

Years 1/2

Small Steps Guidance and Examples

Block 3 – Geometry: Shape

WhiteRoseMaths

Overview

Small Steps

Year 1

- Recognise and name 2D shapes
- Recognise and name 3D shapes
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-
-
- Sort 2D shapes
-
-
- Sort 3D shapes
- Patterns with 3D and 2D shapes
-

Year 2

- Recognise and name 2D and 3D shapes
- Counting sides on 2D shapes
- Counting vertices on 2D shapes
- Drawing 2D shapes
- Lines of symmetry
- Sorting 2D shapes
- Counting faces on 3D shapes
- Counting vertices on 3D shapes
- Sorting 3D shapes
- Making patterns with 2D shapes
- Making patterns with 3D shapes

2D Shapes

Notes and Guidance

Looking on the surface of 3D shapes, children start to see 2D shapes. They use the shapes they see to draw around and print.

Here it is important that children see 2D shapes are flat.

Looking at 2D shapes, children name triangles, squares, rectangles and circles.

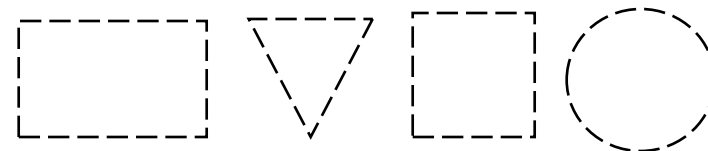
Mathematical Talk

How many of the shapes are squares?

How many are not squares?

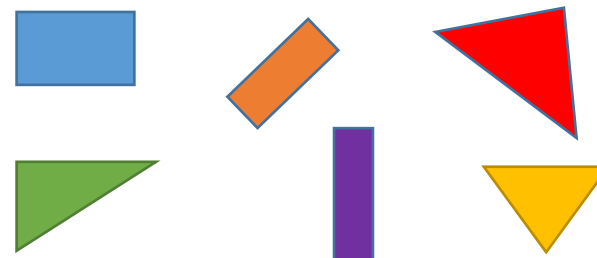
Varied Fluency

- 1 Trace around the shapes and write their names beneath them.



- 2 Choose a 3D object. Use one of the faces as a stencil to draw around. Name the shape that you have drawn. How many different 2D shapes can you draw using 3D shapes as a stencil?

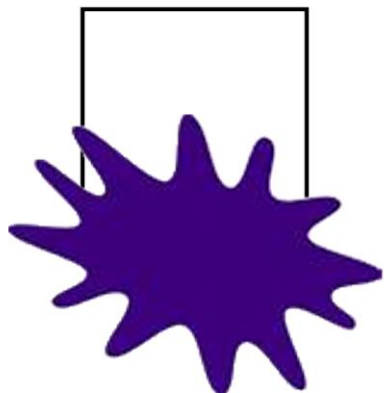
- 3 Circle the triangles and tick the rectangles.



2D Shapes

Reasoning and Problem Solving

Part of a shape is hidden.



What shape could it be?

Is there more than one possibility?

Explain your thinking.

It could be a square because it can have 4 sides the same length.

It could be a rectangle because it could have 2 longer sides.

Here is part of a shape.



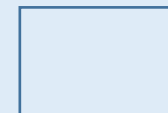
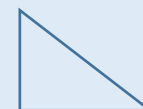
How many different ways can you complete the shape using one or more straight lines?

Compare yours with a partner.

What is the same and what is different?

Possible answers:

Children could continue the shape to make a square, rectangle or triangle.



Recognise 2D and 3D Shapes

Notes and Guidance

Before learning about their properties, children need to recognise and name both 2D and 3D shapes and to be able to differentiate between them. They need to begin to understand that 2D shapes are actually flat and so cannot be handled or picked up.

Children also need to be able to recognise 2D shapes in different orientations..

Mathematical Talk

What shape is this? If I turn it around, now what shape is it?

Can you draw around any of the faces on your 3D shapes?
Which 2D shapes can you make? Are there any you can't draw around?

Varied Fluency

- 1 Match the names of the shapes to the pictures.

Square



Triangle



Rectangle



Circle



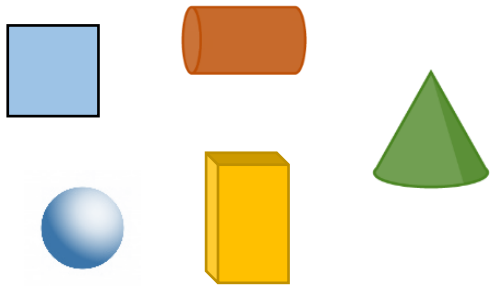
- 2 Put a combination of 3D shapes in a feely bag. Can you find the cube, the cone, the cylinder? etc.

- 3 Go on a shape hunt around school. Can you see any pentagons? Can you see any octagons? Can you see any hexagons?

