

# Faces and edges in 3-D shapes



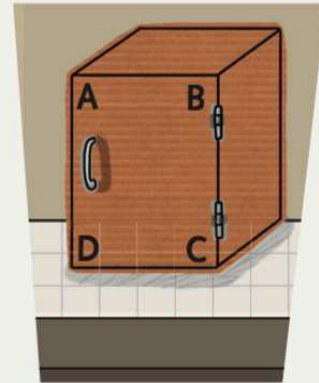
Identify 3-D shapes with parallel or perpendicular faces or edges

**Challenge**

This cupboard is a cuboid and is fixed to a wall.

The four vertices of the rectangular face of the cupboard are labelled A, B, C and D.

Copy and complete each sentence using the word 'parallel' or 'perpendicular'.

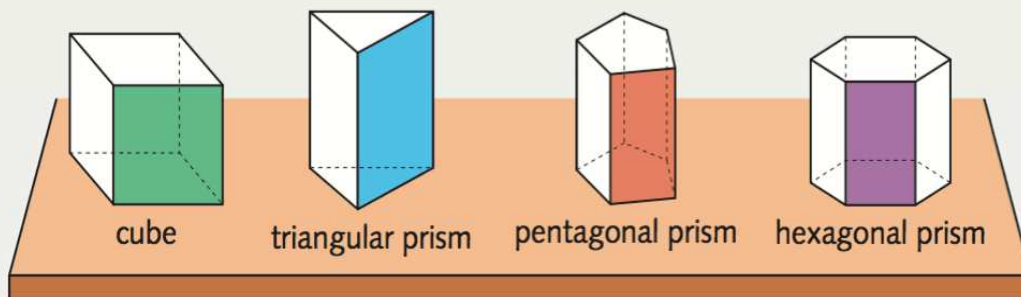


- a AD is  to BC.
- b DC is  to AB.
- c AD is  to DC.
- d DC is  to CB.
- e DA is  to AB.

**Example**  
 AB is parallel to DC.  
 AB is perpendicular to BC.

**Challenges**  
 2,3

1 The four 3-D shapes are placed on a horizontal shelf. Copy and complete the table for the faces of each 3-D shape.

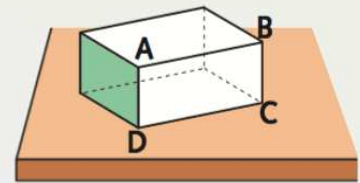


3-D shape	Total number of faces	Number of faces perpendicular to the shelf	Number of faces parallel to the shelf
cube	6	4	
triangular prism			
pentagonal prism			
hexagonal prism			

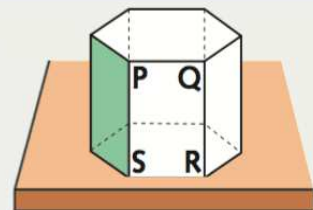
2 Copy and complete the table below for the edges of each 3-D shape in Question 1.

3-D shape	Total number of edges	Number of edges perpendicular to the shelf	Number of edges parallel to the shelf
cube	12	4	
triangular prism			
pentagonal prism			
hexagonal prism			

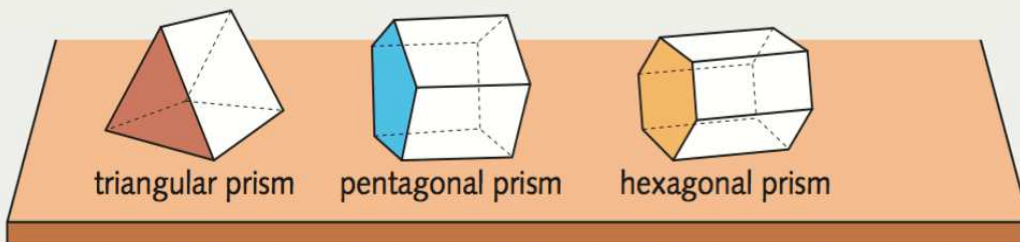
3 These two 3-D shapes are placed on a horizontal shelf. Copy and complete each sentence using the word 'parallel' or 'perpendicular'.



