4.17 Plans and Elevations: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

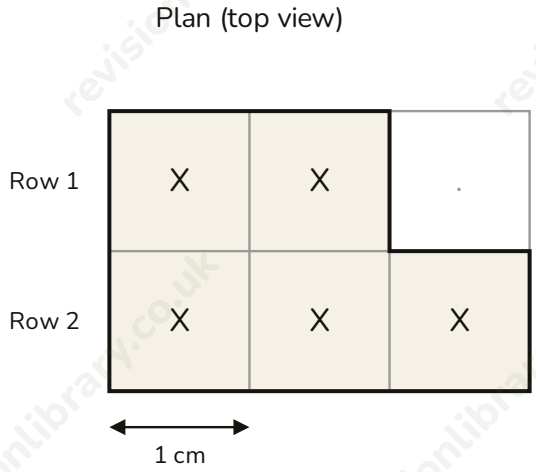
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The plan of a solid, drawn on a centimetre grid, is an L-shape made from 5 unit squares, as shown. Every position in the plan has a stack of cubes exactly 3 cubes tall.

Diagram NOT accurately drawn



(a) How many unit squares make up the plan? **(1)**

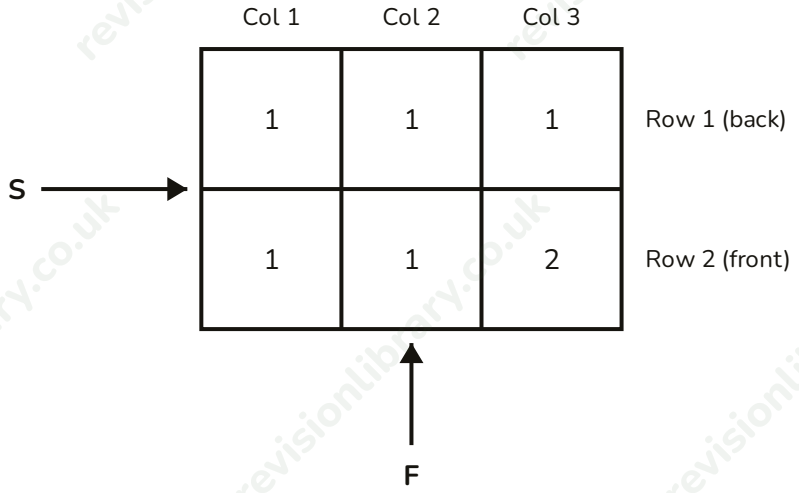
(b) Work out the total number of cubes in the solid. **(2)**

.....

(Total for Question 1 is 3 marks)

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2 The diagram shows a solid built from 1 cm cubes standing on a grid. The numbers show how many cubes are stacked at each position.



(a) Draw the front elevation of the solid, as viewed from arrow F. **(2)**

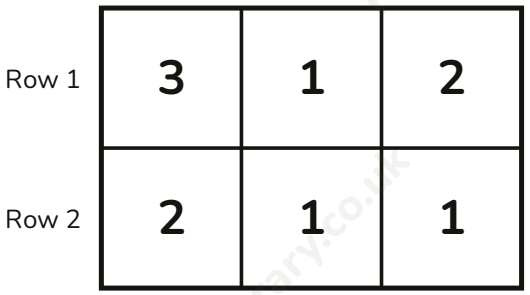
(b) Draw the side elevation of the solid, as viewed from arrow S. **(2)**

(Total for Question 2 is 4 marks)

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3 The diagram shows a solid made from 2 cm cubes standing on a grid. The numbers show how many cubes are stacked at each position.

Diagram NOT accurately drawn



Numbers = height of stack (in 2 cm cubes)

(a) How many 2 cm cubes are used to build the solid? **(1)**

(b) Work out the total volume of the solid. **(2)**

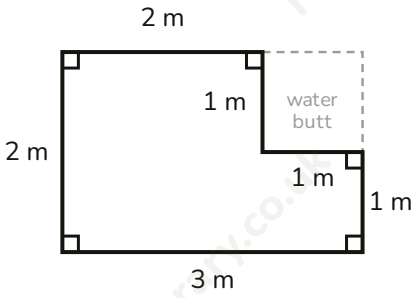
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(Total for Question 3 is 3 marks)

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4 A garden shed has a rectangular floor plan measuring 3 m by 2 m, but a 1 m by 1 m square has been removed from one corner to make room for a water butt, forming an L-shaped plan. All corners are right angles.

Diagram NOT accurately drawn



(a) Work out the area of the shed's floor plan. **(2)**

.....