Recognise 2D and 3D Shapes

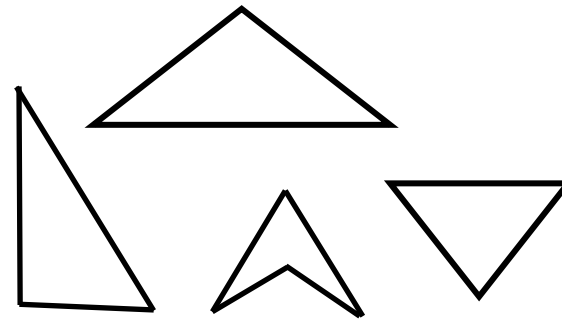
Reasoning and Problem Solving

Which is the odd one out?



The square is the odd one because it is the only 2D shape or the only flat shape.

Which is the odd one out? Explain your reasoning.



Three of the shapes are triangles, one is not. Three of them have three sides, one has four.

Other answers can be accepted with a clear explanation.

3D Shapes

Notes and Guidance

In this step, children are introduced to simple 3D shapes: cuboids, cubes, pyramids, spheres, cylinders and cones.

Children recognise 3D shapes from a group and name them.

They match the shape names to the shape and see how 3D shapes with the same name can look different.

Mathematical Talk

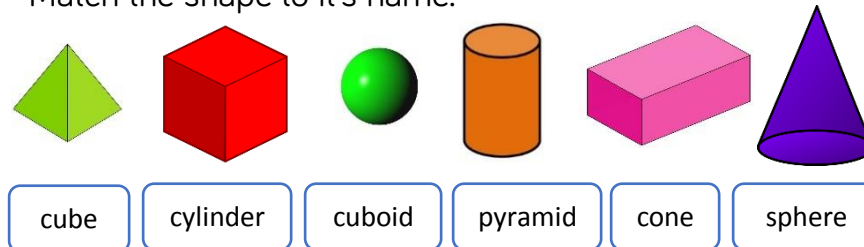
Can we see any 3D shapes in the classroom?

Do cubes all look the same?

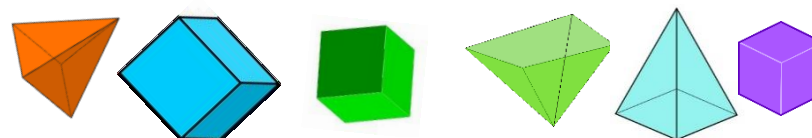
Is a pyramid only a pyramid when the point is at the top?

Varied Fluency

- 1 Match the shape to its name.



- 2 Circle the cubes. Tick the pyramids.



- 3 Lucy has built a model.
Complete the sentences to describe Lucy's model.

There are ____ cuboids.
There are ____ cylinders.
There are ____ pyramids.
There are ____ cubes.



3D Shapes

Reasoning and Problem Solving

The shapes below are shadows of a 3D shape.



What could the 3D shape be?

Place a 3D shape in a feely bag.
What shape could it be?



Explain how you know.

The square could be a shadow of a square based pyramid, cuboid or cone.
The circle could be a shadow of a cylinder, sphere or cone.

Possible answer:
I think it is a cuboid because I cannot feel any curved surfaces but I can feel a long and smaller face.

The bottom of a 3D shape is hidden.



What shape could it be?

Explain how you know.

Possible answers:

Cube

Cuboid

Count Sides on 2D Shapes





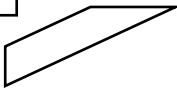


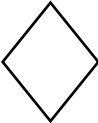
Notes and Guidance

In this step, children need to recognise that there are both straight sides and curved sides. Children should be encouraged to develop strategies for accurate counting of sides, such as by marking each side as it has been counted. Children also need to understand that not all same-sided shapes look the same, such as with irregular 2D shapes.






Mathematical Talk

- What is a side?
- Are all sides straight?
- How can you check that you have counted all sides?
- Do all four-sided shapes look the same?

Varied Fluency

- 1 Match the shapes to the number of sides.
- One Four Three
-   
- 2 Colour the four-sided shapes in red.
-     

- 3 Complete the table.

Name	Shape	Number of sides
Pentagon		
Circle		
Square		
Triangle		
Hexagon		

Count Sides on 2D Shapes

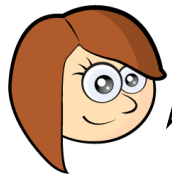
Reasoning and Problem Solving

Here are 18 lollipop sticks. How many octagons can you make?



18 octagons with 2 lollipop sticks spare. $8 + 8 = 16$ sticks.

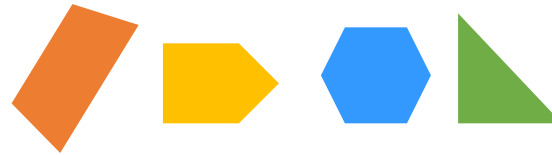
Beth says:



"My shape has one curved side and one straight side. What could it be?"

