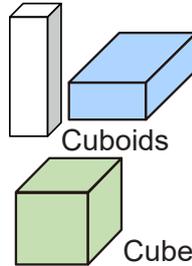# 14 - 1 Solid Shapes

## Cuboids and Cubes (1)

Instruction Cuboid and Cube

- A solid shape whose faces are only rectangles or rectangles and squares is called a "**cuboid**".
- A solid shape whose faces are only squares is called a "**cube**".

Cuboids

Cube

Flat figures are called **plane shapes**. Objects that occupy space are called **solid shapes**. Their surfaces are called faces.

Example The figures below are a cuboid and a cube.

Vertex
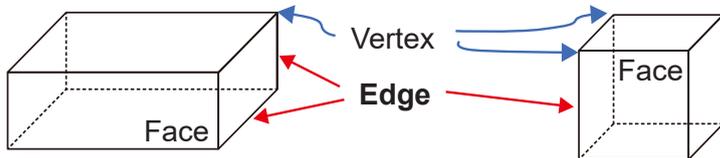
Edge

Face

Face

Side is for plane shapes and edge is for solid shapes.

1　Fill in the following table by observing a cuboid and a cube.

	Number of faces	Number of edges	Number of vertices
Cuboid	6	12	8
Cube	6	12	8

2　How many pairs of faces are the same in a cuboid and a cube?

Cuboid 3 Cube — All the faces are the same.

3　How many sets of edges are the same length in a cuboid and a cube?

Cuboid 3 Cube — All the edges are of equal length.

With the cuboid and the cube on the right, answer the following questions.

1　How many faces are there?

Cuboid ☐ Cube ☐
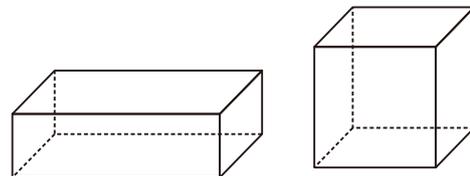
2　How many vertexes are there?

Cuboid ☐ Cube ☐

3　How many kinds of edge lengths are there?

Cuboid ☐ Cube ☐

150

14 - 2　Solid Shapes
Cuboids and Cubes (2)

Example　The figure on the right shows a cuboid.

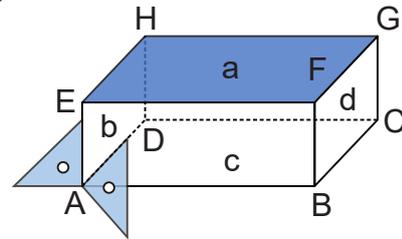**1**　Which edges are perpendicular to edge AB?

> AE, BF, AD, and BC
> (EA, FB, DA, and CB)

2　Which edges are parallel to edge AE?

> BF, DH, and CG
> (FB, HD, and GC)

3　Which faces are parallel to face a?

> c

The figure on the right shows a cube. Answer the following questions.
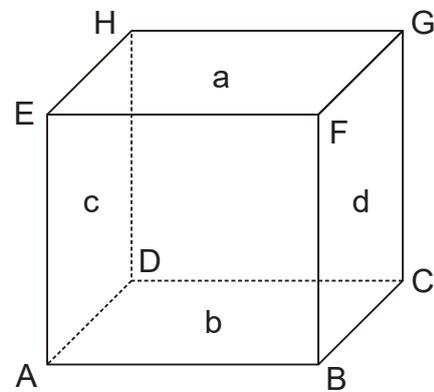
1　Which edges are perpendicular to edge CG?

2　Which edges are parallel to edge EF?

3　Which faces are parallel to face c?

4　Which edges are perpendicular to face a?

5　Which edges are parallel to face d?

14 - 3 Solid Shapes

Nets (1)

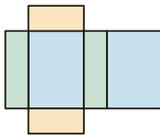**Instruction** Disassemble the following cuboid into one figure to investigate how it is made.
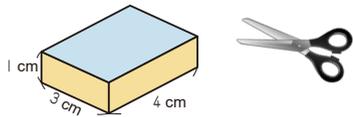
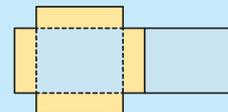Cut a cuboid along the edges using scissors. Which edges should you cut?