(b) Work out the perimeter of the shed's floor plan. **(1)**

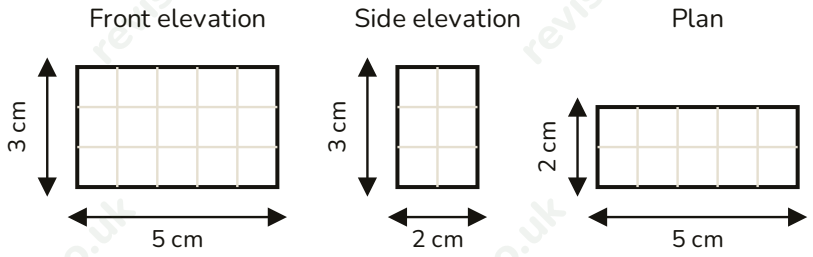
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(Total for Question 4 is 3 marks)

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5 A cuboid has front elevation measuring 5 cm by 3 cm, side elevation measuring 2 cm by 3 cm, and plan measuring 5 cm by 2 cm.

Diagram NOT accurately drawn



(a) Write down the length, width and height of the cuboid. **(1)**

.....

(b) Work out the volume of the cuboid. **(2)**

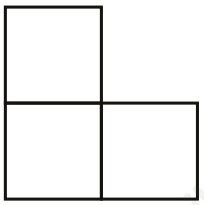
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(Total for Question 5 is 3 marks)

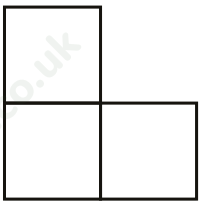
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6 A solid is built from unit cubes on a 2 by 2 grid, with at least one cube at each of the four positions. Let the positions be Front-left, Front-right, Back-left and Back-right. The front elevation viewed from the front shows heights (left to right) 2 and 1. The side elevation viewed from the right shows heights (front to back) 2 and 1. Work out the height (number of unit cubes stacked) at each of the four grid positions.

Front elevation



Right elevation



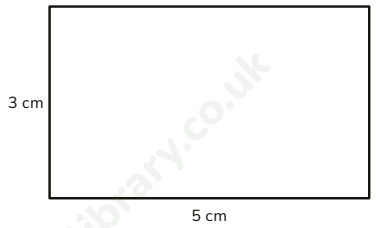
(Total for Question 6 is 3 marks)

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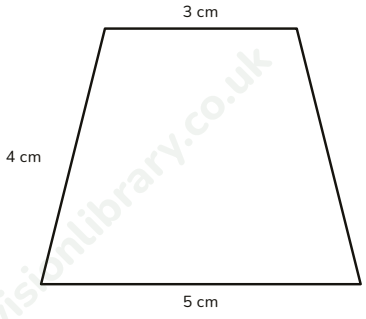
7 A solid is a prism with a constant trapezium cross-section throughout its depth. It has plan a 5 cm by 3 cm rectangle. The front elevation is a trapezium with top base 3 cm, bottom base 5 cm and height 4 cm. The side elevation is a rectangle 3 cm by 4 cm.
Work out the volume of the solid in cubic centimetres.

Diagram NOT accurately drawn

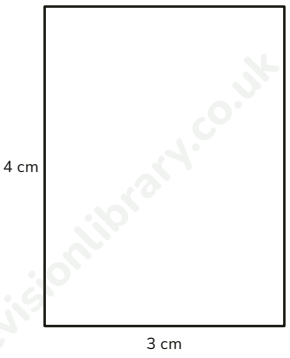
plan



front elevation



side elevation



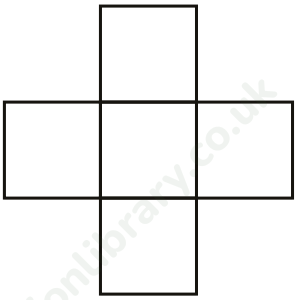
(Total for Question 7 is 3 marks)

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8 A shape has plan a cross shaped layout on a 3 by 3 grid: central square and the middle square on each side, so 5 unit squares in the plan. The model consists of five stacks of unit cubes, one at each occupied plan position. The central stack has height 3 cubes and each of the four arm stacks has height 1 cube.

Work out the total number of unit cubes used.

Diagram NOT accurately drawn



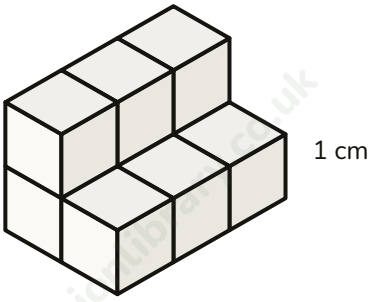
(Total for Question 8 is 3 marks)

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9 A model is built from 1 cm cubes. The plan is a 2 by 3 rectangle. The front elevation shows heights 2 and 1 across the width: left column height 2 cm, right column height 1 cm, for each of the 3 positions along the length.

Work out the total number of 1 cm cubes used in the model.