Beth's shape is a semi-circle.

Put these shapes into order based upon the number of sides that they have.



Triangle, quadrilateral, pentagon, hexagon.



Count Vertices on 2D Shapes

Notes and Guidance

Children are introduced to the term vertices. They will understand that a vertex is where two lines meet at a point. By exploring the non-concept, e.g. a perpendicular line, they will recognise that corners are vertices and be able to count them in real-life 2D shapes.

Mathematical Talk

Show me a vertex.

Can you identify the vertices in this shape?

Would this be a vertex? Explain why.

If I have ____ vertices, what could my shape be? What won't it be?

Varied Fluency

- 1 Match the shape to the correct number of vertices.

3 Vertices



5 Vertices



4 Vertices



- 2 Chris says:

My shape has
3 vertices.



What shape could he have?

- 3 Put these shapes in order based upon the number of vertices they have.

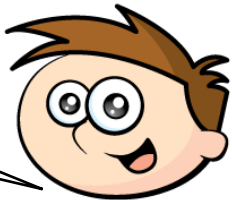


Count Vertices on 2D Shapes

Reasoning and Problem Solving

Bob says:

All squares have 5 vertices.



No, squares have 4 vertices.

Do you agree? Convince me.

Which 2d shape has half the amount of vertices as a hexagon?

Triangle.

What 2d shape has twice as many vertices as a square?

Octagon.

Which has more vertices?

	Number of vertices
2 squares	
4 triangles	
2 pentagons	

(8, 12, 10)

4 Triangles

Draw 2D Shapes

Notes and Guidance

Children use their knowledge of properties of shape to accurately draw 2D shapes. Starting with geoboards, children make shapes with elastic bands to look carefully at the number of sides and vertices.

They then use rulers and straight edges to draw the shapes on squared or dotty paper.

Mathematical Talk

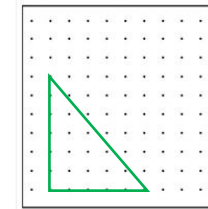
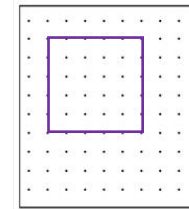
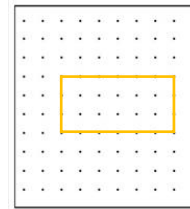
Where are you going to start drawing the shape? In the middle of a side? At a vertex? Which is the most efficient way?

Can you make the shape on a geoboard? How many sides has the shape got?

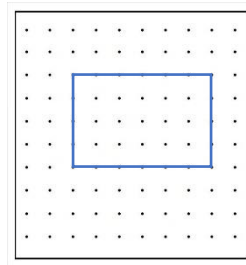
Can you draw a rectangle? Can you now draw a larger rectangle?

Varied Fluency

- 1 Use a geoboard to make different 2D shapes. Can you make a rectangle? Can you make a square? Can you make a triangle?



- 2 Can you draw a rectangle on dotty paper? Start at a vertex and use a ruler to draw your first straight side. How many straight sides will you need? Rotate the paper to help you draw the shape more accurately.



- 3 Use a geoboard to make different 2D shapes. Can you make a rectangle? Can you make a square? Can you make a triangle?

Draw 2D Shapes

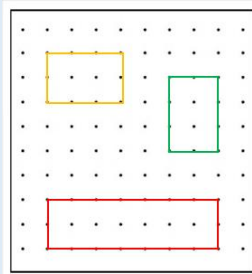
Reasoning and Problem Solving

Using geoboards, how many different rectangles can you make?

What's the same about the rectangles?
What's different?

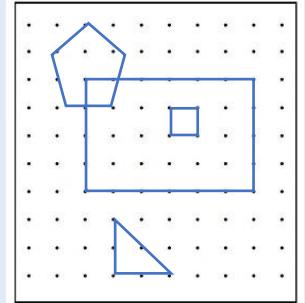
Has your friend made any different rectangles?

Here are three possible rectangles. The green and the yellow rectangles are the same size but has been rotated. The red rectangle is longer than the others. They all have four sides and four vertices.



Draw a large rectangle on squared paper. Draw a square inside the rectangle. Draw a triangle underneath the rectangle. Draw a pentagon that is bigger than the square.

Can you give instructions to your partner to help them draw different shapes?



Children may end up with a different picture from above however they should have four shapes drawn.

Children will make up their own instructions.

Lines of Symmetry

Notes and Guidance

In the previous small steps, children have identified and described 2D shapes according to the number of sides and vertices. They now need to be introduced to the concept of symmetry. There are a range of practical resources that would introduce them to the concept of shapes being halved on their vertical line of symmetry, such as mirrors, GeoBoards and paper folding.

Mathematical Talk

What is a vertical line of symmetry?

