

Unit 6

Five daily lessons

Shape and space
Reasoning about shapes

Year 3
Autumn term

Unit Objectives Year 3

- | Classify and describe 3-D and 2-D shapes, referring to reflective symmetry, faces, sides/edges, vertices, angles. (pages 80 – 83)
- | Read and begin to write the vocabulary of position. (pages 86 – 87)
- | Use spaces on square grids. (pages 88 – 89)
- | **Identify right angles in 2-D shapes and in the environment.**

Year 2

Year 4

- ?? **Use mathematical names for common 3-D and 2-D shapes.**
- ?? **Sort shapes and describe some of their features, e.g. number of sides, corners, edges, faces.** Make and describe shapes, patterns or pictures using solid shapes and templates.
- ?? **Use mathematical vocabulary to describe position.**
- ?? **Investigate general statements about shapes**

- ?? Measure/calculate perimeter of rectangles and simple shapes (*cm*).
- ?? Describe and visualise 3-D and 2-D shapes, inc. tetrahedron, heptagon.
- ?? Recognise equilateral and isosceles triangles.
- ?? **Classify shapes (right angles, regularity, symmetry).**
- ?? Recognise position on square grids with numbered lines.
- ?? Investigate general statements about shapes

Resources needed to teach this unit:

Large piece of card
2-D shapes
3-D shapes
Scissors
Glue
Small cubes
Treasure Island map
Small whiteboards and pens
Chalk/large paper
2 hoops
A4/A5 paper

Resource Sheet 6.1
Resource Sheet 6.2
Resource Sheet 6.3
Resource Sheet 6.4

Activity Sheet 6.1
Activity Sheet 6.2
Activity Sheet 6.3
Activity Sheet 6.4
Activity Sheet 6.5