Cut the coloured edges and unfold it one by one as follow:

1. 1 cm, 3 cm, 4 cm	2.	3.
4.	5.	
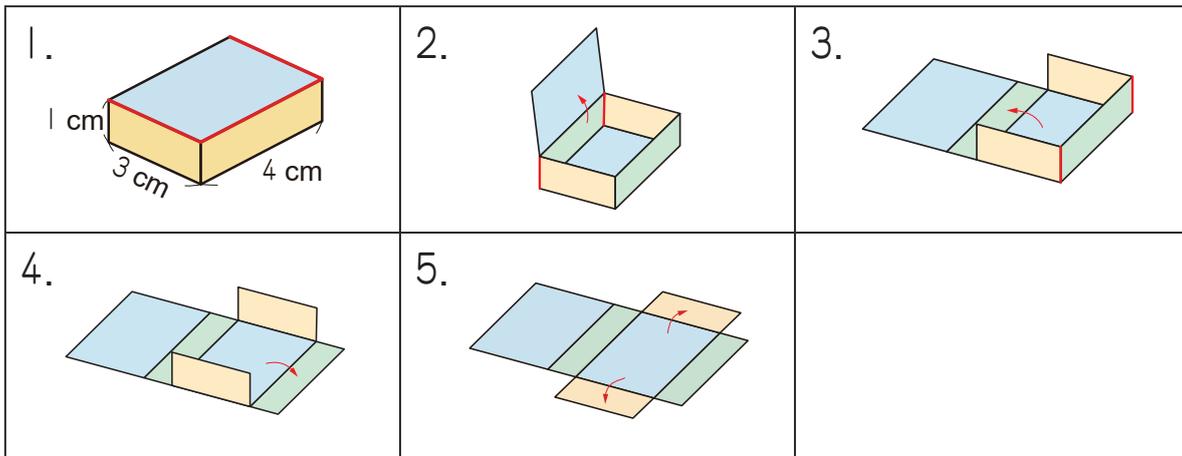
● A figure drawn on a sheet of paper by cutting the edges of a box, unfolding it and laying it flat is called a **net**.
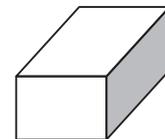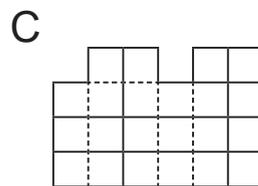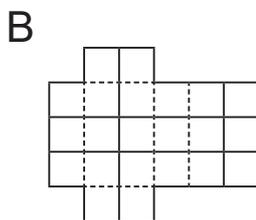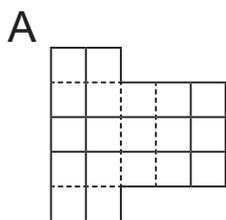
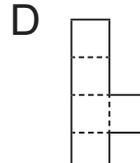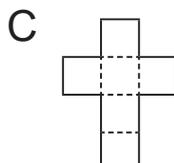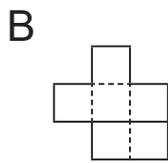You can also make different shapes depending on how you cut it.
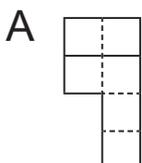

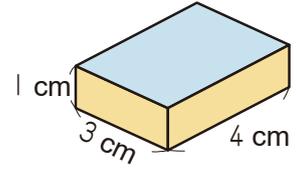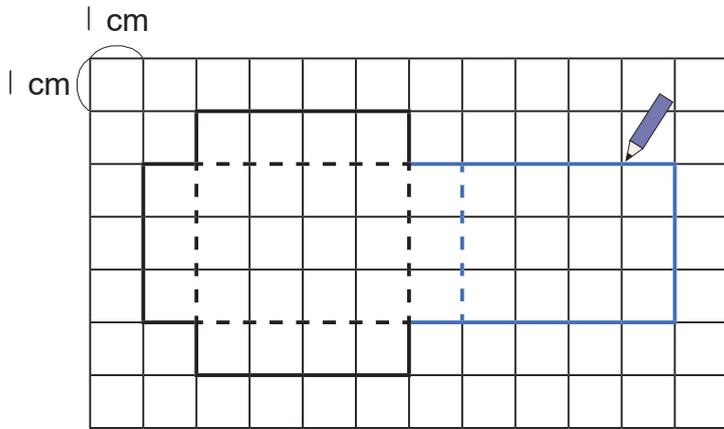**Example** Which net can form a cuboid? Fold the dotted lines and make cuboids.