Diagram NOT accurately drawn



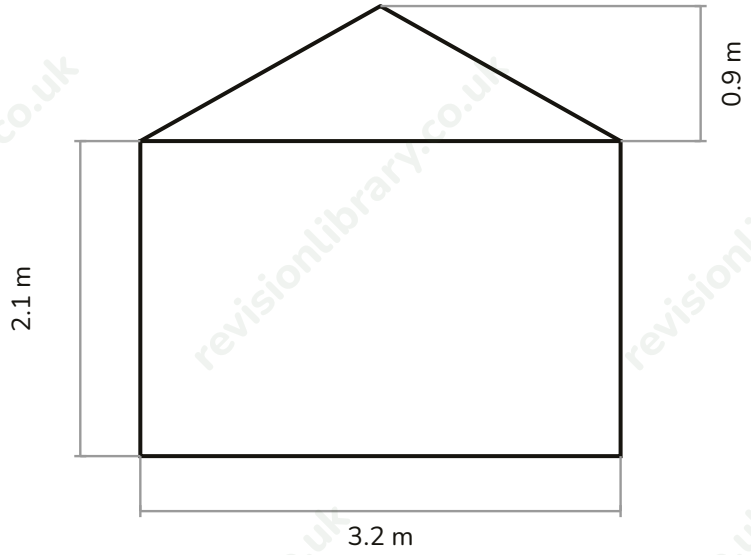
(Total for Question 9 is 4 marks)

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10 The front elevation of a garden summerhouse is a rectangle with an isosceles triangle roof on top. The rectangle is 3.2 m wide and 2.1 m high. The triangular roof has a base of 3.2 m and a height of 0.9 m.

Work out the total area of the front elevation.

Diagram NOT accurately drawn

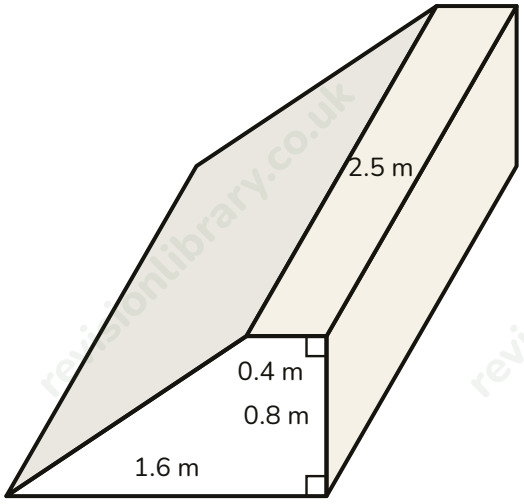


(Total for Question 10 is 4 marks)

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11 The front elevation (cross-section) of a skateboard ramp is a trapezium. The two parallel sides are 0.4 m and 1.6 m, and the perpendicular distance between them is 0.8 m. The ramp is a prism, 2.5 m wide (front to back).

Diagram NOT accurately drawn



(a) Work out the area of the front elevation. **(2)**

.....

(b) Work out the volume of the ramp. **(2)**

.....

(Total for Question 11 is 4 marks)

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12 A solid is made from 1 cm cubes on a 3 by 3 base. The numbers show how many cubes are in each stack, with the columns listed from left to right.

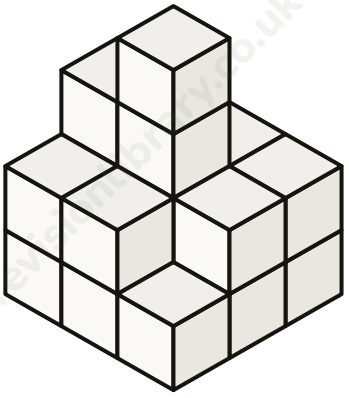
Front row: 2, 2, 1

Middle row: 3, 4, 2

Back row: 2, 2, 2

Cubes are added until the solid is a 3 by 3 block with the same height as the tallest stack. How many cubes are added?

Diagram NOT accurately drawn



(Total for Question 12 is 3 marks)

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13 A solid is made from 1 cm cubes on a 3 by 3 base. The numbers show how many cubes are in each stack, with the columns listed from left to right.

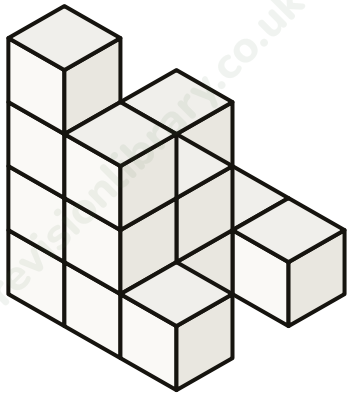
Front row: 4, 3, 1

Middle row: 0, 2, 0

Back row: 2, 1, 1

More cubes are added without changing the front elevation or the side elevation. What is the greatest number of cubes that can be added?