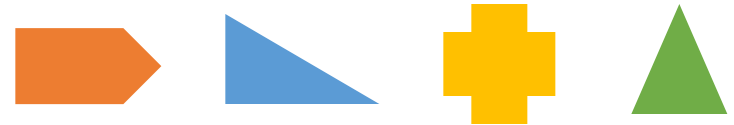
What does vertical mean?

Which is the odd shape out? How do you know?

What resources could you use to check if a shape has a vertical line of symmetry?

Varied Fluency

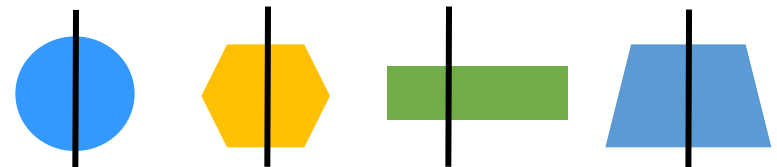
- 1 Can you fold these shapes to find a vertical line of symmetry? Rotate the shape, can you find a Horizontal line of symmetry?



- 2 Draw the vertical lines of symmetry on these shapes.



- 3 Circle the shape with an incorrect line of symmetry. Explain why.



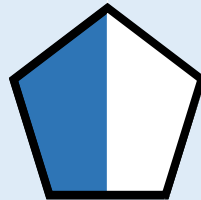
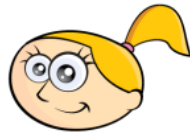
Lines of Symmetry

Reasoning and Problem Solving

Can you draw more than one four-sided shape that has a vertical line of symmetry?

E.g. square,
rectangle, kite

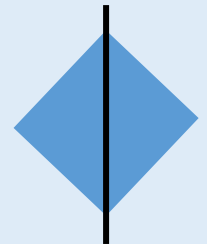
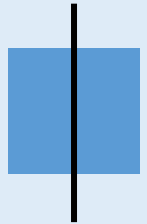
Caroline has placed a mirror on the vertical line of symmetry. This is what she sees:



Can you complete the other half of the shape?

Which 2D shapes can be made when a vertical line of symmetry is drawn on a square?

Rectangle and
triangle



Sort 2D Shapes

Notes and Guidance

Children place 2D shapes into groups based on their names.

Children see that 2D shapes with the same name can be different sizes, orientations and colours but still have the same name.

Mathematical Talk

What is the same about all the rectangles?

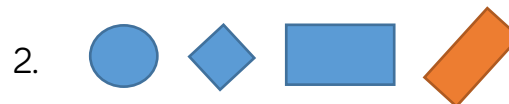
What is the same about a square and a rectangle? What's different?

Why is the shape the odd one out? Could another shape be the odd one out?

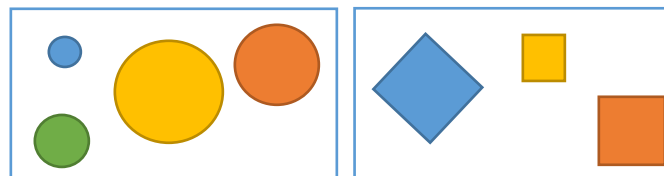
Can you label the groups?

Varied Fluency

1 Circle the odd one out in each group.



2 How are the shapes grouped?
Label each group.

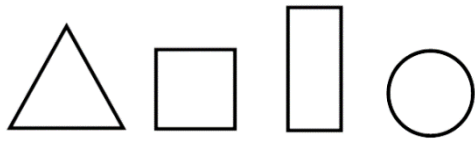


3 Use a selection of triangles, rectangles, squares and circles.
Put your shapes into groups.
Ask a friend to label the groups.

Sort 2D Shapes

Reasoning and Problem Solving

Use a selection of triangles, rectangles, squares and circles.



Put your shapes into groups.

Ask a partner to label your groups.

How many groups can you create?

Possible ways of sorting:

Colour, name of shape, number of sides.

Look at the square and rectangle below.

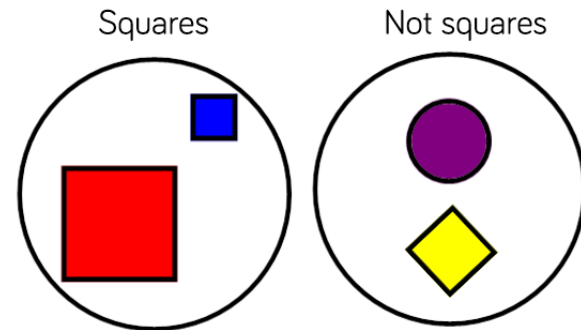


What is the same and what is different?

The square and the rectangle both have 4 sides.

The rectangle has 2 short sides and 2 long sides.

Simon has sorted some shapes.



Has he sorted them correctly?

Explain how you know.

Simon has not sorted them correctly.

The yellow shape is a square; it is just a different way round.