A   B   C

Answer ☐

1 Which net can form a cube? Fold the dotted lines and make cubes.

A   B   C   D
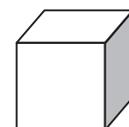
Answer ☐

Example 2   Finish drawing the net of the cuboid on the right.
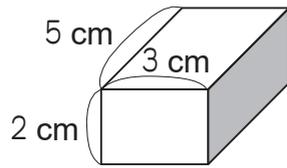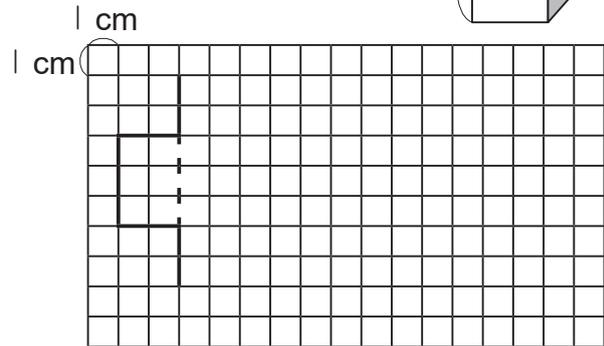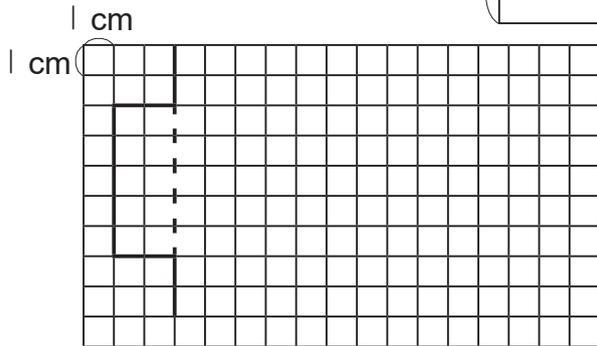
｜cm

｜cm

｜cm

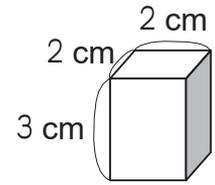3 cm   4 cm

Dotted lines show the edges you should fold to make a cuboid.
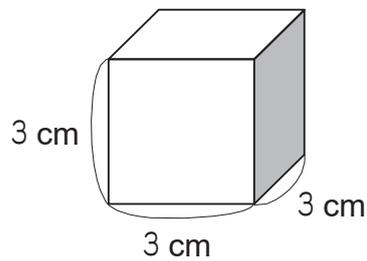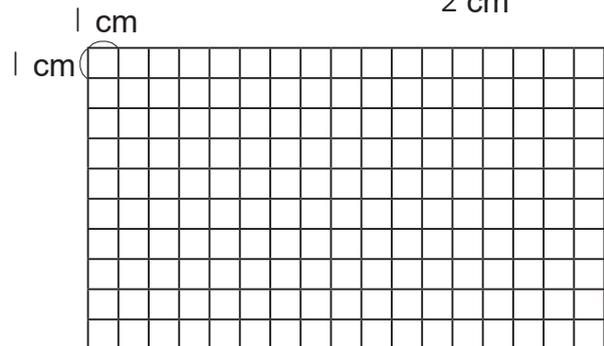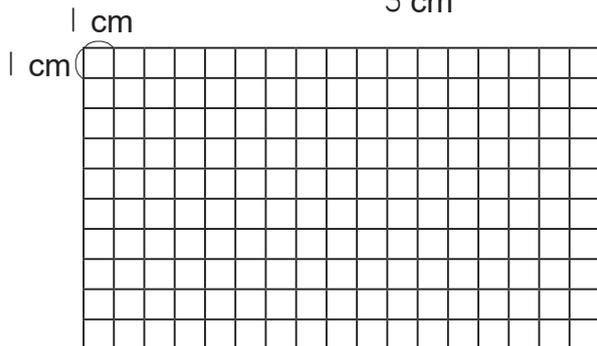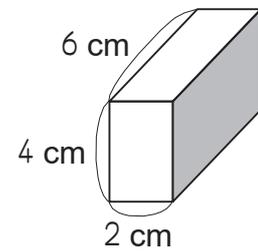
1   Finish drawing the net of the cuboid on the right.