Interactive Teaching programs
Year 1, 2, 3 ITP - Polygon



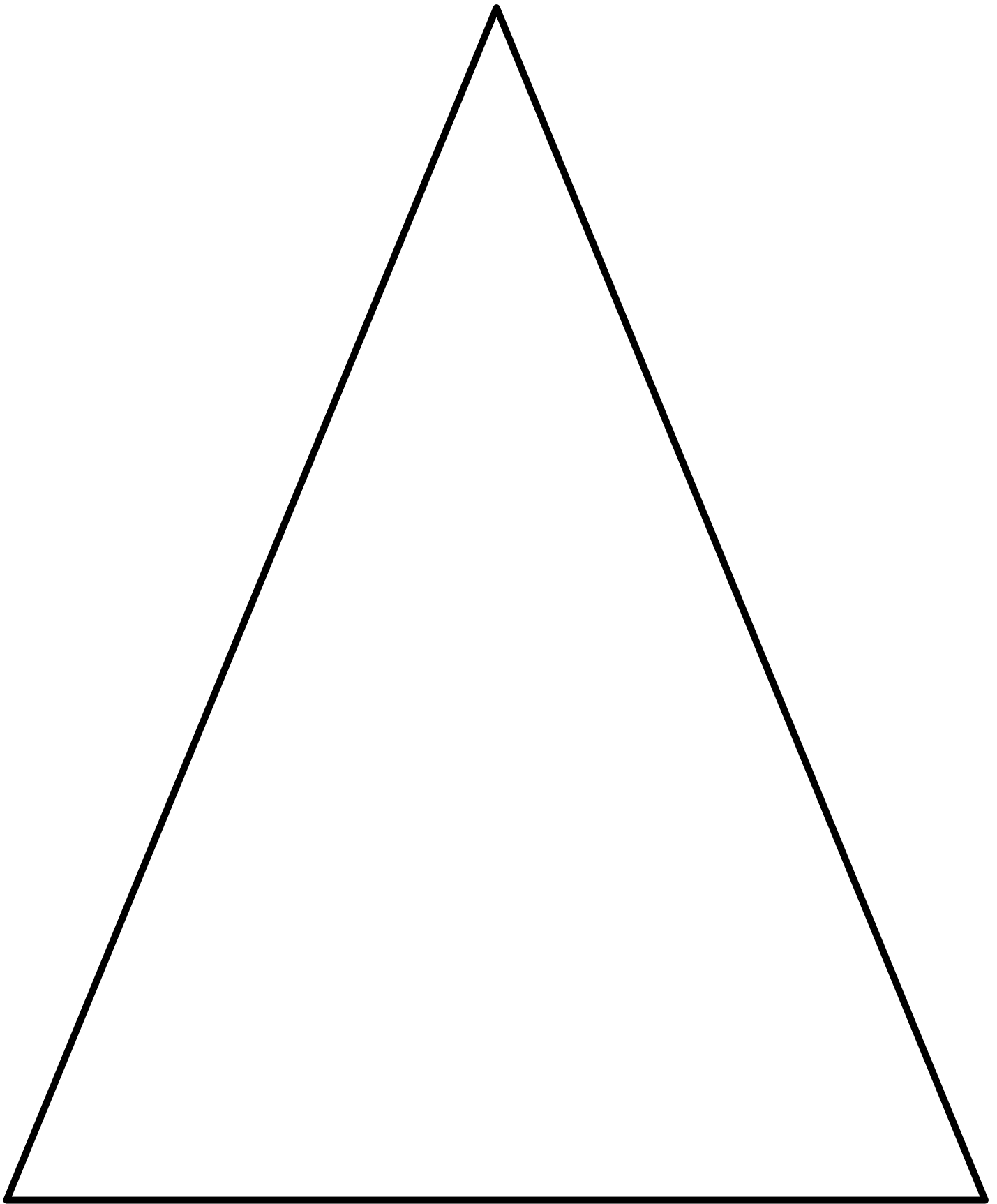
Planning sheet	Day One	Unit 6 Shape and space	Term: <i>Autumn</i>	Year Group: 3
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>Describe 2-D shapes, referring to faces, sides/edges and vertices.</p> <p>VOCABULARY: Shape 2-D edges/sides corners/vertices names of 2-D shapes</p> <p>RESOURCES: Large piece of card Assorted 2-D shapes</p>	<p>Hold a large piece of card in front of you.</p> <p>Tell the children that you have hidden some shapes behind this card.</p> <p>They are going to guess what the shape is as you reveal small parts of it peeping above the card.</p> <p>Hold a circle behind the card and slowly move it up to show a tiny section.</p> <p>Q. Which shapes could it possibly be? (circle or semi-circle)</p> <p>Q. How do you know this?</p> <p>Tell the children you are going to bring the shape back down, turn it around and show them another section.</p> <p>It is also useful to ask children what shape it is definitely <i>not</i>.</p> <p>Repeat this encouraging children to guess the shape with a sound explanation. (e.g. 'I know it's a circle because there are no corners')</p> <p>Repeat this game using all 2-D shapes that the children know.</p> <p>Ensure that each time they guess they give a mathematical reason for it.</p> <p>To extend the children, begin to use 2-D shapes that they may not yet know the names of (but may be able to describe the properties).</p>	<p>Classify and describe 3-D and 2-D shapes, referring to reflective symmetry, faces, sides/edges, vertices, angles.</p> <p>VOCABULARY: shape 2-D 2-dimensional faces edges/sides vertices/vertex angles reflective symmetry names of 2-D shapes</p> <p>RESOURCES: Assorted 2-D shapes Year 1, 2, 3 ITP 'Polygon' Resource Sheet 6.1 Resource Sheet 6.2 Activity sheet 6.1 Scissors Glue</p>	<p>Hold up a square for the children to see or put one on the board using the ITP.</p> <p>Q. What is this shape called?</p> <p>Q. How many sides/edges does it have?</p> <p>Q. How many corners (vertices) does it have?</p> <p>Record this on the white board.</p> <p>Bring up or hold up a rectangle.</p> <p>Q. Repeat the above questions.</p> <p>Record this on the whiteboard.</p> <p>Q. The descriptions of these two shapes seem the same, so how are they different?</p> <p>Children should spot that a square has four equal sides and a rectangle has two lots of two equal sides.</p> <p>Record the amended descriptions, emphasising that it is important that we know everything about the description of the shape or we could become confused.