- a AB is  to DC.      b AD is  to BC.  
 c AD is  to DC.      d PS is  to SR.  
 e PQ is  to QR.      f QR is  to PS.



4 Each of the 3-D shapes below is placed on a shelf and lies on a rectangular face.

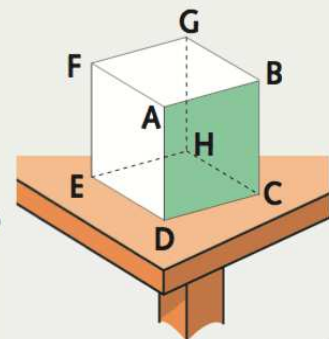


- a Copy the tables in Questions 1 and 2 but leave out the row for cube. Complete the tables for each shape.  
 b Compare your answers with those you completed in Questions 1 and 2. Write what you notice.

Challenge  
3

This cube is placed on a horizontal table.

- a How many faces are parallel to the shaded face?  
 b How many faces are perpendicular to the shaded face?  
 c Name three pairs of parallel edges.  
 d Name three pairs of perpendicular edges.



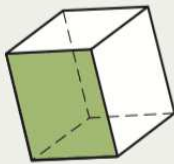
# Identifying 3-D shapes

Use properties to identify 3-D shapes



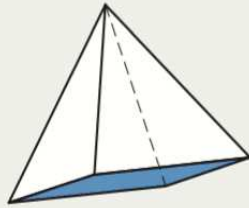
Challenge

A



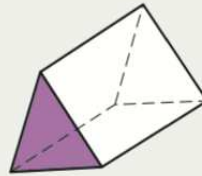
cube

B



square-based pyramid

C



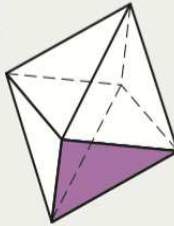
triangular prism

D



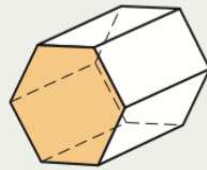
tetrahedron

E



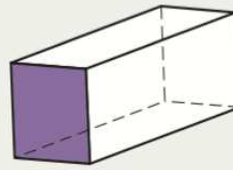
octahedron

F



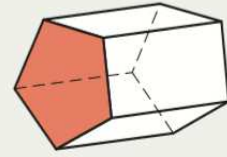
hexagonal prism

G



cuboid

H



pentagonal prism

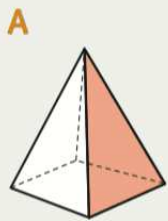
- Look at the 3-D shapes above. Copy the table and write in the letters of the shapes.

No faces with four right angles	
Only one face with four right angles	
More than one face with four right angles	
Three edges at each vertex	
More than three edges at one or more vertices	

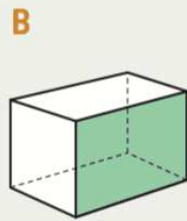
- Write the name of the 3-D shape that:

- is a prism with six rectangular faces
- has four edges meeting at every vertex and all faces triangular.

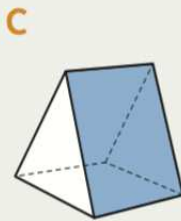
**Challenge 2**



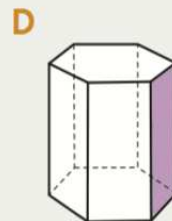
square-based pyramid



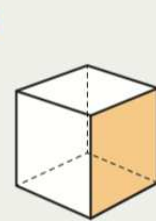
cuboid



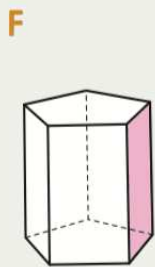
triangular prism



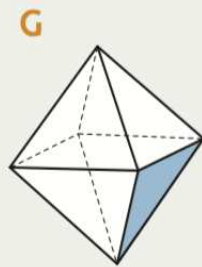
hexagonal prism



cube



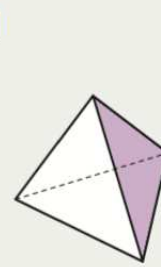
pentagonal prism



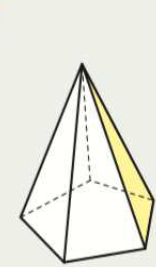
octahedron



dodecahedron



tetrahedron



pentagonal-based pyramid

1 Look at the 3-D shapes above. Copy the table and write in the letters of the shapes.

	Three edges at each vertex	More than three edges at one or more vertices
No right-angled faces		
One right-angled face		
More than one right-angled face		