1

5 cm   3 cm

2 cm

｜cm

｜cm

2

2 cm

2 cm

3 cm

｜cm

｜cm

2   Draw a net of this cube on graph paper.

1

3 cm

3 cm

3 cm

｜cm

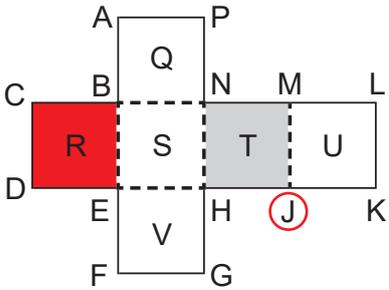｜cm

2

6 cm

4 cm

2 cm

｜cm

｜cm

14 - 4 Solid Shapes

Nets (2)

Example   We are going to make a cube by folding the net below.

1 Colour the face opposite the shaded face.

2 Circle the vertexes that match up with vertex G.

3 Which edges match up with edge AP?

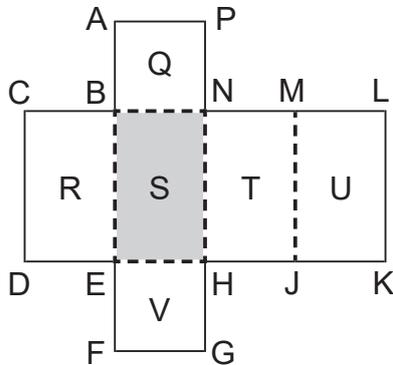Answer   ML (LM)

4 Which faces are perpendicular to edge EH?

Answer   R, T

---

1 We are going to make a cuboid by folding the net below.

1 Colour the face opposite the shaded face.

2 Circle the vertexes that match up with vertex M.
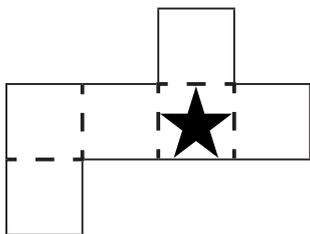
3 Which edges match up with edge CD?

Answer

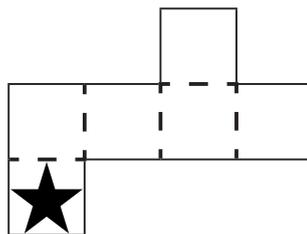**4** Which faces are perpendicular to edge HN?

Answer

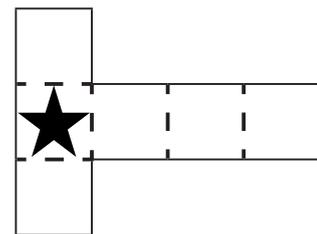**2** Colour the face opposite the marked face.
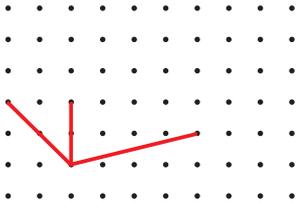
1

2
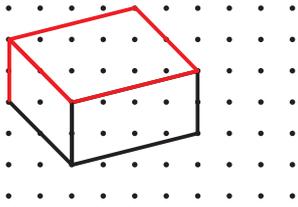
3

14 - 5 | Solid Shapes
Sketch

Instruction How to draw a figure that shows the full shape of a cuboid.

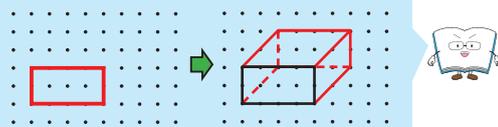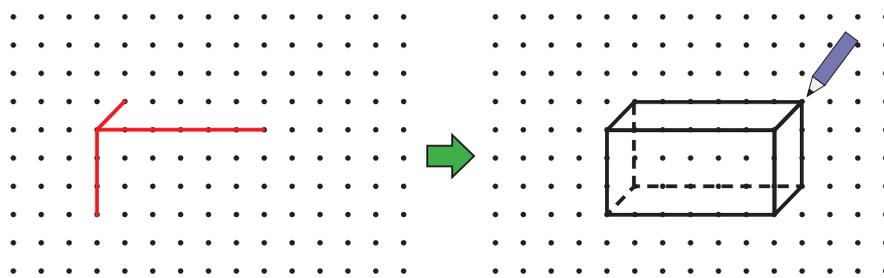| 1. Draw three edges from one vertex.	2. Draw the visible edges.	3. Draw the invisible edges using a dotted line.
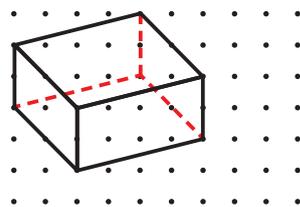
● A diagram that shows a quick view of the whole object is called a **sketch**.