</p> <p>Q. We have looked at two shapes with four sides/edges and four vertices/corners. Do we know of any shape with three sides/edges and three vertices/corners?</p> <p>Show the children a triangle (or all three types of triangle if possible). Talk about the properties of it – encourage the children to use the correct mathematical vocabulary.</p> <p>Repeat this for shapes with five and six sides. Extend this also to shapes with eight sides if necessary.</p> <p>Tell the children that as well as using edges and vertices to describe and classify shapes, we can also use reflective symmetry.</p> <p>Ensure the children understand the meaning of 'symmetry' and its link to reflection and mirrors.</p> <p>Show the children a cut-out of Resource Sheet 6.1. This could be enlarged to A3 for ease of viewing. Ask them to name the shape.</p> <p>Demonstrate how to fold the triangle so that the edges and vertices match exactly. Open the triangle out and draw down the fold. Explain that this is the line of symmetry for a triangle.</p> <p>Reinforce this by using a mirror to reflect one side and then the other.</p> <p>Tell the children that some shapes have more than one line of symmetry and this is how we can describe or classify them</p> <p>Show a cut-out of Resource Sheet 6.2. Name the shape.</p> <p>Demonstrate folding to find the line of symmetry as before. Draw the line.</p> <p>Hold the shape up.</p> <p>Q. Can they spot any other way to fold the square so that the two sides are the same?</p> <p>Fold the shape again for the other two lines of symmetry and count them together.</p> <p>Explain activity.</p> <p>Activity Give each child a copy of Activity Sheet 6.1. Ask them to cut out each shape and fold it to find each line of symmetry. They can then draw the line/s of symmetry on the shape. When they stick the shape down they can write beside it the number of lines of symmetry.</p>	<p>Tell the children that we are now going to use this information to sort our shapes. Draw sections on the board and label them 1 line of symmetry; 2 lines of symmetry and so on.</p> <p>Q. Which shapes can we sort into the '1 line of symmetry' group? Repeat this for all the shapes. Add a new section – 0 lines of symmetry.</p> <p>Q. What shape could go in here? Q. Would it be a regular polygon or one that we could make up? Ask volunteers to draw in shapes they think have no line of symmetry.</p> <p>By the end of the lesson the children should be able to:</p> <p>Identify edges and vertices of 2-D shapes. Find and identify lines of symmetry in 2-D shapes. Use these to describe and classify shapes.</p>

