





















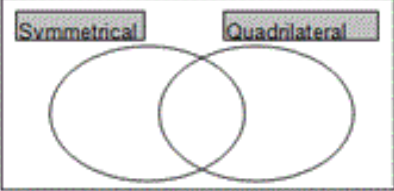




Unit Overview and Guidance

- The exemplification has been taken from the NCETM online 'Resource Toolkit', with additions in order to ensure full coverage.
- Links to the White Rose Maths hubs schemes of work (with questions categorised into the three aims of the national curriculum i.e. fluency, problem solving and reasoning) are hyperlinked to each of the objectives. Many thanks go to the White Rose Maths hub for permission to include their resources.
- The NCETM reasoning questions have also been incorporated into each unit and are identified in pale purple boxes underneath the group of the most relevant objectives.
- The 'big Ideas' sections from the NCETM 'Teaching for Mastery' documents have been included at the start of each unit. Hyperlinks to the full NCETM 'Teaching for Mastery' documents have also been included for easy reference.
- Hyperlinks to NRich activities have also been added to this version. These are found by clicking on the blue buttons like this one  at the bottom of relevant objective.
- Some additional content has been added in order to support mixed-aged planning. Any additional content is in *italics*. Occasionally ~~strikethrough~~ has been used to identify when an objective has been altered and this is primarily where an objective has been split between two units.
- Each unit is sub-divided into sections for ease of planning. Sub-categories in this unit are:
 1. Properties of shapes
 2. Position, direction, Movement and Angles
 3. Symmetry and Pattern

	Reception	Yr 1	Yr 2	Yr 3
NCETM Teaching for Mastery Questions, tasks and activities to support assessment	<p>The Big Ideas</p> <p><i>Shape, Space and Measures (Early Learning Goals)</i></p> <p>They explore characteristics of everyday objects and shapes and use mathematical language to describe them.</p> <p>They recognise, create and describe patterns.</p>	<p>The Big Ideas</p> <p>It is important for children to be familiar with a range of 2-D and 3-D shapes and not just recognise them in specific orientations, e.g. thinking that this is a triangle  but this  or this  are not .</p> <p>It is preferable to introduce 3-D shapes before 2-D shapes, since 2-D shapes only exist in the real world as faces of 3-D shapes.</p> <p>An emphasis should be placed upon identifying and describing the properties of shapes. It is important that pupils develop the correct mathematical language to do so.</p> <p>The development of precise language to describe position and movement is important.</p>	<p>The Big Ideas</p> <p>It is not uncommon for pupils to say that this is a square  and this is not , or that something like this is a triangle .</p> <p>It is important for pupils to know what the properties are that make up certain shapes, and for them not to just learn the names of typical proto looking shapes.</p> <p>It is helpful to think about non examples of shapes. For example, why this is not a  triangle:</p> <p>Recognising pattern and generalising structures and relationships are key elements for laying the foundations for later work in algebra.</p>	<p>The Big Ideas</p> <p>During this year there is an increasing range of shapes that pupils are familiar with. The introduction of symmetrical and non-symmetrical polygons and the requirement that pupils should be able to draw them will give rise to discussions about lengths of sides and sizes of angles. Pupils need to appreciate these features as properties of shapes as well as the number of sides and vertices.</p> <p>Pupils recognise that angles are about the amount of turn – the lengths of the lines used to represent angles do not affect the size of the angle.</p> <p>Pupils recognise that relationships are at the heart of properties of shapes, not particular measurements. For example, the opposite sides of any rectangle will always be equal, not that rectangles have a pair of long sides and a pair of short sides.</p>
	<p style="text-align: center;">Becoming a Mathematician</p>	<p style="text-align: center;">Teaching for Mastery Year 1</p>	<p style="text-align: center;">Teaching for Mastery Year 2</p>	<p style="text-align: center;">Teaching for Mastery Year 3</p>

GEOMETRY (GEO - 4 weeks)