● In a sketch, we draw parallel edges as parallel lines.

When drawing a figure, you can also draw the front face

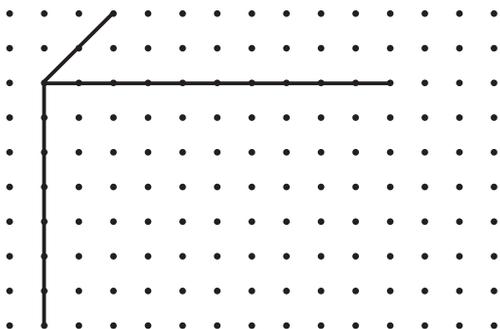**Example** Finish drawing the sketch of the cuboid as shown below.

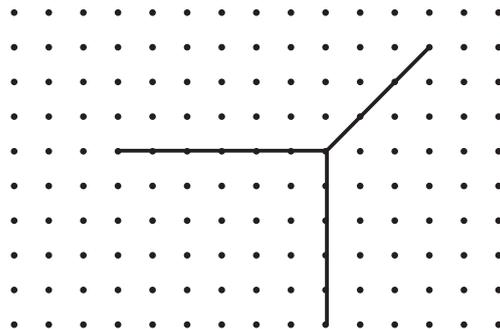Draw the invisible edges using dotted lines.

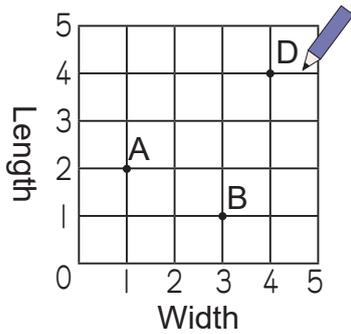Finish drawing the sketch of the cuboid as shown below.

1

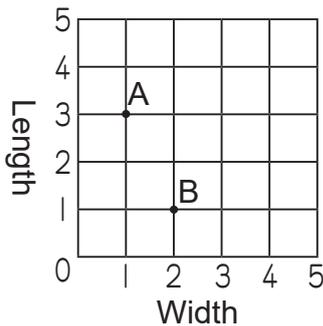

2

14 - 6 Solid Shapes

How to Express Position (1)

Example On the grid paper shown below, the length and width axes are numbered. Point A is represented as (1 and 2).
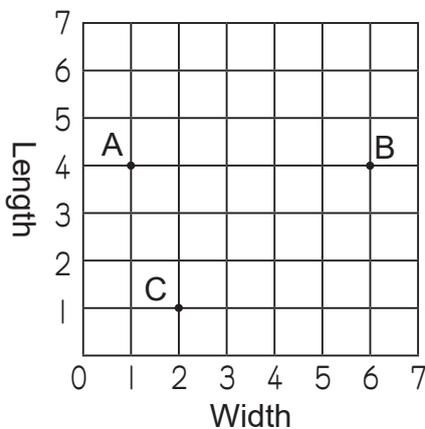
① How can you represent the position of Point B?

(3 and 1)

② The position of Point D is: (4 and 4). Draw Point D in the figure on the left.

1 On the grid paper shown below, the length and width axes are numbered. Point A is represented as (1 and 3).

① How can you represent the position of Point B?

② The position of Point D is: (5 and 2). Draw Point D in the figure on the left.

2 On the grid paper shown below, the length and width axes are numbered. Point A is represented as (1 and 4).

① How can you represent the positions of Point B and Point C?

Point B

Point C

② The position of Point D is: (4 and 6). Draw Point D in the figure on the left.