Diagram NOT accurately drawn



(Total for Question 13 is 3 marks)

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14 A solid is made from 1 cm cubes on a 3 by 3 base. The numbers show how many cubes are in each stack, with the columns listed from left to right.

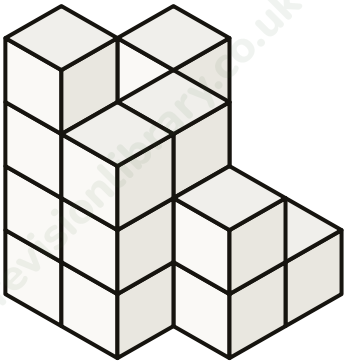
Front row: 4, 3, 0

Middle row: 1, 3, 2

Back row: 3, 0, 1

The side elevation is the view from the left-hand side. How many squares are in the side elevation?

Diagram NOT accurately drawn



(Total for Question 14 is 2 marks)

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Mark scheme · 4.17 Plans and Elevations: 1-hour Pack

Question 1

(a) 5 cao **B1**

(a) Answer: 5

(b) 5 x 3 **M1**

(b) 15 cao **A1**

(b) Answer: 15

Question 2

(a) correct heights per column: 1, 1, 2 (left to right) **B1**

(a) correct overall shape: 3 squares wide with a single extra square on top of the right-hand column **B1**

(a) Answer: A profile 3 squares wide with heights (left to right) 1, 1, 2 unit squares.

(b) correct heights per row (depth position): back = 1, front = 2 **B1**

(b) correct overall shape: 2 squares wide with the front column one square taller than the back column **B1**

(b) Answer: A profile 2 squares wide with heights (back to front) 1, 2 unit squares.

Question 3

(a) 10 cao **B1**

(a) Answer: 10

(b) volume of one cube = 2^3 (= 8 cm³), or 10 x 2 x 2 x 2 **M1**

(b) 80 cm³ cao **A1**

(b) Answer: 80 cm^3

Question 4

(a) 3 x 2 (= 6) and 1 x 1 (= 1) identified, or equivalent split into two rectangles **M1**

(a) 5 m² cao **A1**

(a) Answer: 5 m^2

(b) 10 m cao **B1**

(b) Answer: 10 m

Question 5

(a) 5 cm, 2 cm and 3 cm identified (in any correspondence) oe **B1**

(a) Answer: Length 5 cm, width 2 cm, height 3 cm

(b) 5 x 2 x 3 **M1**

(b) 30 cm³ cao **A1**

(b) Answer: 30 cm^3

Question 6

use maxima: for each column and row, set max heights equal to given elevations oe **M1**

deduce Front-left = 2 from constraints and others cannot exceed given maxima, so find remaining heights oe **M1**

heights: Front-left 2, Front-right 1, Back-left 1, Back-right 1 cao **A1**

Answer: Front-left 2, Front-right 1, Back-left 1, Back-right 1 (heights in unit cubes). Explanation: let h_{FL} = 2, then remaining values consistent with front and side maxima are 1,1,1.

Question 7

find area of trapezium cross-section = (3 + 5) / 2 x 4 = 16 cm² **M1**

use side elevation to confirm depth/width = 3 cm or interpret width correctly **M1**

16 x 3 = 48 cm³ cao **A1**

Answer: 48

Question 8

identify heights for each of the 5 plan positions: central 3, four arms 1 each **M1**

calculate total 3 + 4 x 1 = 7 **M1**

7 cao **A1**

Answer: 7

Question 9

identify number of stacks from plan 2 x 3 and per-stack heights (for each of 3 positions heights sum 2 + 1 = 3) **M1**

calculate per-position total 3, show multiplication by 3 positions **M1**

compute 3 x 3 = 9 **M1**

9 cao **A1**

Answer: 9

Question 10

3.2 x 2.1 (= 6.72) **M1**

0.5 x 3.2 x 0.9 (= 1.44) **M1**

6.72 + 1.44 (dep on both previous M marks) **M1**

8.16 m² cao (awrt 8.16) **A1**

Answer: 8.16 m^2

Question 11

(a) 0.5 x (0.4 + 1.6) x 0.8 **M1**

(a) 0.8 m² cao **A1**

(a) Answer: 0.8 m^2

(b) 0.8 x 2.5 ft (their area from part a x 2.5) **M1**

(b) 2 m³ cao **A1**

(b) Answer: 2 m^3

Question 12

9 x 4 = 36 **M1**

36 - 20 **M1**

16 **A1**

Answer: 16

Question 13

front and side elevation heights found **M1**

each stack can rise to the smaller of its column and row height **M1**

4 **A1**

Answer: 4

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Question 14

tallest stack in each row: 4, 3, 3 **M1**

10 **A1**

Answer: 10

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