

Planning Overview

Year 2 Properties of Shape

Identify and describe the properties of 2-D shapes, including the number of sides and lines symmetry in a vertical line

Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces

Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]

Compare and sort common 2-D and 3-D shapes and everyday objects.

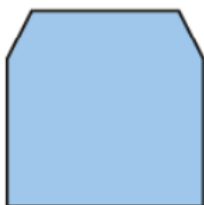
2G-1 Use precise language to describe the properties of 2D and 3D shapes, and compare shapes by reasoning about similarities and differences in properties

Name and describe properties of 2-D and 3-D shapes, including number of sides, vertices, edges, faces and lines of symmetry (TAF ARE)

Describe similarities and differences of 2-D and 3-D shapes, using their properties (e.g. that two different 2-D shapes both have only one line of symmetry; that a cube and a cuboid have the same number of edges, faces and vertices, but different dimensions) (TAF GD)

Name some common 2-D and 3-D shapes from a group of shapes or from pictures of the shapes and describe some of their properties (e.g. triangles, rectangles, squares, circles, cuboids, cubes, pyramids and spheres) (TAF WT)

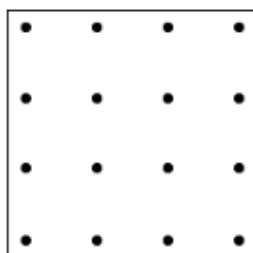
	Teaching and Learning
Introduction and recap of shape work from Year 1	What do they already know? Lay out a selection of 2D/3D shapes and tell children they can make a model/picture using only the shapes they know the names of. Shape hunt outside – collect a specific colour and then bring them back. Discuss properties. Who can tell me a property of their shape? Who else thinks they have a shape with the same property? Show me. Put the shapes in the middle. Describe a shape. Which shape could I be describing? Which shape can't it be? Why? Feely bag- what shape could it be? Describe and develop language – recapping learning from Year 1. Sort shapes using their own criteria. Focus on accurate use of property names building on knowledge from Year 1. Encourage use of sides or vertices in their sorting criteria. E.g. • 3 sides and not 3 sides • up to 3 vertices and more than 3 vertices • no curved sides and some curved sides Make sure children can describe a vertex as where 2 sides meet.

Name and describe properties of 2D shapes including sorting by those properties	Use a set of 2D shapes that includes pattern blocks and cardboard shapes so that there are lots of irregular and unusual shapes. We can identify names of shapes by counting the number of sides (or vertices) but sometimes there are several different shapes that have the same number of sides or vertices. What happens then? Look at a variety of triangles, pentagons and hexagons. For all these shapes it doesn't matter how they look, they all have the same name. Counting the sides or vertices, gives you the name. Now look at a set of 4-sided shapes. Children need to know the term quadrilateral as the generic term for a 4-sided shape. They will probably know rectangle and square but need to be able to define these two special quadrilaterals. To be a rectangle the vertices all need to be the same. To be a square all the vertices and all the sides need to be the same. (They do not need to understand or use the terms parallel or perpendicular or know other quadrilateral shape names in year 2). Introduce the term polygon as a 2D shape which has only straight sides. Recognise that they already know the names of some common polygons. They also know some shapes that are not polygons. Can they explain which shapes are/are not polygons and why? Make sure children are confident that the number of sides/vertices determines the type of polygon, rather than whether it looks like a similar shape they know.  For example, this looks like a square but it is a hexagon because it has 6 straight sides. Sort shapes by type of polygon Sort shapes by their properties Make as many different pentagons as possible with cuisenaire rods Draw as many different types of quadrilateral as possible. Use a ruler to draw a polygon person. Label each polygon.
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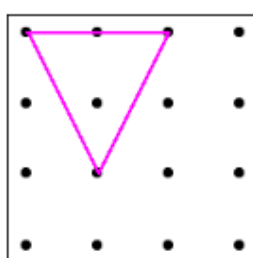
NRICH – Inside Triangles

Age 5 to 7
Challenge Level ★

Here is a four by four dotted grid:



I have joined three dots on the grid to make a triangle which has one dot inside it:



How many different triangles with one dot in the middle can you draw?