3 Draw the following points in order and connect them with lines. Point A(1 and 4) → Point B → Point C → Point D(4 and 6) → (5 and 1) → Point A
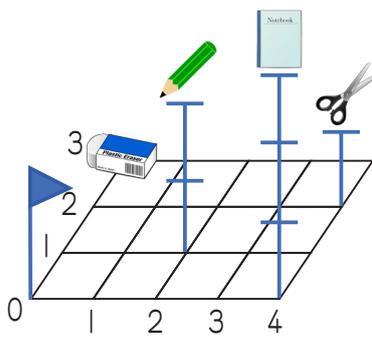
14 - 7

How to Express Position (2)

Example Every position in the space is represented by three numbers. The position of the pen is 2 width, 1 length, and 2 height. We express the position as $(2, 1, 2)$.
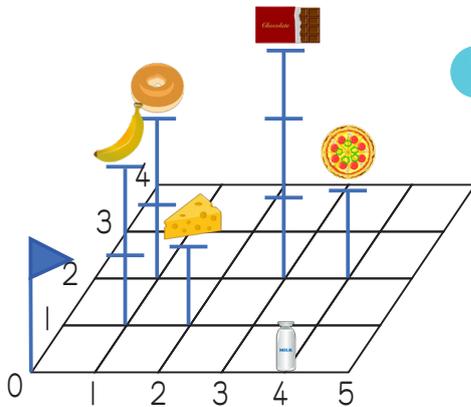
1 Represent the position of following items.

Sessors | $(4, 2, 1)$

Eraser | $(0, 3, 0)$

2 What item is in position $(4, 0, 3)$?

Notebook

The position of the doughnut is 1 width, 2 length, and 2 height. We express the position as $(1, 2, 2)$.

1 Represent the position of following items.

Chocolate

Cheese

Pizza

2 What item is in position $(1, 1, 2)$?
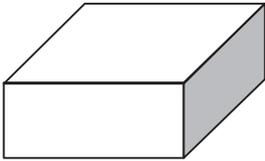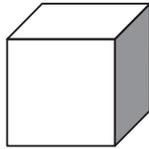
3 What item is in position $(4, 0, 0)$?

157

14 - 8 Solid Shapes
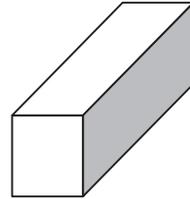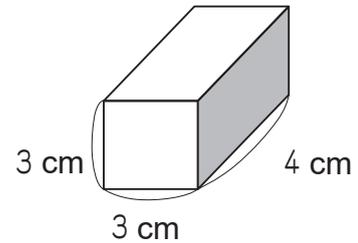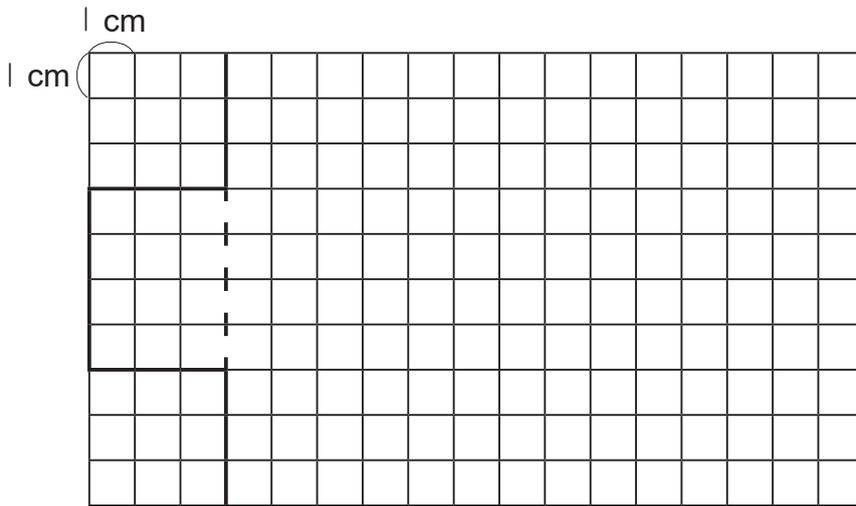
Review
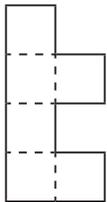
1 Fill in the blank with the name of the figures.