Sort 2D Shapes

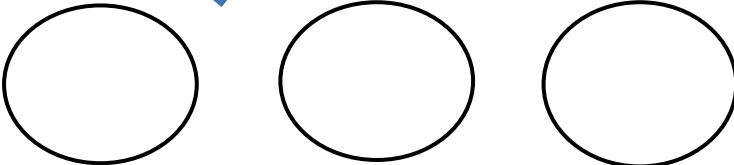

Notes and Guidance

Children need to be able to recognise and name 2D shapes including circle, square, triangle, rectangle, pentagon, hexagon and octagon using a range of different orientations and real life objects. Children need to be able to count the number of sides and vertices on 2D shapes including circle, square, triangle, rectangle, pentagon, hexagon and octagon. Children may have been introduced to the Venn diagram in cross curricular work so they can focus on the shapes within this step.

Mathematical Talk

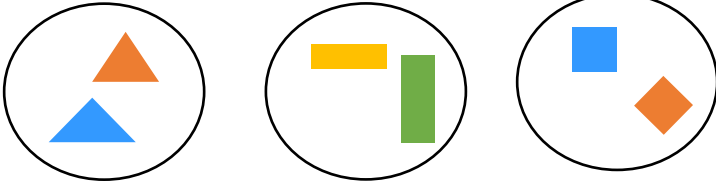
- How have you sorted your shapes?
- How do you know you have sorted your shapes correctly?
- Which method have you used to sort your shapes?

Varied Fluency

- 1 Sort these 2D shapes into the correct group:
- 

Rectangle

Triangle

Square
- 2 Give children prepared groups of 2D shapes and labels. Match the labels to the groups and justify how they have been sorted. How are the shapes sorted?
- 
- 3 Sophie sorted the shapes by the number of vertices. What shapes belong to each group?

4 vertices	More than 4 vertices

Sort 2D Shapes

Reasoning and Problem Solving

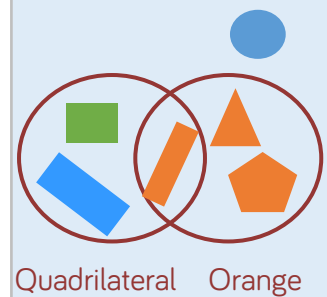
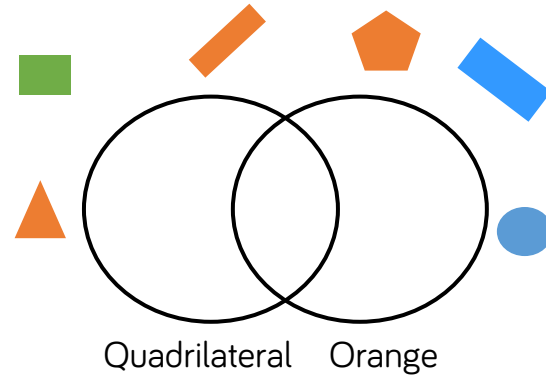
Ben sorted the shapes in order of the number of sides. Has he ordered them correctly?



No because the square should be before the pentagon.

Sort shapes with line of symmetry and not a line of symmetry

Where should these shapes go in the Venn diagram?



Count Faces on 3D Shapes

Notes and Guidance

Children will use their knowledge of 2D shapes to identify the shapes of faces on 3D shapes. To avoid over counting the faces children need to mark each face in some way. Children need to be able to visualise the 3D shape from a 2D representation on paper. Cones should be described as having 1 face and 1 curved surface; cylinders as having 2 faces and 1 curved surface and spheres having 1 curved surface.

Mathematical Talk

What do we mean by the 'face' of a shape?

What is the difference between a face and a curved surface?

What real life objects have 6 faces like a cube?

Does a cuboid always have 2 square faces and 4 rectangular faces?

Which 2D shapes can you see on different 3D shapes?

How can you make sure that you don't count the faces more than once?

Varied Fluency




- 1 Look at these 3D shapes:



Which 2D shapes can you see on each one?

How many 2D shapes can you see on each one?

- 2 Complete the table:

Shape	Name	Flat Faces	Curved Surfaces
			
			
			

- 3 I am a 3D shape with 2 square faces and 4 rectangular faces. What am I?

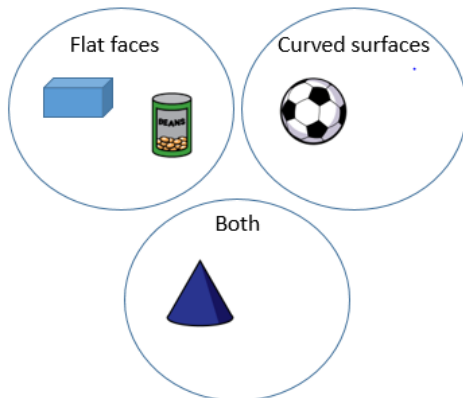
Count Faces on 3D Shapes

Reasoning and Problem Solving

Samir says my 3D shape has 6 faces.
Jolene says he must have a cube.
Is Jolene correct?
Explain your answer.