Strand	Reception	Yr1	Yr2	Yr3
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Properties of Shapes</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Properties of Shapes – 2D</p>	<p>30-50 months Shows an interest in shape and space by playing with shapes or making arrangements with objects.</p> <p>30-50 months Shows awareness of similarities of shapes in the environment.</p> <p>30-50 months Shows interest in shape by sustained construction activity or by talking about shapes or arrangements.</p> <p>30-50 months Shows interest in shapes in the environment.</p> <p>30-50 months Uses shapes appropriately for tasks.</p> <p>30-50 months Beginning to talk about the shapes of everyday objects, e.g. 'round' and 'tall'.</p> <p>40-60+ months begin to use mathematical names for 'flat' 2-D shapes, and mathematical terms to describe shapes</p> <p>40-60+ months select a particular named shape</p> <p>Adult Initiated</p> <p>Find similar shapes on faces of objects. Where can we find circles in the shop? Can you match these lids to the jars or boxes?</p> <p>Play Peeping Shapes: Without using its name, describe a thin plastic shape hidden in a cloth bag. My shape has three corners and three sides. What can it be? My shape is curved all the way round. What can it be? Show a small part of the shape; What shape might it be? Why? What shape can't it be? Why?</p> <p>Sort into trays a collection of varied flat shapes, either thin plastic shapes, shapes made from paper, or drawn or stuck on card. Tell me how you sorted the shapes? Can you sort them so that all the ones with three sides are together? Can you find all the shapes which are not square? Can you find the shapes which are not round?</p> <p>Sort or match scraps of fabric, or buttons. Identify which scraps of fabric have the same pattern? Which have stripes? Which have dots? Which have square checks? Which scraps, or which buttons, are the same shape? Which are the same shape and size?</p> <p>Enabling Environments –child initiated, adult supported</p> <p>Provide and make sure the resources are available for children to extend and revisit the adult initiated experiences.</p> <p>Indoors/ Outdoors</p> <p>Transient Art: Which shapes have you used in your picture? Which objects can you use to make a curve around the edge of the picture?</p> <p>Treasure hunt- for 2D shapes</p> <p>Art area: using 2D shapes to print pictures and make rubbings.</p> <p>Role play: identify and talk about 2D shapes in play within the home corner- in the kitchen, in the shop etc</p> <div style="text-align: right;">1 2</div>	<p>recognise and name common 2-D, including [for example] rectangles (including squares), circles, triangles.</p> <p>Recognise and name 2D shapes</p> <p>Sort 2D shapes</p> <p>Give each child a shape -</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">Child A </div> <div style="text-align: center;">Child B </div> <div style="text-align: center;">Child C </div> <div style="text-align: center;">Child D </div> </div> <p>Give each child two different shapes</p> <p>Tell me something that is the same about these. Now tell me something that is different about these.</p> <p>One shape has 2 long sides and 2 short sides. Tick (✓) it.</p> <div style="display: flex; justify-content: space-around; align-items: center;">    </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;">   </div> <div style="text-align: right; margin-top: 20px;">1 2 3 4</div>	<p>identify and describe the properties of 2D shapes, including the number of sides and symmetry in a vertical line</p> <p>Recognise 2D and 3D shapes</p> <p>Count sides on 2D shapes</p> <p>Count vertices on 2D shapes</p> <p>Draw 2D shapes</p> <p>Lines of symmetry</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Place the shapes below in the correct place in the Venn diagram.</p> <div style="display: flex; justify-content: center; gap: 10px;">      </div> <p>Make one shape of your own to add to each section of the diagram.</p> </div> <div style="display: flex; justify-content: center; align-items: center; margin: 10px 0;"> <div style="border: 1px solid gray; padding: 5px; margin-right: 10px;">Symmetrical</div> <div style="border: 1px solid gray; padding: 5px; margin-right: 10px;">Quadrilateral</div>  </div> <div style="display: flex; justify-content: center; gap: 5px; margin: 10px 0;"> <div style="border: 1px solid gray; padding: 2px 5px;">1</div> <div style="border: 1px solid gray; padding: 2px 5px;">2</div> <div style="border: 1px solid gray; padding: 2px 5px;">3</div> <div style="border: 1px solid gray; padding: 2px 5px;">4</div> <div style="border: 1px solid gray; padding: 2px 5px;">5</div> <div style="border: 1px solid gray; padding: 2px 5px;">6</div> <div style="border: 1px solid gray; padding: 2px 5px;">7</div> <div style="border: 1px solid gray; padding: 2px 5px;">8</div> <div style="border: 1px solid gray; padding: 2px 5px;">9</div> </div> <p>compare and sort common 2D shapes and everyday objects</p> <p>Sort 2D shapes</p> <p>Make patterns with 2D shapes</p> <p>Children can sort two sets of 2D shapes in 2 or more different ways using different criteria each time. For example, they might choose 'dimensions' or 'right angled'</p> <div style="text-align: right; margin-top: 20px;">1 2</div>	<p>draw 2-D shapes;</p> <p>Recognise and describe 2D shapes</p> <p>Children should be able to</p> <p>use appropriate mathematical vocabulary to describe the features of common 2-D shapes</p> <p>sort and classify collections of 2-D shapes in different ways using a range of properties including: 'all sides are of equal length,' 'has at least one right angle' or 'has at least one line of symmetry'</p> <p>record their classifications on Venn and Carroll diagrams, including diagrams involving more than one criterion</p> <p>How many triangles can you draw on a 3x3 pin board? How many quadrilaterals can you draw on a 3x3 pin board?</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>In each case, how do you decide if the shapes are the same or different?</p> <p>Could you find different right angled triangles, or is there only one? Can you name the different quadrilaterals?</p> <div style="text-align: right; margin-top: 10px;">1 2 3</div> <p>Identify horizontal and vertical lines and pairs of perpendicular and parallel lines</p> <p>Horizontal and vertical</p> <p>Parallel and Perpendicular</p> <p><i>Label parallel and perpendicular sides of given shapes.</i></p> <p>(Y4 objective) compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes</p> <p>Pupils should be able to complete this sentence: All equilateral triangles have..</p> <div style="text-align: right; margin-top: 20px;">1 2 3 4 5</div>