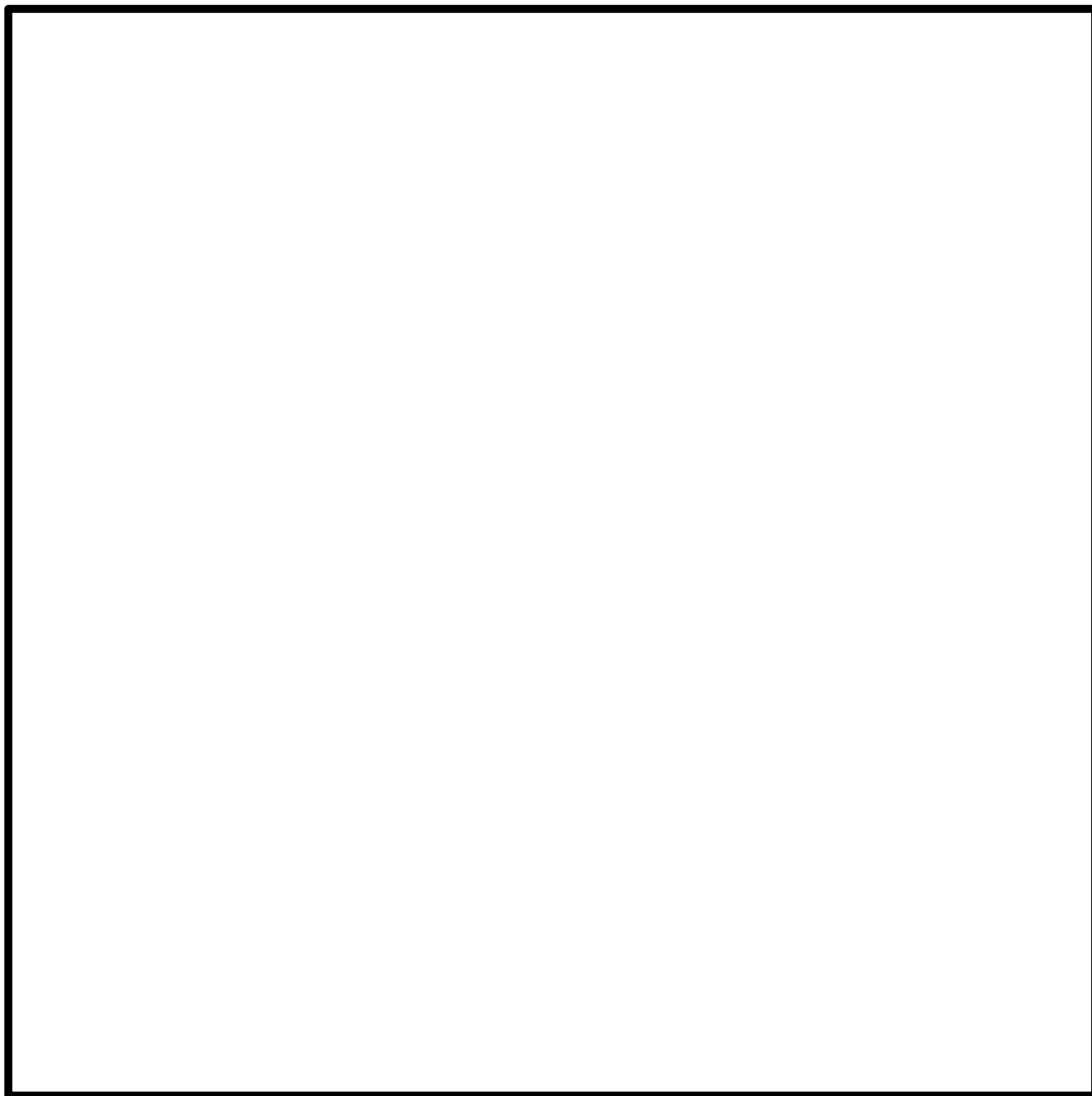
Planning sheet	Day Two	Unit 6 Shape and space	Term: <i>Autumn</i>	Year Group: 3
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>Describe 2-D shapes referring to reflective symmetry, sides/edges and vertices.</p> <p>VOCABULARY: Sides/edges Vertices Names of 2-D shapes</p>	<ul style="list-style-type: none"> ☞ Play 'I'm thinking of a shape'. ☞ Tell the children that you are thinking of a 2-D shape and that they must ask you questions to guess the shape. ☞ You can only answer 'yes' or 'no' to their questions. ☞ Encourage the children to ask questions relating to their work yesterday, for example, 'does your shape have 4 sides?' ☞ Use the other 2-D shapes that they are familiar with to repeat this game. 	<p>Classify and describe 2-D and 3-D shapes, referring to reflective symmetry, faces, sides/edges, vertices, angles.</p> <p>VOCABULARY: 3-D 3-dimensional names of 3-D shapes faces edges vertices</p> <p>RESOURCES: Assorted 3-D shapes Small cubes – enough for one each Activity Sheet 6.2</p>	<ul style="list-style-type: none"> ☞ Explain that today we will be looking at 3-D shapes instead of the 2-D shapes that we looked at yesterday. ☞ Hold up a square and a cube. Q. What is the difference between these two shapes? Q. What is similar about them? ☞ Ensure that the children can recognise the difference between 2-D and 3-D shapes. ☞ Show the children a display of 3-D shapes. ☞ Ask volunteers to come out to pick up and name the shapes that they know. ☞ Tell children the names of any 3-D shapes they do not yet know. ☞ Hold up a cube and give the children a small cube each (use unit cubes; multilink, etc). Q. What is the name of this 3-D shape? Q. From the work we did yesterday, can you touch the edges of your cube and hold it up? Q. Can you count them? ☞ Model counting them without repeating yourself. Q. Who can touch the vertices of their cube and hold it up? Q. Can you count them? ☞ Explain to the children that as well as counting the edges and