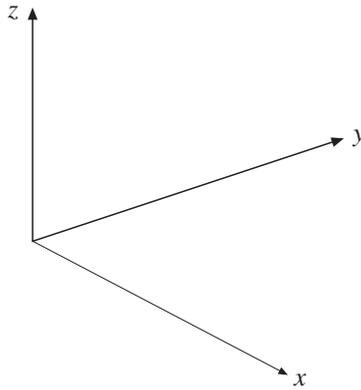


13 Graphs

13.2B Three-Dimensional Coordinates

Coordinates can also be applied to three dimensions. Three numbers are required to identify the position of a point in space.

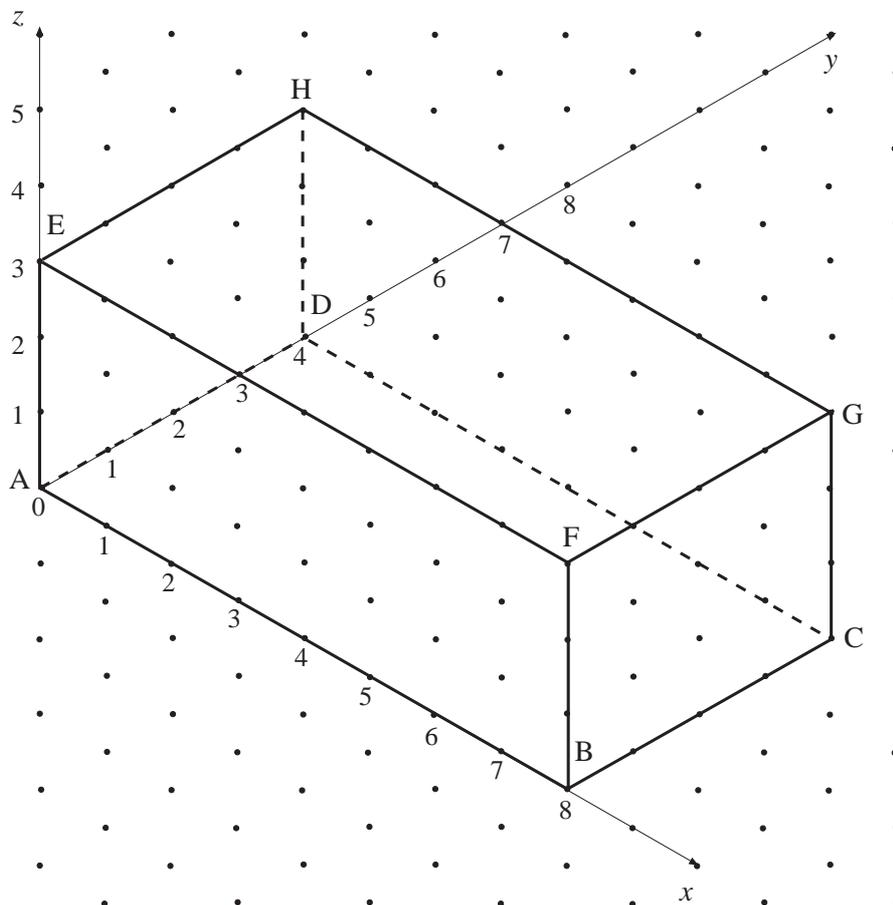


The coordinates are then written as ordered triples in the form of (x, y, z) .



Worked Example 1

The diagram shows a cuboid. Write down the coordinates of each vertex of the cuboid.