GEOMETRY (GEO - 4 weeks)

Properties of Shapes

Properties of Shapes – 3D

30-50 months Shows an interest in shape and space by playing with shapes or making arrangements with objects.
30-50 months Shows awareness of similarities of shapes in the environment.
30-50 months Shows interest in shape by sustained construction activity or by talking about shapes or arrangements.
30-50 months Shows interest in shapes in the environment.
30-50 months Uses shapes appropriately for tasks.
30-50 months Beginning to talk about the shapes of everyday objects, e.g. 'round' and 'tall'.
40-60+ months begin to use mathematical names for 'solid' 3-D shapes and mathematical terms to describe shapes
40-60+ months select a particular named shape

Adult Initiated

Identify solid shapes that can be seen around the school and in the classroom in the home corner or classroom shop; on a 'shape walk' around the school...

Start to become aware of some properties of solid shapes when looking at, talking about and comparing them:
Which shapes are hollow? Can you find a shape which has flat faces? Can you find a shape with a curved surface?

Which shapes do you think will roll? Why?

Guess the name of a solid shape when it is covered with tin foil or wrapping paper, or placed in a cloth bag.

Make models using shapes that vary in shape, size and texture

Which shapes have you used to make your model? Why did you choose that shape for the wheels?

Enabling Environments –child initiated, adult supported

Provide and make sure the resources are available for children to extend and revisit the adult initiated experiences.

Outdoors

Large Construction: Discuss shapes used and made with different large hollow blocks when making a model. Which shapes have you used to make the roof etc?

Treasure hunt- for 3D shapes

Indoors

Art area: Making junk models. Which shapes have you used for your model. Why did you choose that shape for the wheels?

Role play: identify and talk about solid shapes in play within the home corner- in the kitchen, in the shop etc. Can we use the flat face to stand them on the shelf?

In the post office, shop role play- wrapping solid shapes. What shaped box could you fit the present into?

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recognise and name common 3-D shapes, including [for example] rectangles (including squares), circles, triangles, cuboids (including cubes), pyramids and spheres.

Recognise and name 3D shapes

Sort 3D shapes

Patterns with 3D and 2D shapes

Look at the shape I have given you. Tell me one thing about the shape.

Hand each child a solid -

Child A: cylinder

Child B: triangular prism

Child C: cone

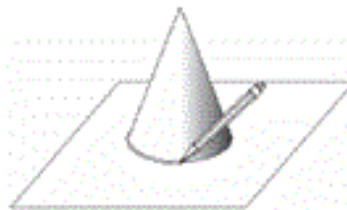
Child D: cube

Look at what I have given you. Tell me one thing about it.