vertices to describe and classify these shapes, we can also count the 'faces' of 3-D shapes. Q. Who can guess which parts of your cube are the faces (as we already know which are the edges and vertices)? ☞ Model counting the faces of the cube and ask children to do the same. ☞ Record the findings on the board. ☞ Repeat the activity with several other shapes, counting the faces, edges and vertices together. ☞ If possible let the children count the shapes themselves, if not model the counting with a larger shape. ☞ Explain the activity. <p><u>Activity</u> Give each group of children a box of assorted 3-D shapes. Tell them that they are going to use these shapes to find out how many faces, edges and vertices each one has. Give each child Activity Sheet 6.2 to record their findings (lower ability may be more confident working in pairs). Remind children that they need to keep track of which faces/edges/vertices they have already counted – they must devise a way of doing this.</p>	<p>Ask the children to share strategies that they came up with to ensure that they didn't repeat themselves whilst counting. Ask them to demonstrate for the children that did have a problem repeating themselves.</p> <p>Play 'Guess my shape'. Tell the children that you have a 3-D shape behind your back and that they have one the same in the box on their tables. They will have to look at the shapes of the faces to be able to guess your shape. Tell the children the shapes of the different faces on your 3-D shape. Begin with an easy shape. Q. My shape has 6 square shaped faces, what could it be? (a cube) Children can use the shapes in their boxes to help them work it out. Move on to more complex shapes. Q. My shape has 2 triangular faces and 3 rectangular faces, what could it be? (a triangular prism) Even if the children are unsure of the shape names, they can hold up the shape they have guessed.</p> <p>By the end of the lesson children should be able to:</p> <p>Describe 3-D shapes using faces, edges and vertices.</p>