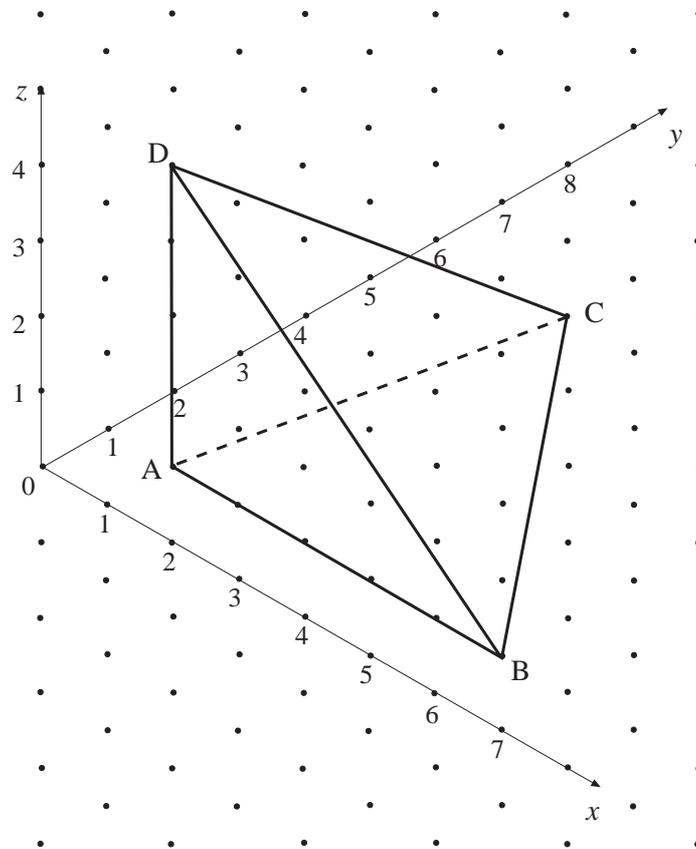
Solution

A (0, 0, 0)	B (8, 0, 0)
C (8, 4, 0)	D (0, 4, 0)
E (0, 0, 3)	F (8, 0, 3)
G (8, 4, 3)	H (0, 4, 3)



Worked Example 2

The diagram shows a triangular-based pyramid, ABCD, in which D is vertically above A. The base ABC is horizontal. Write down the coordinates of each of the vertices.



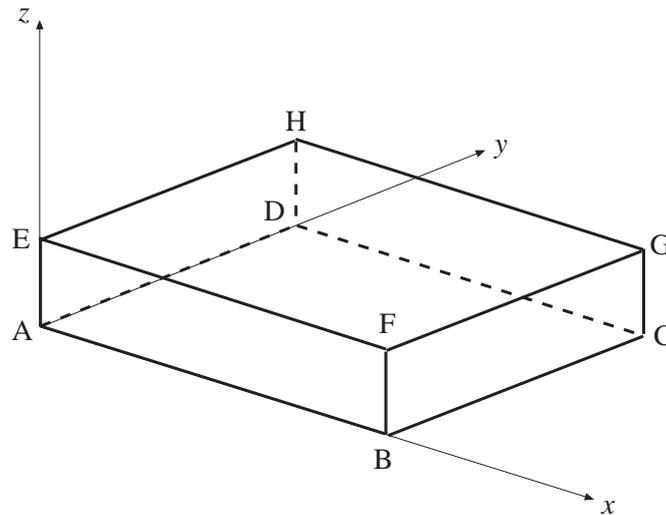
Solution

A (1, 1, 0)	B (6, 1, 0)
C (2, 6, 0)	D (1, 1, 4)



Worked Example 3

The diagram shows a cuboid and the x , y and z axes.



If $AB = 6$, $AD = 5$ and $AE = 2$, write down the coordinates of each vertex of the cuboid.



Solution

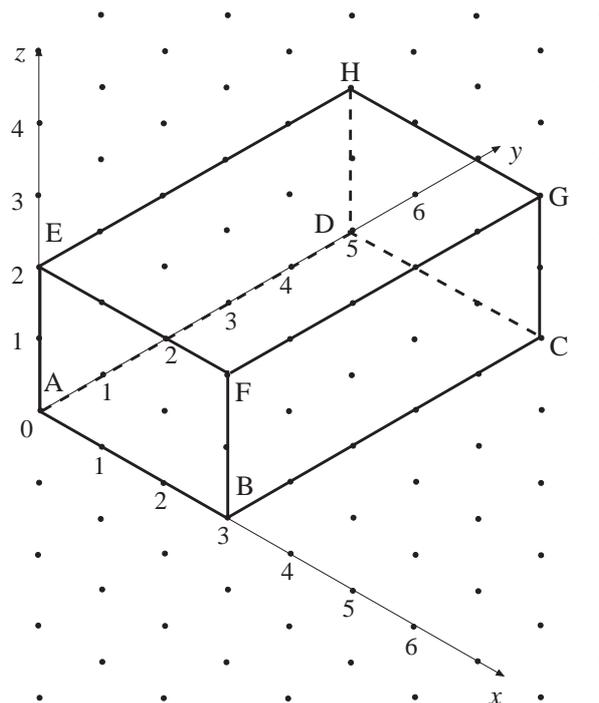
- | | | |
|-------------|-------------|-------------|
| A (0, 0, 0) | B (6, 0, 0) | C (6, 5, 0) |
| D (0, 5, 0) | E (0, 0, 2) | F (6, 0, 2) |
| G (6, 5, 2) | H (0, 5, 2) | |