How do you know have found them all?

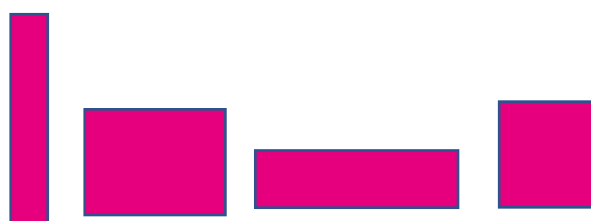
Develop reasoning about 2D shapes.

Reveal 2D shapes slowly from behind a card and guess what they are – giving reasons.

Play what's my rule. Children name a shape or draw a shape and teacher puts them into a circle if it meets the rule or outside if it does not. Children have to work out the rule.

Encourage children to begin to use informal language to discuss and compare the space inside 2D shapes to lay the groundwork for learning about area in year 3. E.g. they might use language such as 'long and thin', 'short and wide', 'larger and 'smaller'

They could decide which chocolate bar they would prefer to eat and give reasons.



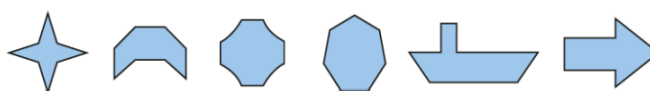
Work in small groups to do tasks like these from the Ready to Progress guidance.

1. How many sides does this shape have? What is the name of this shape?



2. Sketch a hexagon. Try to think of a hexagon that will look different to those drawn by other pupils.
3. Task: Lay out a selection of 3D shapes, then instruct pupils to find a shape that has:
- fewer than 5 edges
 - more than 5 faces
 - exactly 1 vertex
 - all faces the same shape
 - no flat faces
 - no straight edges
 - both a square face and a triangular face

4.



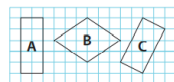
- Circle all of the octagons.
- Explain why the shapes you have *not* circled are *not* octagons.

Mathematics guidance: key stages 1 and 2 Non-statutory guidance for the national curriculum in England.

Mastery

Captain Conjecture says, 'All of these shapes are rectangles because they have four sides.'

Do you agree?



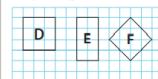
Explain your reasoning.



Mastery with Greater Depth

Captain Conjecture says, 'All of these shapes are rectangles because they have four sides.'

Do you agree?



Explain your reasoning.

Children should appreciate that a square is a rectangle because it has 4 right angles and opposite sides are of equal length.



Lines of symmetry

Give pre-cut 2D shapes and investigate which can be folded to create a line of symmetry and which can't.

Use a mirror to test whether a 2D shape is symmetrical – predict outcomes – 'If it's symmetrical I'll know because....'

Draw lines of symmetry on 2D shapes. Count and record how many lines of symmetry for different shapes.

Give children half a symmetrical shape and ask them to draw the other half.

Use pegboard to make symmetrical patterns.

Design a symmetrical sweater or scarf using shapes.

Spot road signs that are symmetrical.

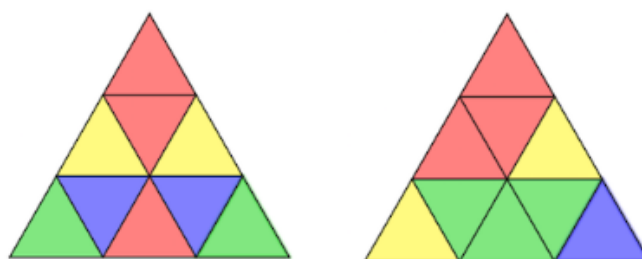
NRICH – colouring triangles

Colouring Triangles

Age 5 to 7

Challenge Level ★★

What do you see below?



What do you notice?

What is the same and what is different about the two pictures?