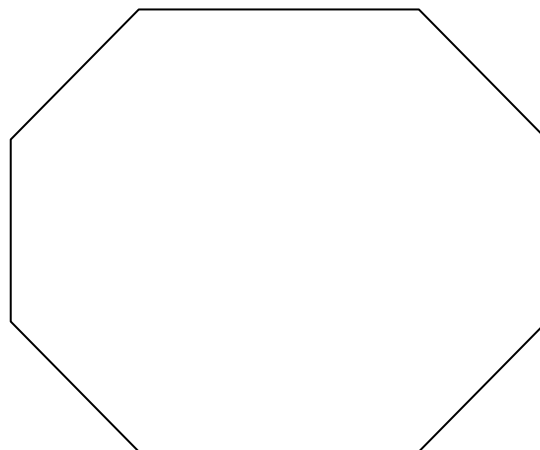
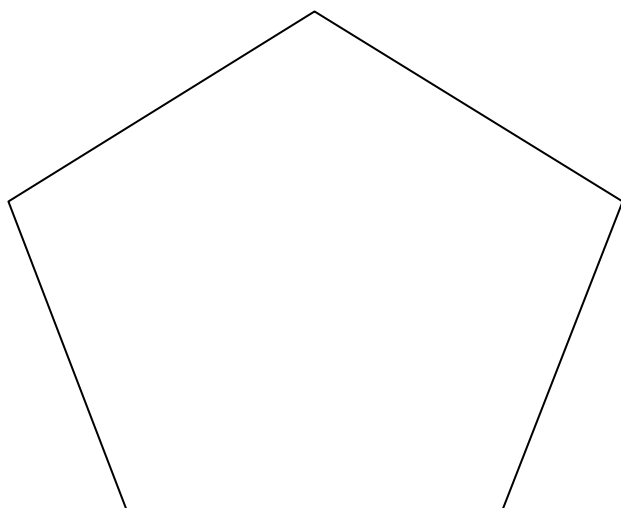
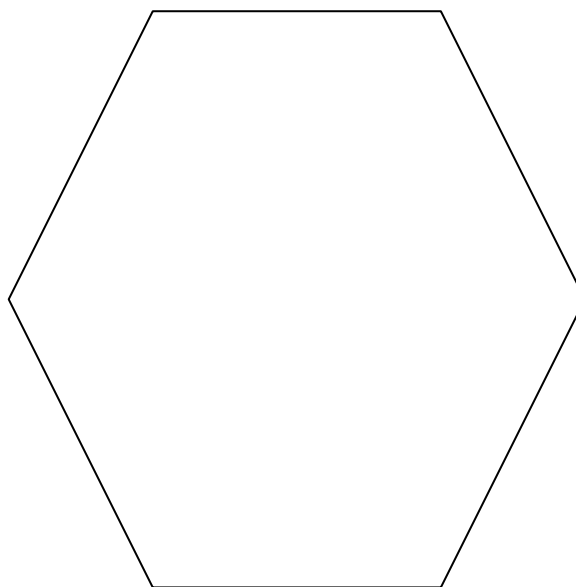
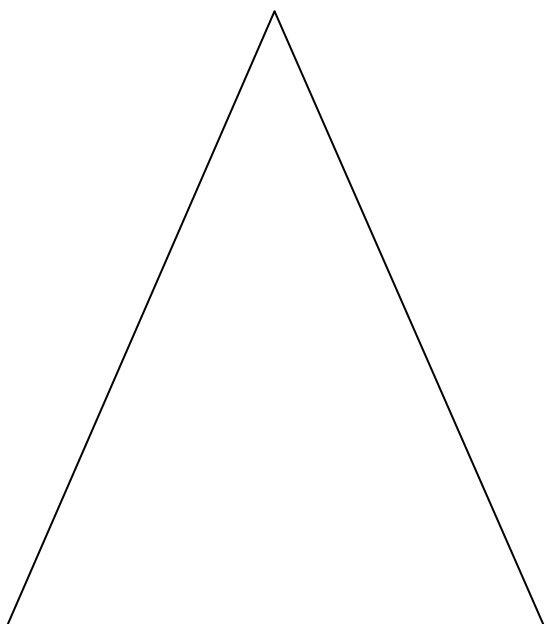
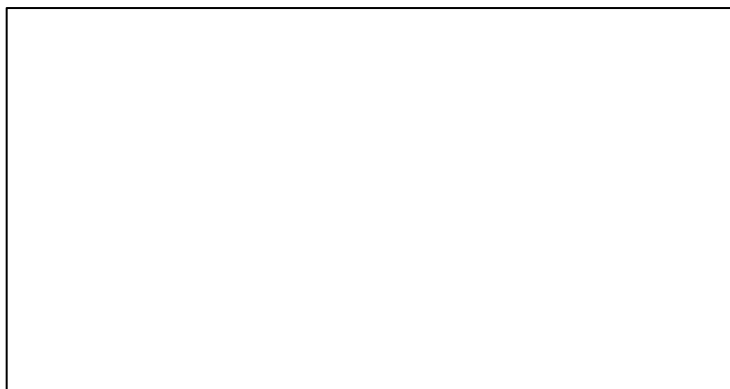
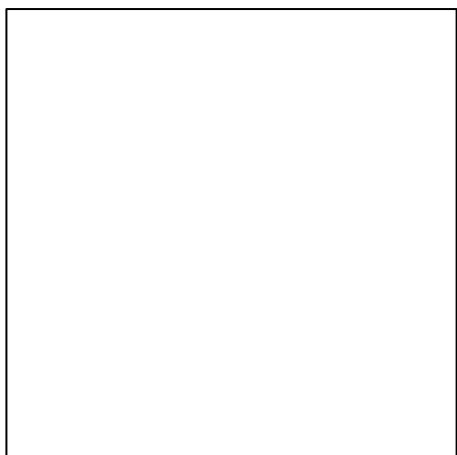
Planning sheet		Day Three	Unit 6 Shape and space	Term: <i>Autumn</i>	Year Group: 3
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions	
<p>To describe 2-D shapes using their properties.</p> <p>VOCABULARY: Sides/edges Vertices Right-angle Symmetry Shape names Straight Curved Diagonal</p> <p>Informal language</p> <p>RESOURCES: Whiteboard and pen between two Resource Sheet 6.3 – enlarged.</p>	<p>☞ Children must be in partners with a whiteboard and pen between them.</p> <p>☞ Begin to describe a shape from Resource Sheet 6.3 using a mixture of mathematical and informal language (e.g. this shape has five sides, at the top it looks like a rectangle, but at the bottom it comes to a point; it looks like an upside-down house).</p> <p>Q. Can you and your partner discuss what this shape could be and draw it on your white boards?</p> <p>☞ Ask one pair to show their answer – do the others agree?</p> <p>☞ If not, are the other shapes true to the description?</p> <p>☞ Reveal the shape that you described.</p> <p>☞ Repeat this for several of the other shapes.</p> <p>☞ Now show the children the whole sheet. Choose a shape that they have not drawn.</p> <p>Q. How could you describe this shape? (talk to your partner)</p> <p>☞ Use the description from one pair to draw on the board – is it accurate?</p>	<p>Read and begin to write the vocabulary of position. Use spaces on square grids.</p> <p>VOCABULARY: Position Grid Co-ordinate Along Up Left Right</p> <p>RESOURCES: Large 3x3 noughts and crosses grid (on board if necessary) Large map of a treasure island (with axes labelled) Activity Sheets 6.3, 6.4, 6.5</p>	<p>☞ Play a large game of noughts and crosses on the board with the children.</p> <p>☞ Split them into two teams and they must direct you and your opponent where to put your marks on a 3x3 grid.