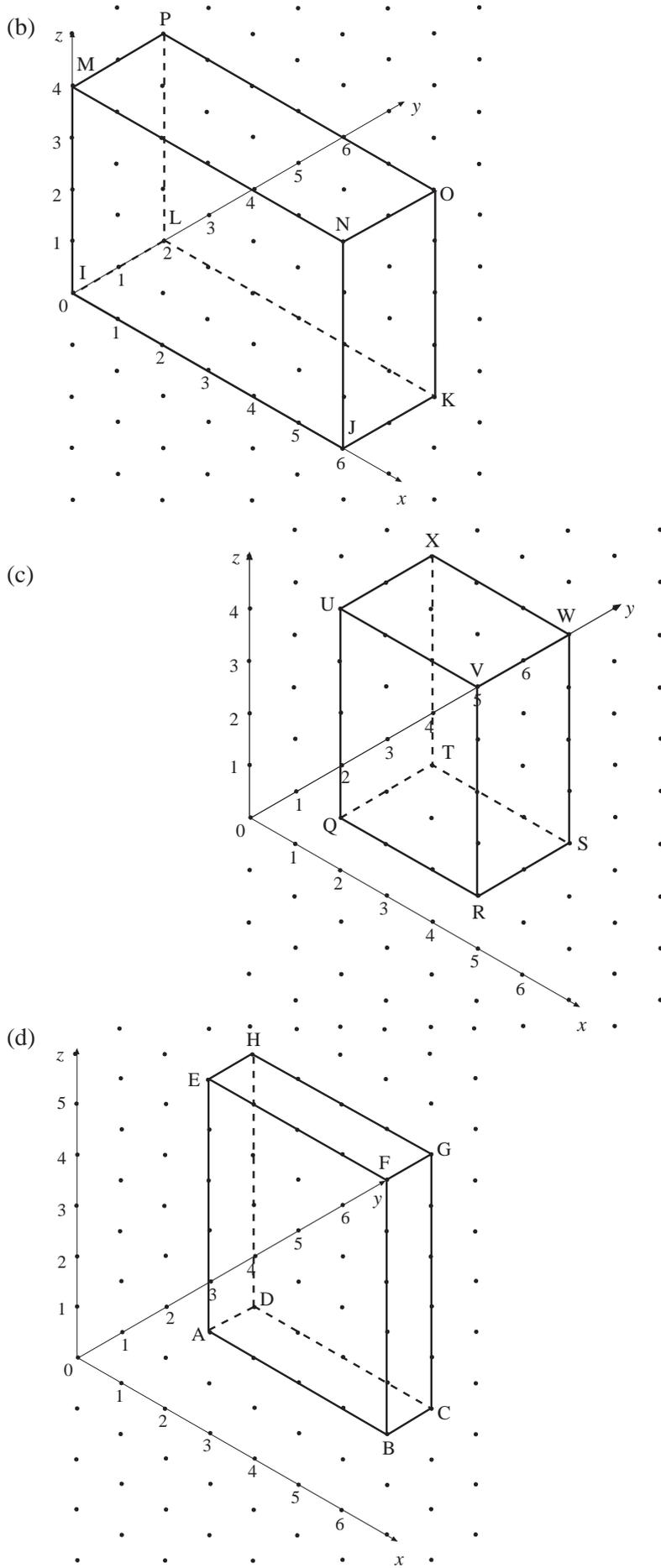


Exercises

1. Write down the coordinates of each of the vertices of the following cuboids.

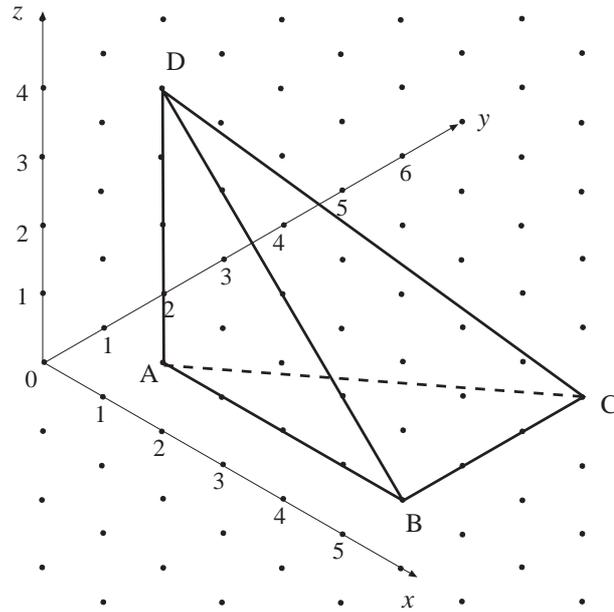
(a)