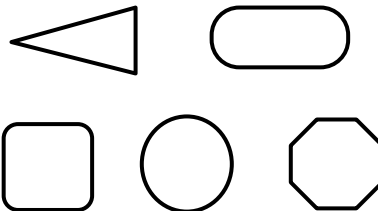
Give each child two different solids.

Tell me something that is the same about these. Now tell me something that is different about these.

Fred draws round the bottom of a cone.



Tick (✓) the shape that Fred draws.



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

Count edges on 3D shapes

Count vertices on 3D shapes

Write the missing numbers in the 2 empty boxes.

	number of square faces	number of triangular faces	number of circular faces
cylinder	0	0	
cube		0	0
pyramid	1	4	0

1 2 3

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

Count faces on 3D shapes

What is a 3-D shape?
 3-D means the shape has 3 dimensions: length, width and depth.

1-Dimension	2-Dimensions	3-Dimensions
3. This is a cube		

It has 3 dimensions - length, height and depth.
 All 3-D shapes are solids.

1 2

compare and sort common 3D shapes and everyday objects

Sort 3D shapes

Make patterns with 3D shapes

Children can sort two sets of 3D shapes in 2 or more different ways using different criteria each time. For example, they might choose 'dimensions' or 'right angled'

make 3D shapes using modelling materials;

Construct 3D shapes

recognise 3-D shapes in different orientations and describe them

Recognise and describe 3D shapes

Children should be able to

use appropriate mathematical vocabulary to describe the features of common 3-D shapes including semicircles, hemispheres and prisms



In each case, how do you decide if the shapes are the same or different?

Could you find different right angled triangles, or is there only one? Can you name the different quadrilaterals?

1 2 3 4
5 6 7 8

1

GEOMETRY (GEO - 4 weeks)

Properties of Shapes	NCETM Reasoning	<p>What's the same, what's different?</p> <p>Find a rectangle and a triangle in this set of shapes. Tell me one thing that's the same about them. Tell me one thing that is different about them.</p> <p>Visualising</p> <p>Put some shapes in a bag.</p> <p>Find me a shape that has more than three edges.</p> <p>True or false?</p> <p>All 2-D shapes have at least 4 sides</p> <p>Other possibilities</p> <p>Can you find shapes that can go with the set with this label?</p> <p>"Have straight sides"</p>	<p>What's the same, what's different? Pick up and look at these 3-D shapes.</p>  <p>Do they all have straight edges and flat faces?</p> <p>What is the same and what is different about these shapes?</p> <p>Visualising</p> <p>In your head picture a rectangle that is twice as long as it is wide.</p> <p>What could its measurements be?</p> <p>Always, sometimes, never</p> <p>Is it always, sometimes or never true that when you fold a square in half you get a rectangle.</p> <p>Other possibilities</p> <p>Can you find shapes that can go with the set with this label?</p> <p>"Have straight sides and all sides are the same length"</p>	<p>What's the same, what's different? What is the same and different about these three 2-D shapes?</p>  <p>Visualising</p> <p>I am thinking of a 3-dimensional shape which has faces that are triangles and squares. What could my shape be?</p> <p>Other possibilities One face of a 3-D shape looks like this.</p> <p>What could it be? Are there any other possibilities?</p> <p>Always, sometimes, never Is it always, sometimes or never that all sides of a hexagon are the same length?</p> <p>Other possibilities Can you find shapes that can go with the set with this label?</p> <p>"Have straight sides that are different lengths."</p> <p>Convince me Which capital letters have perpendicular and / or parallel lines? Convince me.</p>

GEOMETRY (GEO - 4 weeks)

Position, direction, Movement and Angles

Position, direction, Movement and Angles

30-50 months Uses positional language
40-60+ months describe their relative position such as 'behind' or 'next to'

Adult Initiated

Describe where objects are in a picture. For example: *The fish is above the weed in the pond...The frog is under the rock beside the pond...*

Follow instructions to get through an obstacle course or over climbing equipment in PE, *stand in front of, behind, beside, opposite a partner... or between two others...*

Describe how things are stored on shelves in the classroom or in a cupboard. *Are the felt pens on top of, under, next to... the books?*

Use small world to follow and give instructions and talk about position. *Put the sheep on the trailer. Put the pigs in the pen. Where shall we put the hens? Can you tell where the cat is?*

Talk about movements and directions.

