4.12D Surface Area: Fluency and Exam Drill

EDEXCEL 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.

(Total for Question 1 is 1 mark)

2 Work out the surface area of a cuboid with length 4 cm, width 3 cm and height 2 cm.

(Total for Question 2 is 1 mark)

3 A cuboid measures 12 cm by 5 cm by 3 cm. Calculate its surface area.

(Total for Question 3 is 2 marks)

4 A rectangular block measures 1.2 m by 0.8 m by 0.5 m. Calculate its surface area in square metres. Give your answer to 2 decimal places.

(Total for Question 4 is 2 marks)

5 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.

(Total for Question 5 is 3 marks)

6 A cuboid of dimensions 8 cm by 4 cm by 4 cm is attached to a cube of side 4 cm so that the 4 cm by 4 cm faces are exactly joined. Work out the surface area of the composite solid.

(Total for Question 6 is 3 marks)

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7 A cuboid has length 10 cm, width w cm and height 3 cm. The surface area of the cuboid is 190 cm^2. Work out w.

(Total for Question 7 is 3 marks)

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8 A triangular prism has triangular cross-section with sides 3 cm, 4 cm and 5 cm and length 12 cm. Calculate the total surface area of the prism.

(Total for Question 8 is 3 marks)

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9 A rectangular prism has base 6 cm by 4 cm and height h cm. The total surface area is 188 cm^2. Work out h.

(Total for Question 9 is 3 marks)

10 A house model is made by placing a triangular prism roof on top of a rectangular cuboid. The cuboid measures 12 cm by 8 cm by 6 cm. The roof is a triangular prism of length 12 cm where each triangular cross-section has base 8 cm and height 5 cm. The roof sits centrally on the top of the cuboid so that a full rectangular face of the roof of area 12 cm by 8 cm is attached to the cuboid top. Calculate the total surface area of the complete model. Give your answer to 2 decimal places.

(Total for Question 10 is 4 marks)

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11 A wooden crate measures 30 cm by 20 cm by 10 cm. The crate is to be painted on all outer faces except the bottom (the crate sits on the ground). Calculate the painted surface area in square centimetres.

(Total for Question 11 is 3 marks)

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12 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.

(Total for Question 12 is 3 marks)

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13 A block measures 600 mm by 200 mm by 100 mm. Calculate its surface area in square metres. Give your answer to 2 decimal places.

(Total for Question 13 is 2 marks)

14 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 14 is 3 marks)

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15 A triangular prism has triangular cross-section with sides 10 cm, 24 cm and 26 cm and length 14 cm. Calculate the total surface area of the prism.

(Total for Question 15 is 3 marks)

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

(Total for Question 16 is 1 mark)

Mark scheme · 4.12D Surface Area: Fluency and Exam Drill

Question 1

- **B1** 96 cm^2 cao
- **Answer: 96 cm^2**

Question 2

- **B1** 52 cm^2 cao
- **Answer: 52 cm^2**

Question 3

- **M1** correct method: 2(lw + lh + wh) or calculation of each pair of faces shown
- **A1** 222 cm^2 cao
- **Answer: 222 cm^2**

Question 4

- **M1** convert and apply SA = 2(lw + lh + wh) with l=1.2, w=0.8, h=0.5
- **A1** 3.92 m^2 awrt 2 dp
- **Answer: 3.92 m^2**

Question 5

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

Question 6

- **M1** calculate SA of cuboid 8x4x4: 2(8*4 + 8*4 + 4*4) = 160 cm^2 and cube SA $6*4^2$ = 96 cm^2
- **M1** subtract the two joined faces (2*16 = 32 cm^2) from the sum
- **A1** 160 + 96 - 32 = 224 cm^2 cao
- **Answer: 224 cm^2**

Question 7

- **M1** form 2(lw + lh + wh) = 190 or simplify to 13w + 30 = 95 (showing steps)
- **M1** solve 13w = 65 or equivalent algebra shown
- **A1** w = 5 cm cao
- **Answer: 5 cm**

Question 8

- **M1** area of triangle = 1/2 * 3 * 4 = 6 cm^2 and 2*area = 12 cm^2
- **M1** lateral area = perimeter 12 * length 12 = 144 cm^2
- **A1** total surface area = 12 + 144 = 156 cm^2 cao
- **Answer: 156 cm^2**

Question 9

- **M1** form SA = 2(6*4 + 6h + 4h) = 188 => 48 + 20h = 188 or equivalent
- **M1** solve 20h = 140 (show working)
- **A1** h = 7 cm cao
- **Answer: 7 cm**

Question 10

- **M1** calculate SA of cuboid: $2(12*8 + 12*6 + 8*6) = 432$ cm^2
- **M1** calculate SA of triangular prism: 2*area triangle where area = 1/2*8*5 = 20 => 40 and lateral = perimeter*length where perimeter = $8 + 2*\sqrt{4^2+5^2}$ => compute lateral
- **M1** subtract the two attached faces (top of cuboid 12*8 and the corresponding rectangular face of roof) from the sum of the two SAs
- **A1** total SA = 529.67 cm^2 awrt 2 dp
- **Answer: 529.67 cm^2**

Question 11

- **M1** calculate total SA = $2(30*20 + 30*10 + 20*10) = 2200$ cm^2
- **M1** subtract bottom area $30*20 = 600$ cm^2
- **A1** painted area = 1600 cm^2 cao
- **Answer: 1600 cm^2**

Question 12

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

Question 13

- **M1** convert to metres 0.6, 0.2, 0.1 and apply SA = 2(lw + lh + wh)
- **A1** 0.40 m^2 cao
- **Answer: 0.40 m^2**

Question 14

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

Question 15

- **M1** area of triangle = 1/2 * 10 * 24 = 120 cm^2 (or equivalent)
- **M1** lateral area = perimeter 60 * length 14 = 840 cm^2
- **A1** total surface area = 2*120 + 840 = 1080 cm^2 cao
- **Answer: 1080 cm^2**

Question 16

- **B1** 2(lw + lh + wh) cao
- **Answer: Surface area = 2(lw + lh + wh)**