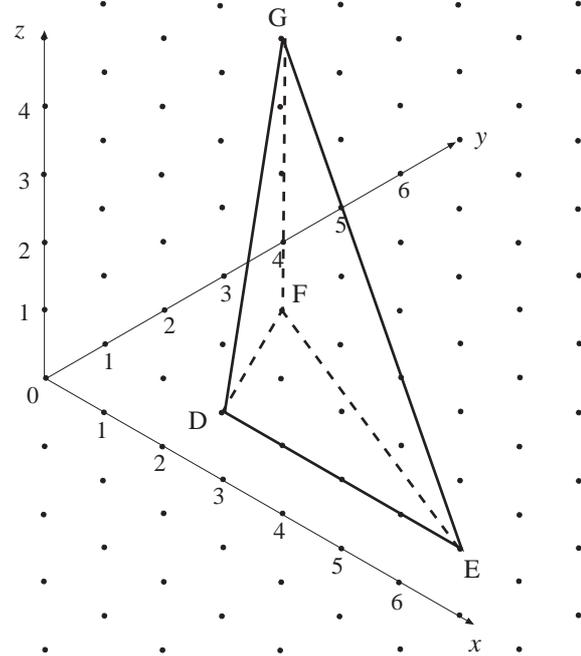


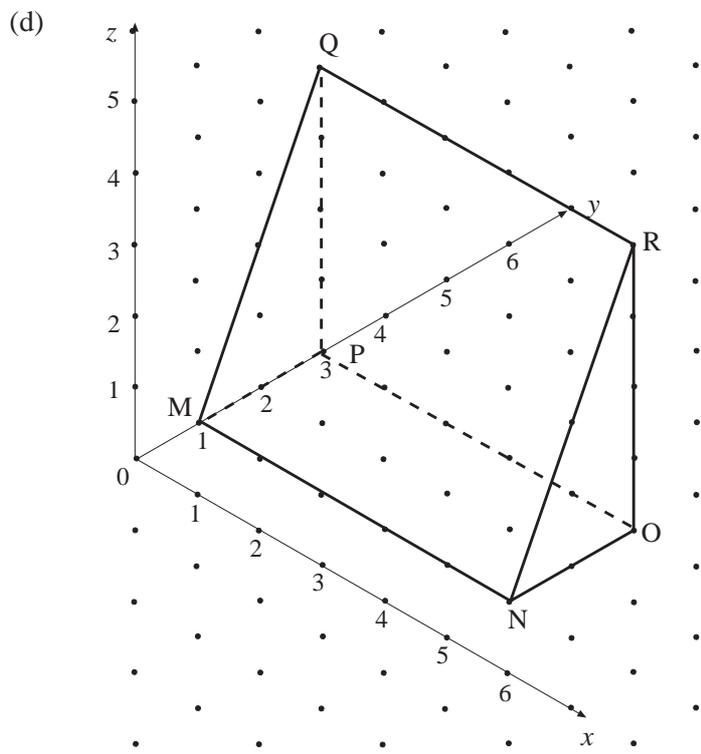
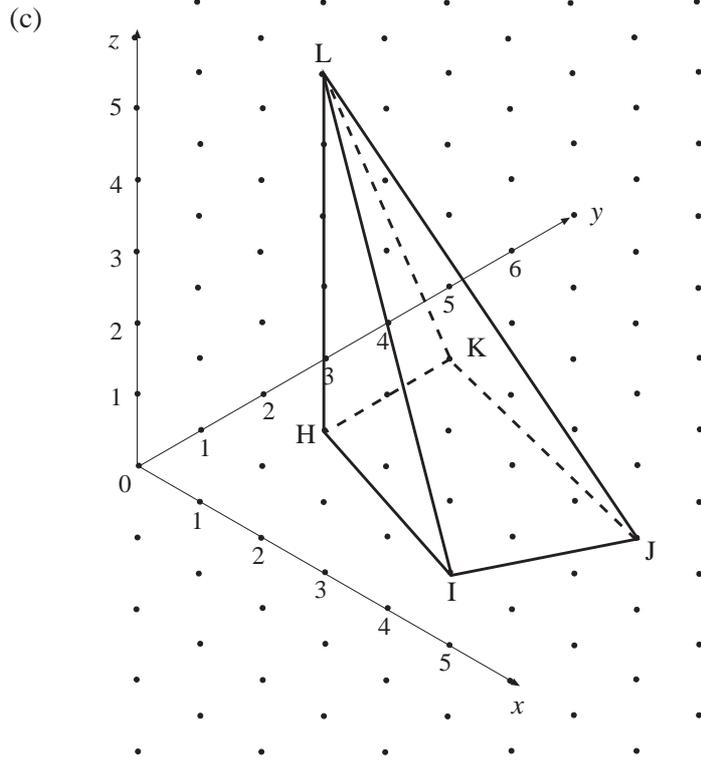
2. Write down the coordinates of each of the vertices of the following solids.

