4.12 Surface Area: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

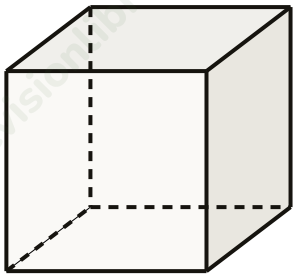
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A cube has side length 4 cm. Work out the surface area of the cube.

Diagram NOT accurately drawn



4 cm

(Total for Question 1 is 1 mark)

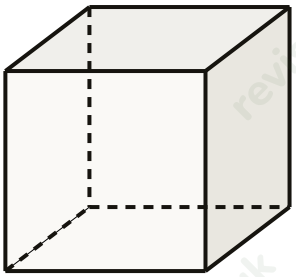
2 Write down the formula for the surface area of a cuboid with length l, width w and height h.

(Total for Question 2 is 1 mark)

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3 A cube has edge length x.

Diagram NOT accurately drawn



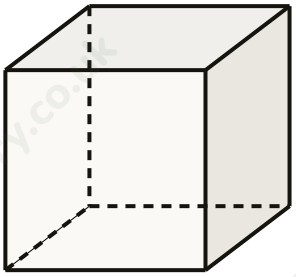
x

(a) Write down a formula for the total surface area, S, of the cube in terms of x. **(1)**

.....

(b) Work out the total surface area of a cube with edge length 5 cm. **(2)**

Diagram NOT accurately drawn



5 cm

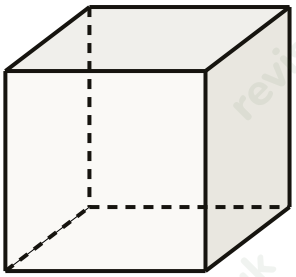
.....

(Total for Question 3 is 3 marks)

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4 A cube has edge length 4 cm. Which of the following is the total surface area of the cube?

Diagram NOT accurately drawn



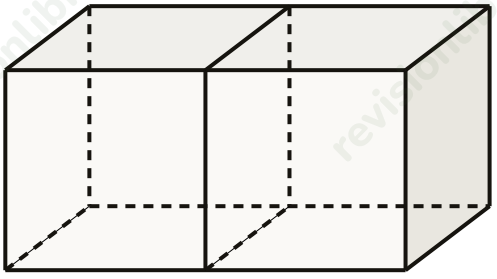
- ☐ A) 16 cm²
- ☐ B) 64 cm²
- ☐ C) 96 cm²
- ☐ D) 24 cm²

(Total for Question 4 is 1 mark)

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5 Two identical cubes, each of side 5 cm, are joined together by one face so they form a solid. Find the surface area of the solid.

Diagram NOT accurately drawn

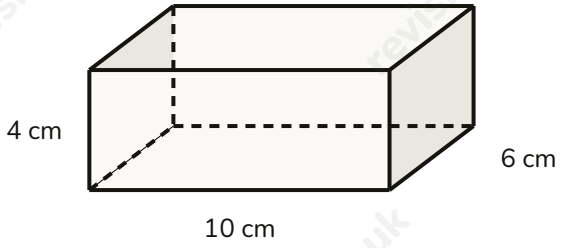


(Total for Question 5 is 3 marks)

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6 A storage box without its lid is a cuboid 10 cm by 6 cm by 4 cm high. Calculate the surface area of the box excluding the lid (include the base and the four sides).

Diagram NOT accurately drawn

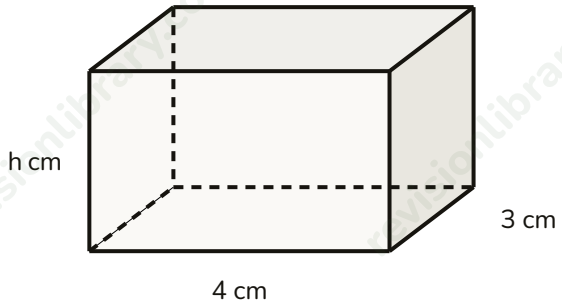


(Total for Question 6 is 2 marks)

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7 A cuboid has dimensions 4 cm by 3 cm by h cm. The total surface area is 94 cm². Find the value of h.

Diagram NOT accurately drawn

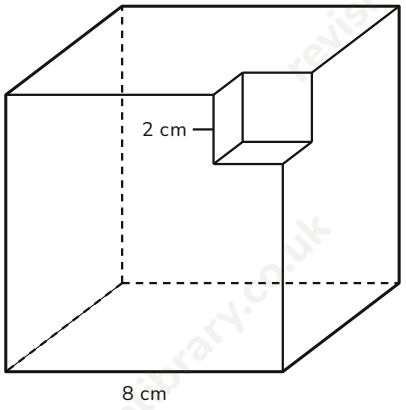


(Total for Question 7 is 2 marks)

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8 A small cube of edge 2 cm is cut from one corner of a larger solid cube of edge 8 cm. Work out the total surface area of the remaining solid, giving a reason for your method.