2 Write the name of the 3-D shape that has:

- a eight vertices and all right-angled faces are identical
- b one face which is not right-angled and five edges meeting at one of the vertices
- c four more vertices than a cube with two identical and regular end faces
- d all faces regular but neither triangular nor right-angled.

**Challenge 3**

Look at the 3-D shapes in Challenge 2. Name the 3-D shapes that have the properties of a regular polyhedron.

**Rule**

In a regular polyhedron:

- each face is a regular polygon
- all faces are identical
- the same number of faces meet at each vertex.





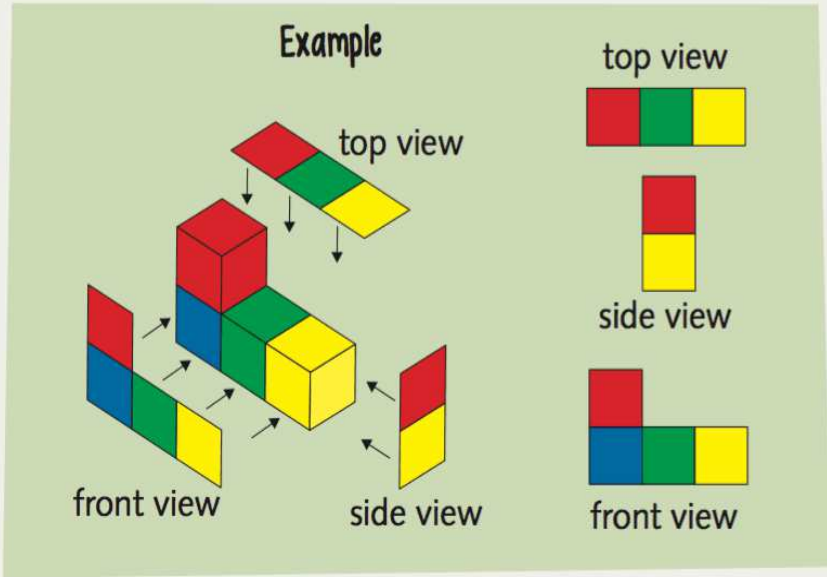
# Drawing 3-D shapes

Visualise and draw 3-D shapes from the top, from the front and from the side

**Challenge**

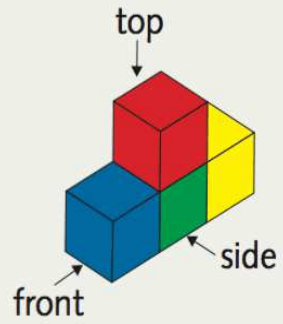
You can view 3-D shapes in three ways: from the top, from the front and from the side.

- You will need:**
- 20 centicubes in five colours: red, blue, green, yellow and orange
  - five coloured pencils
  - 1 cm square dot paper
  - ruler



1 Make the 3-D shape on the right with four centicubes. Draw it on square dot paper as you would see it from the

- a top view      b front view      c side view.



2 Use the three views to make each shape with centicubes.

<b>a</b>	top view 	front view 	side view 
<b>b</b>	top view 	front view 	side view 