(a)

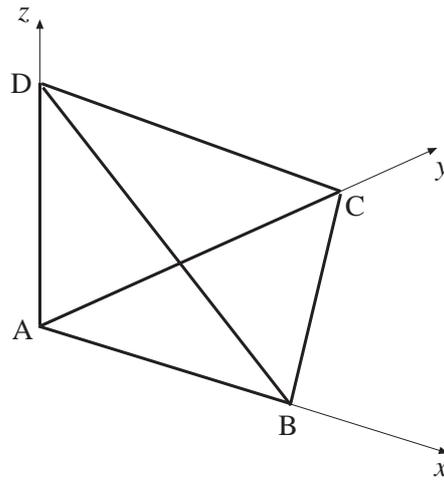


(b)



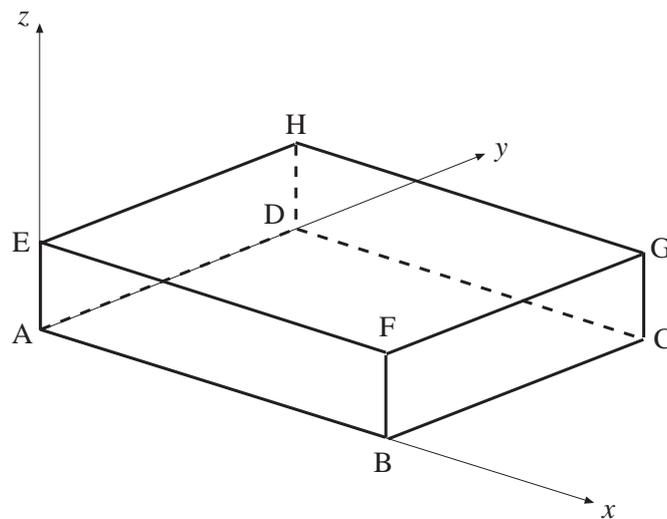


3. The diagram shows a tetrahedron.



If $AB = 3$, $AC = 4$ and $AD = 5$, write down the coordinates of each vertex of the tetrahedron.