Diagram NOT accurately drawn

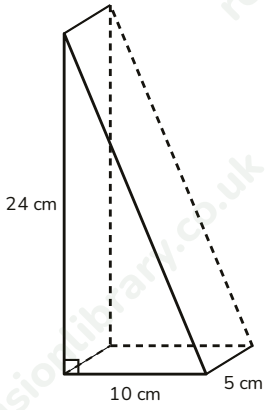


(Total for Question 8 is 3 marks)

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9 A prism has a cross-section that is a right-angled triangle with perpendicular sides 10 cm and 24 cm. The length of the prism is 5 cm.
Work out the total surface area of the prism.

Diagram NOT accurately drawn

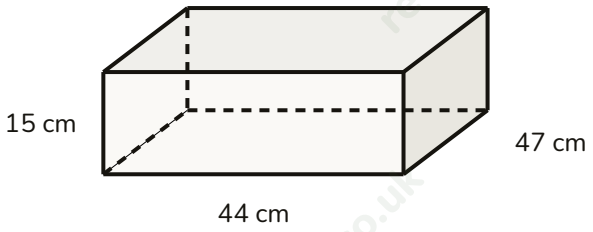


(Total for Question 9 is 4 marks)

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10 A closed wooden box is a cuboid 44 cm by 47 cm by 15 cm. All of the outside is painted. One tin of paint covers 3000 cm^2.
Work out the least number of tins of paint needed to paint the box.

Diagram NOT accurately drawn

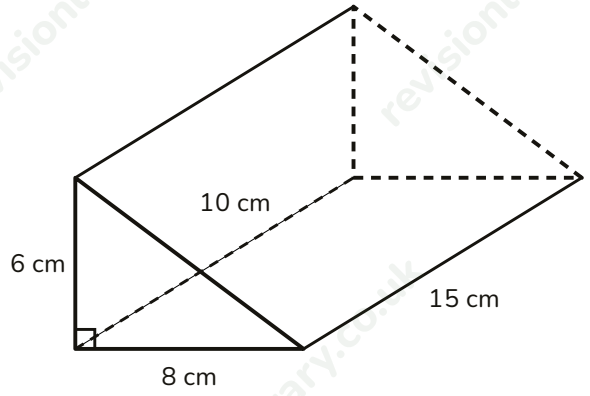


(Total for Question 10 is 4 marks)

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11 A triangular prism has triangular cross-section with sides 6 cm, 8 cm and 10 cm and length 15 cm. Calculate the total surface area of the prism.

Diagram NOT accurately drawn



(Total for Question 11 is 3 marks)

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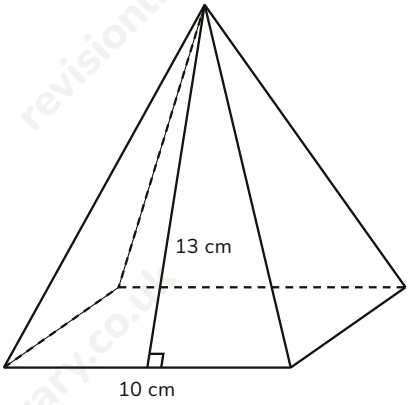
12 Show that increasing every linear dimension of a cuboid by 10% increases its surface area by 21%. You must show your working.

(Total for Question 12 is 3 marks)

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13 A regular square pyramid has base side 10 cm and sloping height 13 cm. Calculate the total surface area of the pyramid.

Diagram NOT accurately drawn



(Total for Question 13 is 4 marks)

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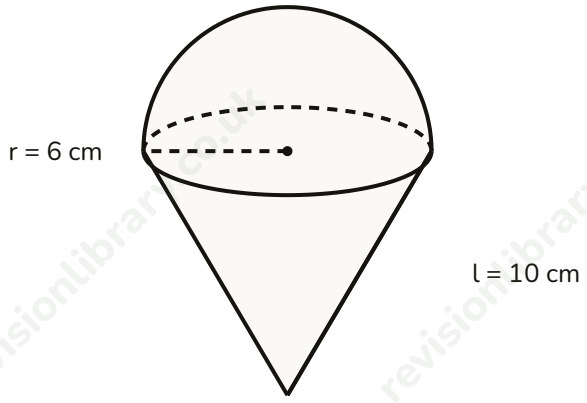
14 Show that if the dimensions of a solid are all multiplied by 3, its total surface area is multiplied by 9. You may use a cube or any prism as an example and justify your scaling step.

