4.8 3D Block Counting: 10-minute Pack

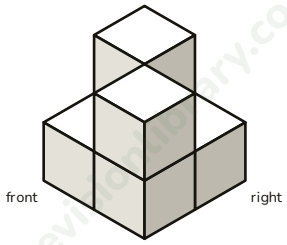
GL ASSESSMENT GL-EP.N10 · Calculators not allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

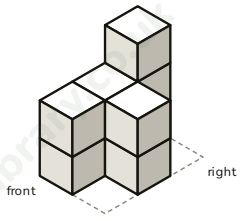
Answer ALL questions. Show all your working.

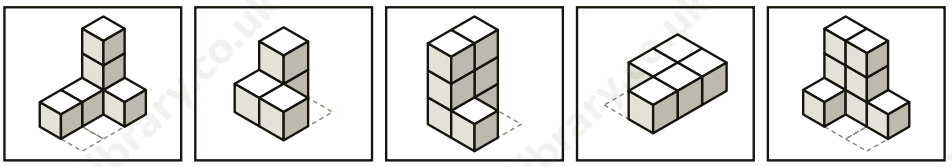
1 How many unit cubes make up this solid altogether?



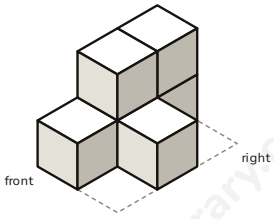
A	B	C	D	E
6	7	8	9	10

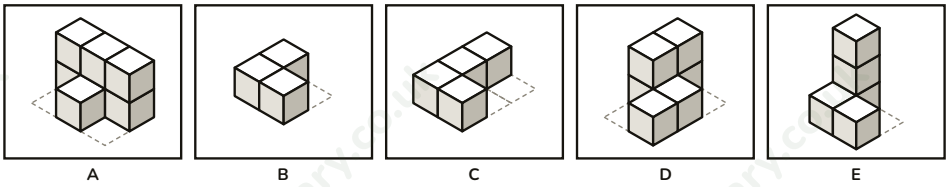
2 Rule: every cube sits on the table or on another cube (nothing floats), every stack of cubes can be seen from above in the picture (no stack is hidden behind another), and a cube you cannot see is always one that is needed to hold up the cubes you can. Which option, A to E, shows a solid made from exactly 3 fewer cubes than the solid shown?



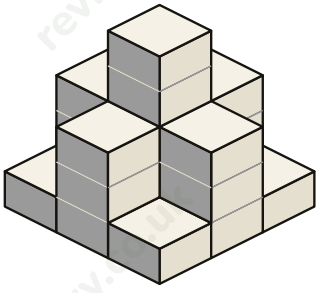


3 Rule: every cube sits on the table or on another cube (nothing floats), every stack of cubes can be seen from above in the picture (no stack is hidden behind another), and a cube you cannot see is always one that is needed to hold up the cubes you can. Which option, A to E, shows a solid made from the same number of cubes as the solid shown?





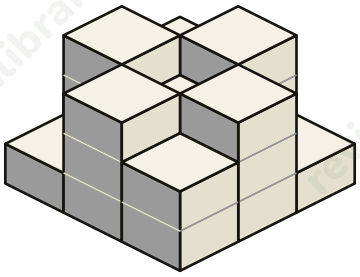
4 A unit cube counts as completely hidden if it has no visible left, right, front, back or top face - the underside resting on the table does not count. How many unit cubes in this solid are completely hidden from view?



A	B	C	D	E
3	4	5	6	7

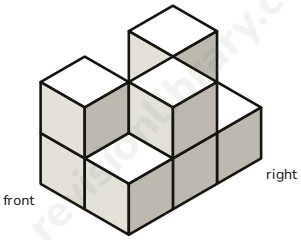
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5 This solid stands inside an invisible box measuring 3 x 3 x 3 unit cubes (so a completely full box would need 27 cubes in total). How many extra unit cubes would need to be added to fill the box completely, with no gaps?



A	B	C	D	E
6	7	8	9	10

6 The solid is lifted, dipped completely in paint so that every outward-facing surface (including the underside) is coloured, then rebuilt in exactly the same arrangement. How many individual unit cubes have exactly 3 painted faces?



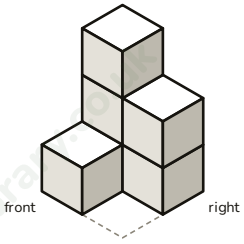
plan

2	1
1	2
2	1

front

A	B	C	D	E
2	3	4	5	6

7 How many individual unit cubes are touching the table (the surface the solid stands on)?



A	B	C	D	E
2	3	4	5	6

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Mark scheme · 4.8 3D Block Counting: 10-minute Pack

Question 1

Correct option identified (6 oe) - the four stack heights 1, 2, 2 and 1 sum to 6 **B1**

Answer: 6

Question 2

Correct option identified: the stem solid has 9 cubes so the answer needs 6; the options have 6, 4, 7, 5, 8 cubes. **B1**

Answer: A) a solid built from unit cubes standing on a flat table, isometric view from the front-right-top. Base grid: 2 columns (A, B) by 3 rows (row 1 nearest the viewer). Stack heights - Row 1: A = 1, B = 0; Row 2: A = 1, B = 0; Row 3: A = 3, B = 1. A height of 0 means that grid square is bare table.

Question 3

Correct option identified: the stem solid has 6 cubes so the answer needs 6; the options have 7, 3, 4, 6, 5 cubes. **B1**

Answer: D) a solid built from unit cubes standing on a flat table, isometric view from the front-right-top. Base grid: 2 columns (A, B) by 3 rows (row 1 nearest the viewer). Stack heights - Row 1: A = 0, B = 1; Row 2: A = 2, B = 1; Row 3: A = 2, B = 0. A height of 0 means that grid square is bare table.

Question 4

Correct option identified (3 oe) - the bottom three cubes of the centre (B2) stack are each surrounded on all four sides and covered from above **B1**

Answer: 3

Question 5

Correct option identified (7 oe) - the solid uses 20 cubes, so 27 minus 20 leaves 7 cubes needed to complete the box **B1**

Answer: 7

Question 6

Correct option identified (3 oe) - the bottom cube of each A-column stack (A1, A2 and A3) has exactly 3 painted faces **B1**

Answer: 3

Question 7

Correct option identified (3 oe) - a cube touches the table wherever the grid square is occupied (height at least 1); three of the four grid squares are occupied **B1**

Answer: 3

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