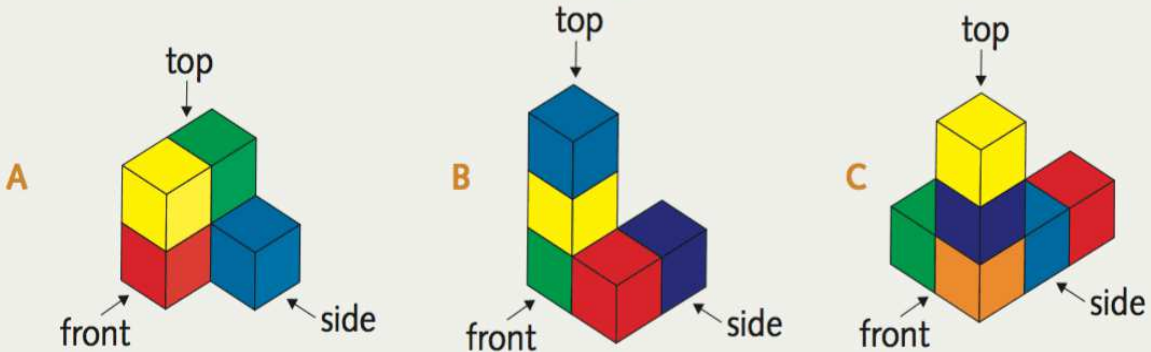
Challenges  
2,3

1 Look at the diagrams below.

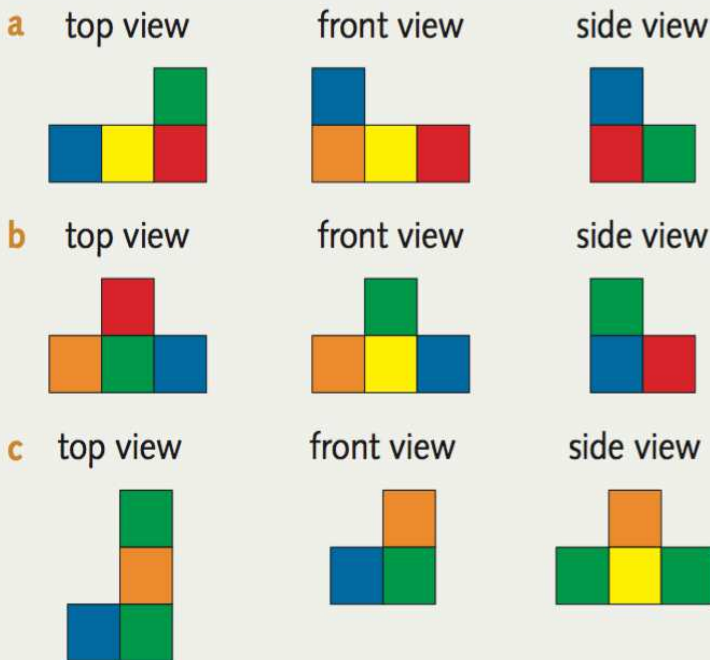
- a Make each 3-D shape with centicubes.
- b Draw it on square dot paper as you would see it from the top, the front and the side.

You will need:

- 20 centicubes in six colours: red, blue, green, yellow, orange and purple
- six coloured pencils
- 1 cm square dot paper
- ruler



2 Use the three views to make each shape with centicubes.

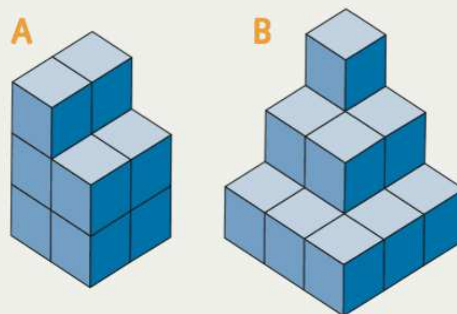


You will need:

- coloured pencil
- 1 cm triangular dot grid paper
- 1 cm square dot paper
- ruler

Challenge  
3

- 1 Copy each 3-D shape onto triangular dot grid paper and colour the cubes.
- 2 On square dot paper, draw the views from the top, from the front and from the side.

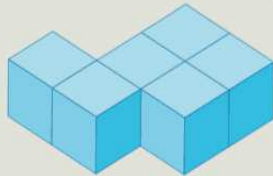




# Working with 3-D shapes

Investigate and draw 3-D shapes which can be made using interlocking cubes

This drawing shows the six cubes which make the 3-D shape.



This is a drawing of the same 3-D shape but it does not show the individual cubes.



**Challenge**

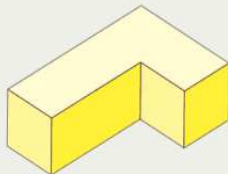
1 For each shape below:

- estimate the least number of cubes you will need to build each shape
- build the shape
- write the number of cubes you needed.