(Total for Question 14 is 3 marks)

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15 A solid model is made by placing a hemisphere on top of a right circular cone so that the flat face of the hemisphere rests on the cone base. The hemisphere has radius r, and the cone has the same base radius r and sloping height l. The curved surface area of the hemisphere is $2\pi r^2$ and the curved surface area of the cone is $\pi r l$. Given r = 6 cm and l = 10 cm, calculate the total exposed surface area of the model (do not include the circular area where they meet). Give your answer in terms of π.

Diagram NOT accurately drawn



(Total for Question 15 is 7 marks)

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Mark scheme · 4.12 Surface Area: Test Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

96 cm² cao	**B1**

Answer: 96 cm^2

Question 2

2(lw + lh + wh) cao	**B1**

Answer: Surface area = 2(lw + lh + wh)

Question 3

(a) S = $6x^2$ oe	**B1**

(a) Answer: S = $6x^2$

(b) 5^2 (= 25) seen, or 6 x 5^2	**M1**
(b) 150 cm² cao	**A1**

(b) Answer: 150 cm^2

Question 4

C (96 cm²)	**B1**

Answer: C) 96 cm^2

Question 5

each cube SA = 6*5^2 = 150 cm² so two cubes = 300 cm²	**M1**
subtract the two joined faces: 2*25 = 50 cm²	**M1**
total SA = 250 cm² cao	**A1**

Answer: 250 cm^2

Question 6

method for lateral area + base: 2(lh + wh) + lw or equivalent	**M1**
188 cm² cao	**A1**

Answer: 188 cm^2

Question 7

use 2(lw + lh + wh) = 94 leading to 2(12 + 4h + 3h) = 94 or equivalent setup	**M1**
h = 5 cm cao	**A1**

Answer: 5 cm

Question 8

surface area of the large cube, 6x8^2 (= 384)	**M1**
correct reasoning that the three small square faces removed (3x2^2) are exactly replaced by three new small square faces exposed (3x2^2), so the surface area is unchanged	**B1**
384 cm² cao	**A1**

Answer: 384 cm^2

Question 9

hypotenuse $\sqrt{10^2 + 24^2}$ = 26	**M1**
two triangles 2 x 1/2 x 10 x 24 = 240	**M1**
rectangles (10 + 24 + 26) x 5	**M1**
540 cm²	**A1**

Answer: 540 cm^2

Question 10

44 x 47, 44 x 15, 47 x 15 found	**M1**
total surface area 6866 cm²	**M1**
6866 / 3000 = 2.29	**M1**
3 tins	**A1**

Answer: 3 tins

Question 11

area of triangle = 1/2 * 6 * 8 = 24 cm² or equivalent method shown	**M1**
lateral area = perimeter(6+8+10)=24 times length 15 => 24*15 = 360 cm²	**M1**
total surface area = 2*24 + 360 = 408 cm² cao	**A1**

Answer: 408 cm^2

Question 12

express new dimensions as 1.1 times original and show new surface area is multiplied by $(1.1)^2$	**M1/cso**
calculate $(1.1)^2$ = 1.21	**M1/cso**
state increase is 21% cao	**A1/cso**

Answer: 21% increase

Question 13

identify base area and 4 triangular faces: base = 10^2 = 100, each triangle area = 1/2 * base side * sloping height	**M1**
triangle area = 1/2 * 10 * 13 = 65, total for four faces = 4*65 = 260	**M1**
sum base + faces = 100 + 260	**M1**
360 cm² cao	**A1**

Answer: 360 cm^2

Question 14

state surface area scales as length^2 so factor becomes k^2 when lengths scaled by k	**M1**
substitute k=3 to get scaling factor 3^2 = 9	**M1**
conclusion: total surface area multiplied by 9 with justification oe	**A1**

Answer: Surface area scale factor = 3^2 = 9, so total surface area is multiplied by 9.

Question 15

identify the two exposed curved surfaces, using hemisphere area 2 π r^2 and cone area π r l; exclude the hidden circular face where they meet (may be implied by the calculation)	**B1**
substitute r = 6 into the hemisphere formula: 2 π x 6^2	**M1**
hemisphere curved area = 72 π cm^2 cao	**A1**
substitute r = 6 and l = 10 into the cone formula: π x 6 x 10	**M1**
cone curved area = 60 π cm^2 cao	**A1**
add the two curved areas: 72 π + 60 π; accept equivalent combined working such as π x 6 x (2 x 6 + 10), crediting the component method and accuracy marks where implied, without adding marks for an alternative route	**M1**
final answer 132 π cm^2 cao, stated in terms of π	**A1**

Answer: 132 π cm^2

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