Samir could have a cube or a cuboid.

Hannah has sorted these 3D shapes.
Can you spot her mistake?
Can you add another shape to one of the circles?



The cylinder is in the wrong place, it should be in 'Both'.

You could add a cube, pyramid, triangular prism.

Sam is drawing all the 2D shapes she finds on 3D shapes. She draws 8 squares for a cube. Is she right?

Prove it!

Sam is incorrect because a cube has 6 square faces.

Count Vertices on 3D Shapes

Notes and Guidance

Children will use their knowledge of edges to help them to identify vertices on 3D shapes. They need to be discretely taught that a vertex is where 2 or more edges meet. Note – a cone has an apex not a vertex, because it has one curved surface. To avoid over counting the vertices children need to mark each edge in some way. Children need to be able to visualise the 3D shape from a 2D representation on paper.

Mathematical Talk

- What do we mean by the ‘vertices’ of a shape?
- How can you make sure that you don’t count the vertices more than once?
- How many edges meet to make a vertex on a 3D shape? How many sides meet to make a vertex on a 2D shape?




Varied Fluency

1 Look at these 3D shapes:



How many vertices can you see on each one?

2 Complete the table:

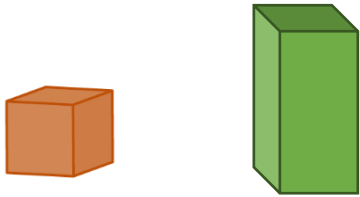
Shape	Name	Faces	Edges	Vertices
				
				
				

3 Alex has a shape with 8 vertices. What 3D shape could it be?

Count Vertices on 3D Shapes

Reasoning and Problem Solving

What is the same about these 2 shapes?



What is different about these 2 shapes?
Talk about faces, edges and vertices in your answer.

Example answer:

Both shapes have the same number of vertices, faces and edges.

The cube only has square faces, but this cuboid has 2 square faces and 4 rectangular faces.

Jack says:



All 3D shapes have at least one vertex.

Is this true or false?
Explain why

False, because a cone has an apex not a vertex. A sphere also has no vertices.

Sort 3D Shapes

Notes and Guidance

They start to see that shapes may have the same name but can be different sizes, orientations and colours.

Given a selection of 3D shapes, children sort their shapes into the correct group given by their name.

Mathematical Talk

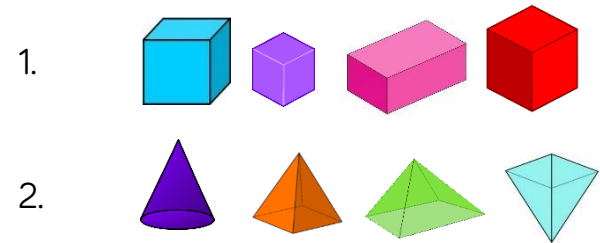
Do all cuboids look the same as each other?

How are they different?

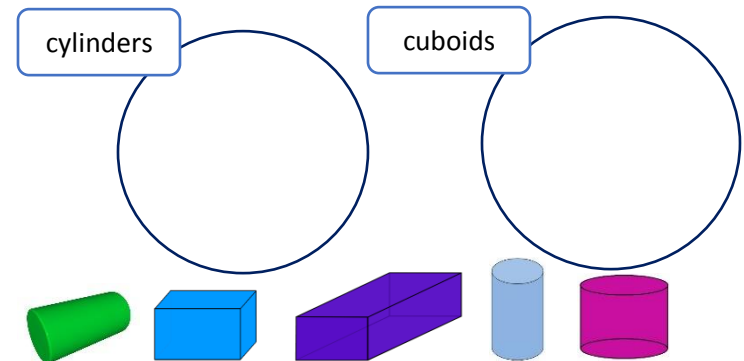
Take two different cylinders. What's the same about them?
What's different?

Varied Fluency

- 1 Circle the odd one out in each group.



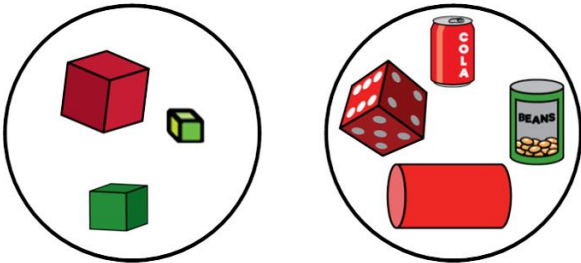
- 2 Place the shapes in the correct groups.



Sort 3D Shapes

Reasoning and Problem Solving

Some 3D shapes have been sorted.



Have the shapes been sorted correctly?

Explain how you know.