In PE, follow instructions to run forwards, walk backwards, turn on the spot, turn to the left, turn to the right, face the front, or side, or back, or corner of the room, move away from the bars, slide down the ramp, roll on the mat...

Give instructions to other children to get round the classroom or through an obstacle course. *Go around the stool, go in front of the table, crawl under the bridge, go over the tyres and stop behind the swing*

Describe a walk round the school or its grounds:

Take photographs of the journey to use back in the classroom. *We went along the path, through the tunnel in the adventure playground and then across the field...*

Explore and talk about things that turn, such as the hands of a clock, wheels, taps, keys in locks, screw top lids on jars...

Enabling Environments –child initiated, adult supported

Outdoors

Digging/planting area; Model positional language when putting in plants. *Shall we put the sunflowers behind/ next to the ...?*

Den Building: Put the material over the top. Fasten the pegs onto the side. *Where shall we make the den? Under the tree or next to the fence?*

Roleplay: Journeys (e.g. The Train Ride) Planning a route. Drawing maps e.g. to find the treasure. Planning where to play. *Shall we go through the tunnel and play next to the?*

Indoors

Small world: The train track layout: *Put the track through the tunnel. Put the trees next to the station etc.*

The doll's house: Position of the furniture and play people

ICT: Programming routes for the 'Beebot' to negotiate pathways made using construction blocks

Construction area: *Put the long block in front of the wall.*

Where shall we put the bridge? Where is the ramp going to go?

1 2 3 4

describe position, direction and movement, including whole, half, quarter and three-quarter turns

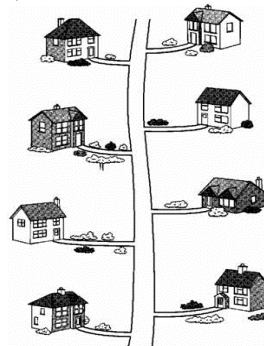
Describe turns

Describe positions (1)

Describe positions (2)

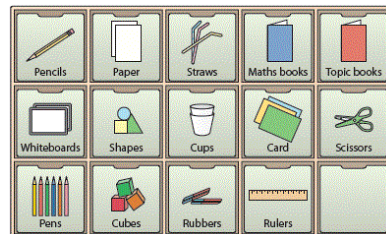
Look at this map – Desi starts at the bottom. Desi's house is the 2nd on the left.

Tick (✓) it.



Look at the shelves with the objects.

The cups are in the middle row and third from the right. They are below the straws.



How could you describe the positions of other things on the shelves?

I am thinking of an item. You may ask questions but I can only answer yes or no.

You could guess the item in four questions, what questions could they be?

1 2 3 4

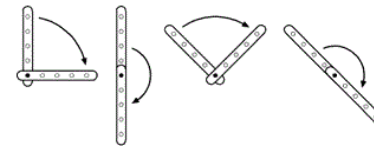
use mathematical vocabulary to describe position, direction and movement including distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise), and movement in a straight line

Describe movement

Describe turns

Describe movement and turns

Recognise whole, half and quarter turns. They describe turns and give and follow instructions to turn. For example, they give instructions to a friend to follow a route around the playground. They make and draw half and quarter turns from the same starting point using, for example, two geo-strips.



Use this grid to help you complete the table –

3	pond		swings		
2		trees		seesaw	
1			slide		
	A	B	C	D	E

Trees	B2
Slide	
Seesaw	
	A3

1	2	3	4	5
6	7	8	9	X

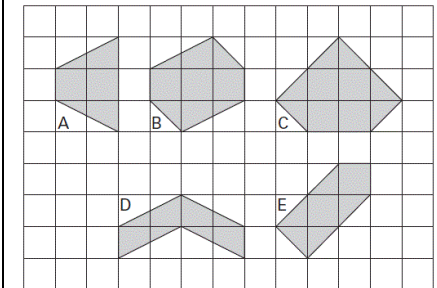
Recognise angles as a property of a shape or description of a turn

Turns and angles

Identify right angles, recognise that two right angles make a half turn, three make three quarters of a turn and a complete turn; identify whether angles are greater or less than a right angle

Right angles in shapes

Compare angles



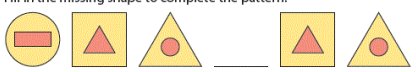
Which of these shapes have right angles?