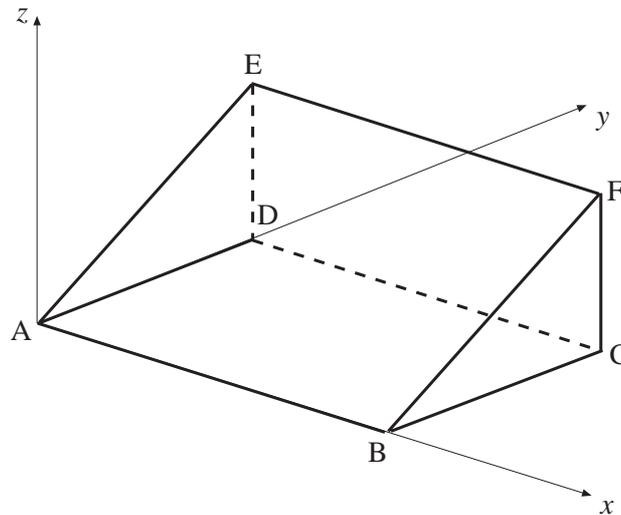
4. The diagram shows a cuboid.



The coordinates of G are $(7, 6, 3)$.

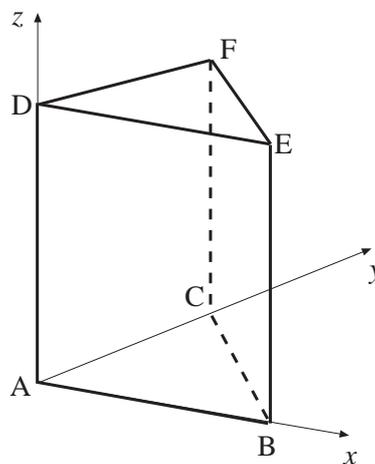
Write down the coordinates of the other vertices.

5. In the diagram below, the x - and y -axes are horizontal and the z -axis is vertical. The diagram shows a triangular prism with a horizontal base, $ABCD$. The faces of the prism, AED and BFC , are vertical.



If $AB = 7$, $AD = 4$ and $DE = 5$, write down the coordinates of each vertex of the prism.

6. In the diagram below, the x - and y -axes are horizontal and the z -axis is vertical. The diagram shows a triangular prism with horizontal faces, ABC and DEF . The edges BE and CF are vertical.



If $AB = 4$, $AC = 5$ and $AD = 8$, write down the coordinates of each vertex of the prism.

Answers

13.2B Three-Dimensional Coordinates

1. (a) A (0, 0, 0) B (3, 0, 0) C (3, 5, 0)
 D (0, 5, 0) E (0, 0, 2) F (3, 0, 2)
 G (3, 5, 2) H (0, 5, 2)
- (b) I (0, 0, 0) J (6, 0, 0) K (6, 2, 0)
 L (0, 2, 0) M (0, 0, 4) N (6, 0, 4)
 O (6, 2, 4) P (0, 2, 4)
- (c) Q (1, 1, 0) R (4, 1, 0) S (4, 3, 0)
 T (1, 3, 0) U (1, 1, 4) V (4, 1, 4)
 W (4, 3, 4) X (1, 3, 4)
- (d) A (1, 2, 0) B (5, 2, 0) C (5, 3, 0)
 D (1, 3, 0) E (1, 2, 5) F (5, 2, 5)
 G (5, 3, 5) H (1, 3, 5)
2. (a) A (1, 1, 0) B (5, 1, 0)
 C (5, 4, 0) D (1, 1, 4)
- (b) D (2, 1, 0) E (6, 1, 0)
 F (1, 3, 0) G (1, 3, 4)
- (c) H (1, 2, 0) I (4, 1, 0) J (5, 3, 0)
 K (1, 4, 0) L (1, 2, 5)
- (d) M (0, 1, 0) N (5, 1, 0) O (5, 3, 0)
 P (0, 3, 0) Q (0, 3, 4) R (5, 3, 4)
3. A (0, 0, 0) B (3, 0, 0)
 C (0, 4, 0) D (0, 0, 5)
4. A (0, 0, 0) B (7, 0, 0) C (7, 6, 0)
 D (0, 6, 0) E (0, 0, 3) F (7, 0, 3)
 H (0, 6, 3)
5. A (0, 0, 0) B (7, 0, 0) C (7, 4, 0)
 D (0, 4, 0) E (0, 4, 5) F (7, 4, 5)
6. A (0, 0, 0) B (4, 0, 0) C (0, 5, 0)
 D (0, 0, 8) E (4, 0, 8) F (0, 5, 8)