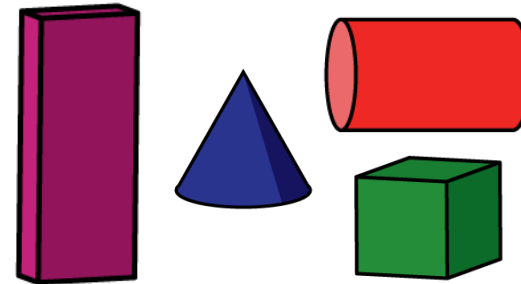
How else could the shapes be sorted?

Possible answers

The shapes have been sorted into colour. The green tin of beans and the red cube need to be moved.

The shapes have been sorted into cylinders and cubes. The dice needs to be moved.

How many ways can you sort the shapes into groups?



Possible answers:

Straight faces and curved surfaces.

Shapes with a circular face and shapes with a square face

Big shapes and small shapes

Sort 3D Shapes

Notes and Guidance

Children need to be able to recognise and name 3D shapes including cube, sphere, cuboid, cone, cylinder, triangular prism and square-based pyramid using a range of different orientations and real life objects. Children need to be able to count the number of sides and vertices on 3D shapes including cube, sphere, cuboid, cone, cylinder, triangular prism and square-based pyramid. In this small step, children should have access to a range of real life objects to sort and compare.

Mathematical Talk

How have you sorted your shapes?

How do you know you have sorted your shapes correctly?

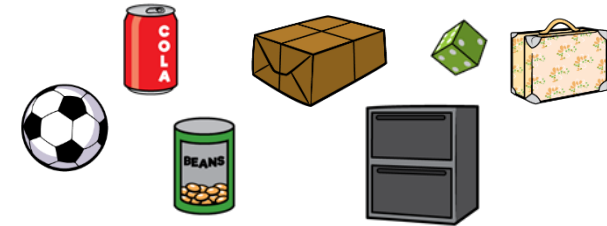
Which method have you used to sort your shapes?

Can you sort your shapes in a different way?

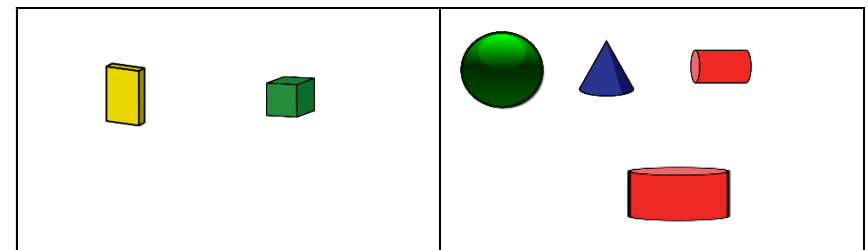
Can you group your solids by shape, type of faces and size?

Varied Fluency

- 1 Group the following real life objects by their 3D shape name.



- 2 Sort the 3D shapes on your table. How have you grouped them? Label the groups.
- 3 How are these shapes grouped? Tell your partner.



Has your partner grouped them in a different way?

Sort 3D Shapes

Reasoning and Problem Solving

Hamish is sorting 3D shapes.
He puts a cube in the cuboid pile.

A cube is a
type of cuboid.



Do you agree? Why?

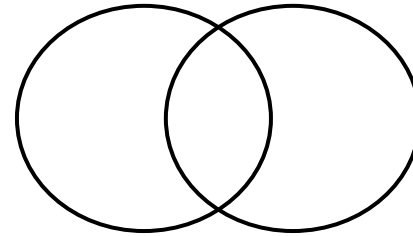
Answer: Yes it is.

They both have 6
faces.

They both have 12
edges.

A cube is a
particular kind of
cuboid where all
faces are squares.

Can you arrange the shapes in your table
into a Venn Diagram?



What titles could you give it?

Hamza has sorted some 3D shapes.
He has placed a cube and a cuboid in the
same group.

How could he have sorted his shapes?

Patterns with 2D & 3D Shapes

Notes and Guidance

This step stems from the non-statutory guidance within Place Value.

Children use 2D and 3D shapes to complete and make simple patterns focusing on different shapes and sizes. Before this small step, children would have been exposed to ordinal numbers so can apply this when describing and continuing patterns.

Mathematical Talk

How can we describe the pattern? What will come next? What's the same and what's different about the first two caterpillar patterns?

What does 1st mean? What colour will come after red?

Let's look at a cone and cube- what shapes can you see on a cone? What shape can you see on a cube?

Varied Fluency

- 1 Continue the patterns.



Can you create your own using two colours?



- 2 Using blocks, cubes or paint, create and continue the pattern:

1st – Red

2nd – Green

3rd – Red

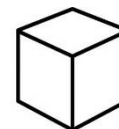
- 3 The pattern below has been created by printing 3D shapes.



What 3D shape below would you use next to continue the pattern?



Cone



Cube

Patterns with 2D & 3D Shapes

Reasoning and Problem Solving

Fred and Emma have each created a pattern.