If I face West and make a quarter turn anticlockwise, in which direction will I now face? What about half turn?

1

GEOMETRY (GEO - 4 weeks)

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Symmetry and Pattern</p>	<p style="text-align: center;">Symmetry and Pattern</p> <p><u>40-60+ months use familiar objects and common shapes to create and recreate patterns and build models</u></p> <p>Adult Initiated</p> <p>Talk about and describe simple patterns, based on experience with patterns from different cultures: on ornaments, in necklaces and bracelets, on textiles, pottery, carpets...</p> <p>Use sets of shapes, printing, collage, weaving, bead threading, computer programs or other media to make own repeating patterns such as: <i>cotton reel, sponge, cotton reel, sponge; thumb print, palm, palm, thumb print, palm, palm...</i></p> <p>Talk about, copy and continue repeating patterns of sounds or movements in music or dance, such as: <i>tap, tap, pause, tap...</i> on the tambourine; <i>hop, hop, jump...</i> in PE.</p> <p>Make predictions, giving reasons for them. Predict who will say 8 when counting round a circle of children. Say what is hidden when an element in a pattern is covered up, or two elements are changed over. <i>My pattern has two circles, then two squares, then two more circles and two more squares, what will come next?</i></p> <p>Make repeating patterns from bricks, beads cubes and natural objects such as pebbles, cones and shells: <i>Describe your pattern? Tell me which shapes you have used. Look at my pattern can you guess how I made it?</i></p> <p>Nature Walk Go on a nature walk inspired by artist Andy Goldsworthy. Make patterns and take photographs to share and talk about.</p> <p>Enabling Environments –child initiated, adult supported</p> <p>Indoors and Outdoors Make sure there are resources and collections e.g. natural objects, open ended material etc. available for children to make comparisons and extend adult initiated experiences.</p> <p>Washing line patterns: provide range of resources and pegs for children to make patterns. <i>Tell me about your pattern? What comes next?</i></p> <p>Music: tap out sound patterns with sticks using different pan lids, upturn buckets, the ground, a range of metal objects hanging on the fence/tree etc.</p> <p>Transient Art indoors and outdoors): make patterns out of natural and found materials. <i>Describe your pattern? Tell me which shapes you have used. Look at my pattern can you guess how I made it?</i></p> <p>Indoors Art area: using 2D and faces on 3D shapes to print wallpaper patterns for the home corner. Provide a range of familiar objects to print patterns.</p> <p>Malleable area: using shapes, faces of objects make a repeating pattern. <i>My pattern has one circle, then two squares, then one more circle and two more squares, what will come next?</i> Making patterns on the buns in the tray e.g. using range of objects or printing shapes on top</p> <p>Sand area: making simple repeating patterns, in wet sand, using a range of shapes and faces of solid objects. <i>Tell me about your pattern?</i></p> <div style="text-align: right;"> 1 2 3 </div>	<p><i>(Taken from Year 1 NC non-statutory guidance) They recognise and create repeating patterns with objects and with shapes.</i></p>	<p>order and arrange combinations of mathematical objects in patterns</p> <p><u>Make patterns with shapes</u></p> <p>Identify symmetry in a vertical line</p> <p>Describe the patterns in sequences and predict what comes next in the sequence and continue the pattern.</p> <div style="border: 1px solid black; padding: 5px;"> <p>Fill in the missing shape to complete the pattern.</p>  <p>If the pattern continued what would the tenth shape be?</p> <p>Explain your reasoning.</p> </div>	<p>(Year 4 objective) identify lines of symmetry in 2-D shapes presented in different orientations</p> <p>(Year 4 objective) complete a simple symmetric figure with respect to a specific line of symmetry</p> <p>Horizontal and vertical lines of symmetry only</p>