



4.17D Plans and Elevations: Fluency and Exam Drill

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 40 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A wooden box measures length 12 cm, width 5 cm and height 3 cm. State the two measurements that are shown on the plan (top view).

(Total for Question 1 is 1 mark)

- 2** Which elevation normally shows the height and the width of an object?

(Total for Question 2 is 1 mark)

- 3** A solid has a front elevation that is 8 cm wide and 6 cm high. The side elevation is 5 cm wide and 6 cm high. Work out the size of the plan (give length and width).

(Total for Question 3 is 2 marks)

- 4** Which elevation shows the height and the depth (sometimes called thickness) of an object?

(Total for Question 4 is 1 mark)

- 5** A solid is built from unit cubes on a 2 by 2 grid. 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.

(Total for Question 5 is 3 marks)

- 6** A solid has stacks on a 2 by 2 grid with heights (in unit cubes) Front-left 2, Front-right 1, Back-left 1, Back-right 1. How many unit cubes make up the solid in total?

(Total for Question 6 is 1 mark)

- 7** A solid has plan dimensions 9 cm by 4 cm and an overall height 7 cm. State the dimensions (width and height) shown on the front elevation and the dimensions (depth and height) shown on the side elevation.

(Total for Question 7 is 2 marks)

- 8** A model is built on a grid of 3 columns (left to right) and 2 rows (front to back). There is a cube in every cell of the plan. The front elevation (looking along the rows) shows heights left to right 2, 3, 2. The side elevation (looking along the columns from the right) shows heights front to back 3, 2. Give one possible set of heights (in unit cubes) for the six cells, writing them row by row (front row left to right, then back row left to right).

(Total for Question 8 is 3 marks)

- 9** A model uses unit cubes on a 2 by 3 grid (2 rows front to back, 3 columns left to right). The plan has a cube in every cell. The front elevation (columns left to right) shows heights 1, 3, 2. The side elevation (rows front to back) shows heights 3, 2. Give heights for each cell (front row left to right, then back row left to right) that satisfy these views, and find the total number of unit cubes in the model.

(Total for Question 9 is 4 marks)

- 10** A solid is built from unit cubes on every cell of a 2 by 2 plan. The front elevation (columns left to right) is 2 and 2. The side elevation (rows front to back) is 2 and 2. What is the minimum and the maximum possible total number of unit cubes the solid could contain? Explain briefly.

(Total for Question 10 is 4 marks)

Mark scheme · 4.17D Plans and Elevations: Fluency and Exam Drill

Question 1

- **B1** 12 cm by 5 cm cao
- **Answer:** 12 cm by 5 cm (length and width). 12 cm, 5 cm are shown on the plan.

Question 2

- **B1** front elevation cao
- **Answer:** Front elevation (it shows height and width).

Question 3

- **M1** identify plan shows the two horizontal dimensions: 8 cm and 5 cm oe
- **A1** 8 cm by 5 cm cao
- **Answer:** Plan dimensions are 8 cm by 5 cm (length 8 cm, width 5 cm).

Question 4

- **B1** side elevation cao
- **Answer:** Side elevation.

Question 5

- **M1** 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
- **A1** heights: Front-left 2, Front-right 1, Back-left 1, Back-right 1 cao
- **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 6

- **B1** 5 cao
- **Answer:** 5 ($2 + 1 + 1 + 1 = 5$ unit cubes).

Question 7

- **M1** front elevation shows 9 cm by 7 cm (width and height) oe
- **A1** side elevation shows 4 cm by 7 cm (depth and height) cao
- **Answer:** Front elevation: 9 cm by 7 cm. Side elevation: 4 cm by 7 cm.

Question 8

- **M1** set up maxima: column maxima = front elevation, row maxima = side elevation oe
- **M1** find a consistent arrangement satisfying those maxima oe
- **A1** one possible set: front row 2, 3, 2; back row 2, 1, 2 cao
- **Answer:** One possible set (front row then back row): 2, 3, 2; 2, 1, 2. (Checks: column maxima 2,3,2 and row maxima 3,2.)

Question 9

- **M1** use maxima constraints for each column and each row oe
- **M1** deduce that the middle front cell must be 3 to satisfy column and row maxima oe
- **M1** complete a consistent set of heights for the remaining cells oe
- **A1** heights: front row 1, 3, 2; back row 1, 2, 1 and total = 10 cao
- **Answer:** Heights (front row then back row): 1, 3, 2; 1, 2, 1. Total cubes = 10 ($1+3+2+1+2+1 = 10$).

Question 10

- **M1** explain minima: need at least one 2 in each row and each column; other stacks at least 1 oe
- **M1** calculate minimum total 6 (for example 2,1;1,2) oe
- **M1** explain maxima: all four stacks can be 2 so maximum is 8 oe
- **A1** minimum 6 and maximum 8 cao
- **Answer: Minimum = 6, Maximum = 8. Example for minimum: heights 2,1 in first row and 1,2 in second row gives total 6; maximum if every stack is 2 gives total 8.**