Our patterns are exactly the same.

Emma

Our patterns are different.



Fred

Who do you agree with?

Explain your answer.

Fred is correct because the triangle is in a different orientation.

Which shape could go in the grey box?



How can you check?

Can you make a different pattern with the same shapes?

The cylinder should go in the grey box

I can check by getting the shapes out and seeing if it repeats correctly.

Make Patterns with 2D Shapes

Notes and Guidance

At this stage children should be able to name and draw 2D shapes and be familiar with their properties. Children should recognise symmetry within shapes and be shown shapes in different orientations. Children should be encouraged to place the shapes in different orientations when making patterns and recognise that it is still a square, triangle etc. Squares do not become diamonds when turned sideways.

Mathematical Talk

Can you explain the pattern? How many time does the pattern repeat?

How are these patterns similar? How are these patterns different?

How can you work out which shape will come ___th?

Varied Fluency

- 1 Continue this pattern:



- 2 Draw pictures to represent this pattern:

Square, circle, triangle, triangle, square, circle, triangle, triangle.

- 3 Make repeating patterns using only one shape



Make Patterns with 2D Shapes

Reasoning and Problem Solving

Catherine says that the 12th shape in this pattern will be a triangle.



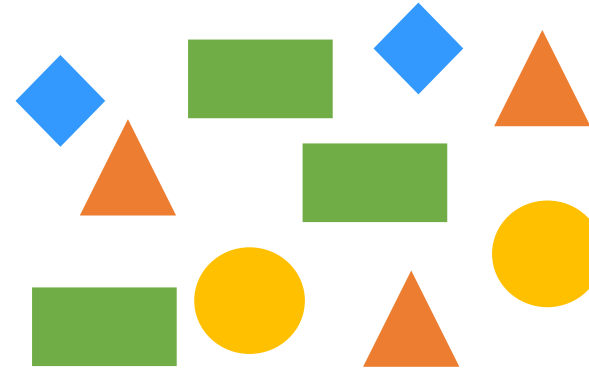
Is she correct?

How do you know?

The 12th shape will be a triangle.

Children may physically continue the pattern to find the answer or recognise that the triangle is the 3rd and count in 3s.

How many different ways can you arrange these shapes to make a repeating pattern?



Create a pattern that only uses shapes with 4 vertices.

There are many ways to make different repeating patterns. Encourage children to orally describe the pattern they have created.

Children will use squares and rectangles in different orientations to make different patterns.

Make Patterns with 3D Shapes

Notes and Guidance

Children should be familiar with the names and properties of 3D shapes at this stage. This step allows opportunities to justify choices in pattern making and reinforce shape vocabulary. Discussion around the orientation of the shape should be encouraged by making patterns with the same shape as per the example with the cones below. A wide range of examples of shapes should be used, including, Polydron, cereal boxes, different sized balls, food cans etc.

Mathematical Talk

Where can you see real life patterns with 3D shapes?

Can you explain your pattern to a partner?

Does the shape always have to be a certain way up?

Can you work out what shape would be the ___th?

Varied Fluency

- 1 Use some different coloured cubes to make a repeating pattern. Can you describe the pattern to your partner?
- 2 Make a sequence of 3D shapes with real life objects. You could use food cans, boxes, balls, or other things in your classroom. Describe the pattern.
- 3 Here is a pattern of 3D shapes:



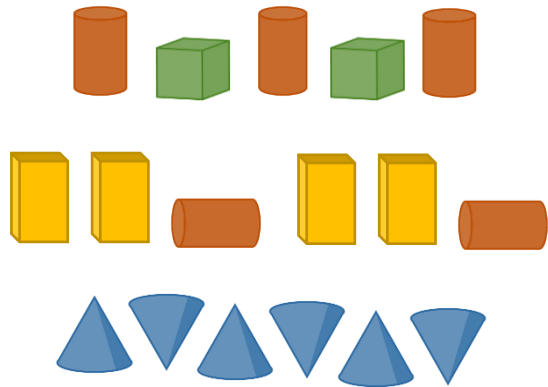
Add a 3D shape into the sequence after the cube. If you continued the pattern, what will the 10th shape in the sequence be?

Can you make a different pattern with the same shapes?
What's the same, what's different?

Make Patterns with 3D Shapes

Reasoning and Problem Solving

What is the same about these patterns?
What is different about these patterns?

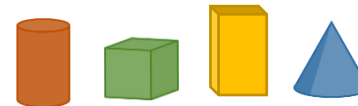


First and second patterns are repeating alternate. Colour is a difference to note. Orientation of shapes is different.

Take a selection of 3D shapes where you have 2 different types.
What different repeating patterns could be made?



Use 4 different types of 3D shapes like the ones below.



Make a repeating pattern where there are more cones than cuboids.
Try to make a repeating pattern where the third shape is always a cylinder.

Answer will depend on the shapes used.