①

②

③

2 Finish drawing the net of the cuboid on the right.
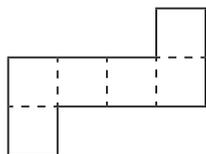
1 cm
1 cm

3 cm   4 cm
3 cm

3 Which net can form a cube? Fold the dotted lines and make cubes.
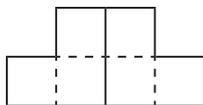
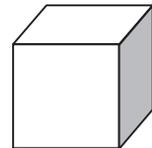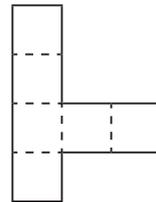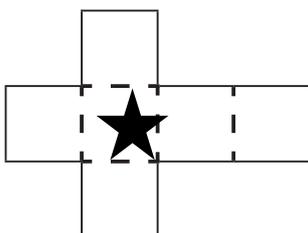A   B   C   D
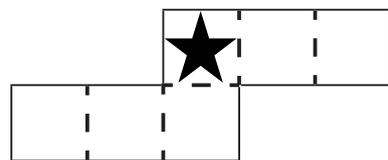

Answer

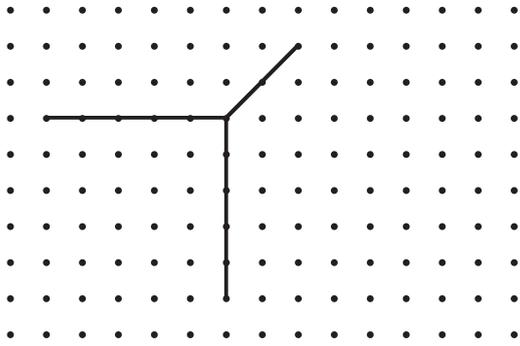**4** Colour the face opposite of the marked face.
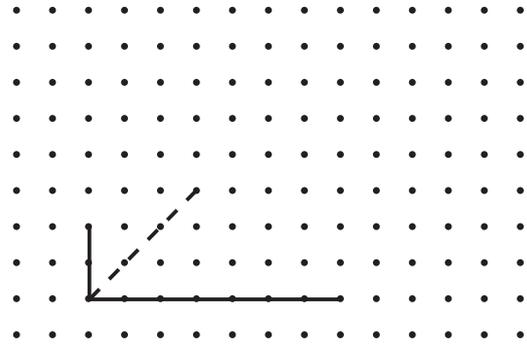
①

②

③

158
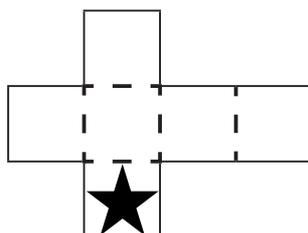
5 Finish drawing the sketch of the cube as shown below.
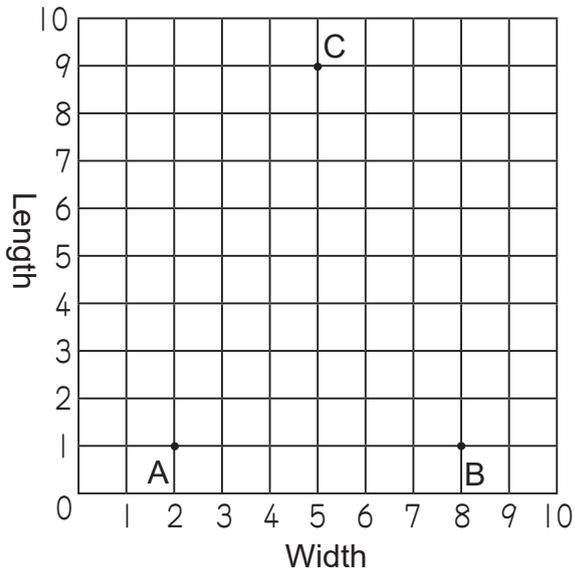
1

2

6 On the grid paper, the length and width axes are numbered. Point A is represented as (2 and 1).

Width

1 How can you represent the positions of Point B and Point C?
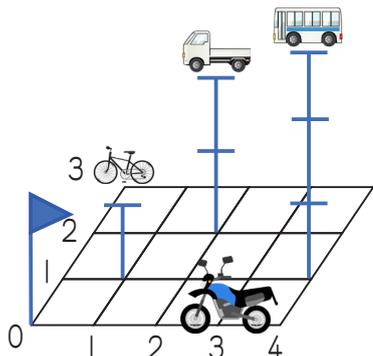
Point B

Point C

2 The position of Point D is: (5 and 4). Draw Point D in the figure on the left.

3 Draw the following points in order and connect them with lines.
Point A(2 and 1) → Point B →(8 and 7)→ Point C →(2 and 7) → Point A →(8 and 7)→(2 and 7)→ Point B

7 The position of the bicycle is 1 width, 1 length, and 1 height. We express the position as (2, 1, 2).

Represent the position of following items.

Bus

Bike

159