 3 x 2 = 60 m³	M1
60000 cao	A1

Answer: **60000 litres**

Question 28

find volume, 24 x 10 = 240 cm³	M1
0.24 cao	A1

Answer: **240 cm³ = 0.24 litres**

Question 29

find total surface area 2(30x20+30x15+20x15) = 2700 and one face area 600	M1
2/9 cao	A1

Answer: **2/9**

Question 30

find the triangle's height using Pythagoras: $\sqrt{13^2 - 5^2}$ = $\sqrt{144}$ = 12	M1
find triangle area, 0.5 x 10 x 12 = 60	M1
1500 cao	A1

Answer: **1500 cm³**

Question 31

find new base dimensions 40 - 10 = 30 and 25 - 10 = 15	M1
find base area, 30 x 15 = 450	M1
2250 cao	A1

Answer: **2250 cm³**

Question 32

rearrange area formula, height = 2 x 63 / 14	M1
height = 9, then find volume 63 x 16	M1
1008 cao	A1

Answer: **1008 cm³**

Question 33

(a) find the volume of one prism, 5 x 3 x 2 = 30	M1
(a) 60 cao	A1
(a) Answer: **60 cm³**	
(b) find one prism's surface area 2(5x3+5x2+3x2) = 62, double it, then subtract the two joined 5x3 faces (2x15)	M1
(b) 94 cao	A1
(b) Answer: **94 cm²**	

Question 34

(a) 12 cao	B1
(a) Answer: **12 m²**	
(b) 54 cao	B1
(b) Answer: **54 m³**	
(c) recognise volume = cross-sectional area x length, so length = volume / area	M1
(c) 54 / 12	M1
(c) 4.5 cao	A1
(c) Answer: **4.5 m**	

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