# Foundation Check In - 8.06 Three-dimensional shapes

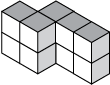
Q1-3. Write down the number of faces, edges and vertices of these three-dimensional shapes.

|  |  |  |
| --- | --- | --- |
| 1. | 2. | 3. |
|  | Shape 2 |  |

Q4-5. Draw the plan, front and side elevations of these three-dimensional shapes. The front of the shape is marked with an arrow.

|  |  |
| --- | --- |
| 4. | 5. |
| (made of 5 cubes)  Shape 4 (made of 5 cubes) | (made of 6 cubes)  shape 5 (made of 6 cubes) |

1. A prism is drawn below. Explain why you can be sure that you would need 10 cubes to build it, rather than just the 9 you can see.



1. Here are the front elevation, side elevation and plan of a three-dimensional shape made from cubes.

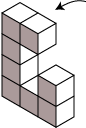
|  |  |  |
| --- | --- | --- |
| Front | Right side | Plan |
| front elevation of a three-dimensional shape | side elevation of a three-dimensional shape | plan of a three-dimensional shape |

On isometric paper, show that it is possible to construct the three-dimensional shape using both 6 cubes and 7 cubes.

1. A piece of a cube is sliced off with a single straight cut. The new shape has 7 faces, 10 vertices and 15 edges. Describe how the cut could have been made.
2. The eight shaded cubes that contain the vertices of this cuboid are removed.



How many vertices does the new three-dimensional shape have?

1. This three-dimensional shape sits upright on a table and consists of a single layer of cubes.

The shape is “toppled” in the direction of the arrow and rests so the shaded face is flat against the table. On isometric paper, draw the three-dimensional shape in its toppled position.

**Extension**

A “hexomino” is a 2D shape made from six connected squares. (Note that the squares are joined edge to edge and there are no overlaps or gaps.)

e.g.

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |

On squared paper, draw some different hexominoes.

How many different hexominoes are there? Which ones could be folded into a cube?

## Answers

| **Question** | **1** | **2** | **3** |
| --- | --- | --- | --- |
| Vertices | 8 | 6 | 5 |
| Faces | 6 | 5 | 5 |
| Edges | 12 | 9 | 8 |

|  |  |  |
| --- | --- | --- |
| Plan | Front | Side |
| Plan | Front | Side |

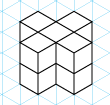
|  |  |  |
| --- | --- | --- |
| Plan | Front | Side |
| Plan | Front | Side |

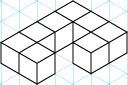
1. The 3D shape is a prism, so it has the same cross-section through its length. Therefore the bottom layer must be the same as the top layer.
2. For example:

|  |  |
| --- | --- |
| 6 cubes  three-dimensional shape made of 6 cubes | 7 cubes  three-dimensional shape made of 7 cubes |

The missing/extra cube is hidden from the right, front and plan views and so is optional.

1. The new solid could be made by cutting off a single vertex by slicing through the midpoint of each edge that leads to this vertex.
2. 24 vertices





**Extension**

There are 35 different hexominoes. Of these, 11 are the net of a cube.

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AO1 | 1 | Recognise and know the properties of a cuboid |  |  |  |  | AO1 | 1 | Recognise and know the properties of a cuboid |  |  |  |
| AO1 | 2 | Recognise and know the properties of a prism |  |  |  |  | AO1 | 2 | Recognise and know the properties of a prism |  |  |  |
| AO1 | 3 | Recognise and know the properties of a pyramid |  |  |  |  | AO1 | 3 | Recognise and know the properties of a pyramid |  |  |  |
| AO1 | 4 | Construct plans and elevations of a simple 3D solid |  |  |  |  | AO1 | 4 | Construct plans and elevations of a simple 3D solid |  |  |  |
| AO1 | 5 | Construct plans and elevations of a simple 3D solid |  |  |  |  | AO1 | 5 | Construct plans and elevations of a simple 3D solid |  |  |  |
| AO2 | 6 | Know the properties of a prism |  |  |  |  | AO2 | 6 | Know the properties of a prism |  |  |  |
| AO2 | 7 | Construct a representation of a 3D solid on isometric paper from plans and elevations |  |  |  |  | AO2 | 7 | Construct a representation of a 3D solid on isometric paper from plans and elevations |  |  |  |
| AO2 | 8 | Know the properties of a cube |  |  |  |  | AO2 | 8 | Know the properties of a cube |  |  |  |
| AO3 | 9 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |  | AO3 | 9 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |
| AO3 | 10 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |  | AO3 | 10 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| AO2 | 6 | Know the properties of a prism |  |  |  |  | AO2 | 6 | Know the properties of a prism |  |  |  |
| AO2 | 7 | Construct a representation of a 3D solid on isometric paper from plans and elevations |  |  |  |  | AO2 | 7 | Construct a representation of a 3D solid on isometric paper from plans and elevations |  |  |  |
| AO2 | 8 | Know the properties of a cube |  |  |  |  | AO2 | 8 | Know the properties of a cube |  |  |  |
| AO3 | 9 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |  | AO3 | 9 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |
| AO3 | 10 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |  | AO3 | 10 | Solve a problem through representation of a 3D solid on isometric paper |  |  |  |