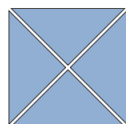
Now, it is your turn to colour!

Explore ways of colouring the black and white outline of the triangles:



Mastery with Greater Depth

Cut a square piece of paper as shown. Rearrange the pieces to make different shapes. What different shapes can you make?



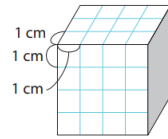
Describe the properties of the shapes you make.

Can you make some shapes which have at least one line of symmetry?

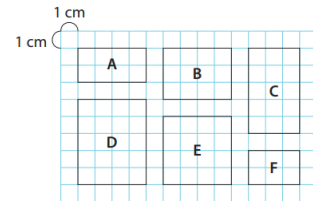
Name and describe properties of 3D shapes including sorting by those properties and identifying 2D shapes as faces on 3D shapes	Recap the terms that are specific to 3D shapes – face and edge (the sides of the 2D shapes on the faces). Edges and faces can be curved or straight. The terms vertex and vertices remain the same but now they are where 2 or more edges meet. Teach strategies to help keep track of which edges you have counted e.g. for a cube all the edges around the top square, all the edges around the base square and all the vertical edges joining the two. Could use stickers or whiteboard pen to keep track. Feely bag visualising – find me a shape that has more than 3 edges etc. Choose a 3D shape – say one property and pass it on – next child says a second property and passes it on. Make 3D shapes from construction toys or sticks and plasticine. Identify and draw the faces from a given 3D shape Complete tables with numbers of edges or vertices for different shapes What's the same what's different questions e.g. triangle-based pyramid and triangular prism. Odd one out questions where any shape could be the odd one out e.g. cuboid, cube and triangular prism. Mastery with Greater Depth What's the same and what's different about these shapes?  Which could be the odd one out and why? Could each one be the odd one out? Explain your reasoning. This is a year 1 GD question. More complex sorting activities e.g. where children use edges as one of criteria Work in small groups to do tasks like these from the Ready to Progress guidance. 5. Task: Present pupils with a cylinder and a cone (the 3D shapes rather than pictures), then instruct pupils to: - describe something that is the same about the 2 shapes - describe something that is different about the 2 shapes 6. Task: Lay out a selection of 3D shapes, then ask pupils to identify all of the shapes that have a square face. <i>Mathematics guidance: key stages 1 and 2 Non-statutory guidance for the national curriculum in England.</i>
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Mastery

We are going to make a box as shown.

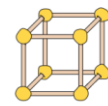


Which quadrilaterals shown below do we need?
How many of each do we need?



Mastery with Greater Depth

Jack has made a cube using 12 sticks and 8 balls of modelling clay.



What shape could he make with:

6 sticks and 4 balls of clay?

4 long sticks, 8 short sticks 8 balls of clay?

Consolidation with further sorting & Problem Solving

Sorting has been built into each section but now that the children are very secure with their property knowledge you might want to finish the unit with a further focus on sorting – extending work onto overlapping Venn diagrams, carroll diagrams or yes/no diagrams.

Problem solving and reasoning activities have been built into the plan but you might want to try one of these to finish off your unit.

Problems from Mathematical Challenges with reasoning
Spot the shapes 1 – puzzle 25

Spot the shapes 1

1. How many triangles can you count?



2. How many rectangles can you count?



3. Draw your own diagram to count triangles.
How many can a friend find?
Can you find more?

25

Teaching objectives

Solve mathematical problems or puzzles.
Visualise 2-D shapes.
Explain methods and reasoning.

Questions and Activities to Develop Reasoning

Another and Another

Draw me a shape with 8 triangles. And another ... And another ...

True or False?

If I draw four rectangles connected in a row, I can count 10 rectangles in total. True or False?

Always, Sometimes, Never

I draw a pair of triangles connected along one side. I can count 3 triangles. Is this always true, sometimes true or never true?

Is it Possible?

Is it possible to make more than 6 triangles from 3 triangles joined by their sides?