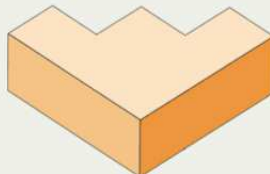
You will need:

- 12 centicubes

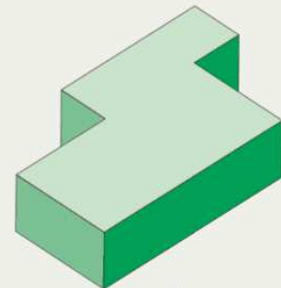
A



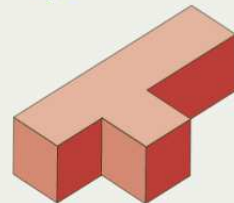
B



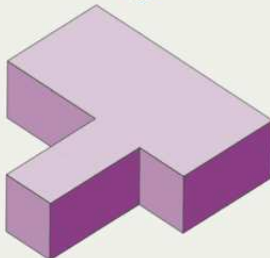
C



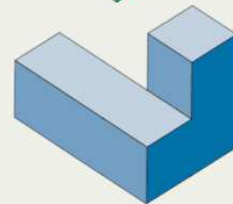
D



E

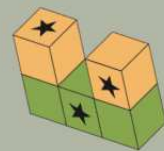


F



2 Carla used five cubes to build her shape. She decorated her shape with star stickers. Write the letter of the shape that is exactly the same as Carla's.

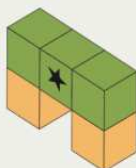
Carla's shape:



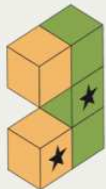
A



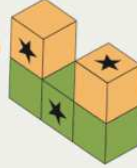
B



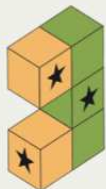
C



D



E



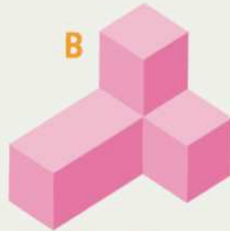
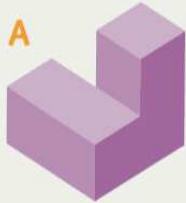
F



**Challenge 2**

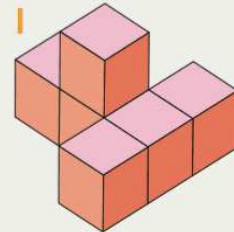
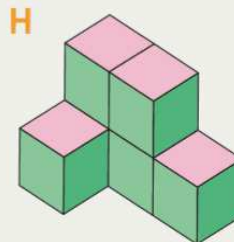
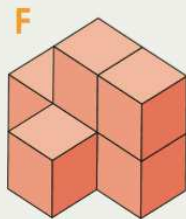
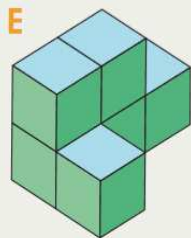
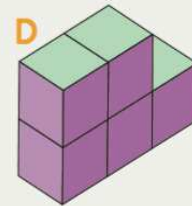
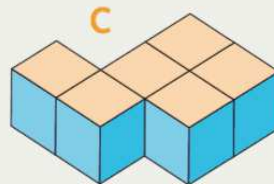
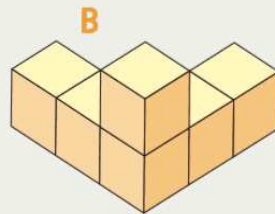
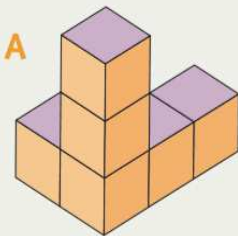
1 Follow the instructions in Challenge 1, Question 1 for these shapes.

**You will need:**  
• 12 centicubes



2 Each of the 3-D shapes below is made with six cubes. Which drawings show the same shape but have different orientations and colours?

**Hint**  
One shape does not have a match.



**Challenge 3**

Build three different shapes with six cubes. Draw each shape you make on triangular dot paper.

**You will need:**  
• 18 centicubes  
• 1 cm triangular dot paper  
• ruler