</p> <p>☞ When finished, highlight the difficulty of them having to point and say 'Put it there!' and bring out some of the positional and directional vocabulary they may have used (e.g. 2 squares above, just below, to the left/right).</p> <p>☞ Write A, B, C along the bottom of the grid and 1, 2, 3 up the side.</p> <p>☞ Explain that people use co-ordinates in order to pinpoint squares accurately.</p> <p>☞ Demonstrate using co-ordinates to find a particular square in the grid and write it down e.g B, 3.</p> <p>☞ Explain that it is very important to read the co-ordinates the right way round – you always go along the bottom line of the grid first and then up the side.</p> <p>☞ Tell the children that they can remember this with different sayings, e.g. 'You must go along the garden path before you can go up the stairs'.</p> <p>☞ Encourage the children to make some up of their own that will prompt them to remember 'along, then up'.</p> <p>☞ Show children a picture of a treasure island map with co-ordinates on (use the Activity Sheets, one of your own, or draw one on the board).</p> <p>☞ Ask children to use co-ordinates to pinpoint certain objects on the grid using co-ordinates.</p> <p>☞ Fill in some more of the island with objects.</p> <p>Q. I want to put a lake in B,3 – can somebody come up and draw it in the correct place?</p> <p>☞ Repeat this with other objects and co-ordinates.</p> <p>☞ Challenge the children, e.g: Q. Why can't I put a beach in at C,2? Because there is already an object there.</p> <p><u>Activity</u> Use Activity Sheets 6.3, 6.4. and 6.5. The children are to work in pairs, both with copies of Activity Sheet 6.3, and one child with A.S. 6.4, the other with A.S 6.5. They must face each other. One child starts first and must describe to the other, using co-ordinates, where the objects on his island are. The other child draws/writes these objects into the correct place on his blank grid. They then repeat this vice versa. When finished, both children can compare their drawn map to the printed one and mark the work themselves.</p>	<p>Go into the hall or playground. Draw a large grid on the floor with chalk (at least 5x5 or larger). Label the axes. Ask a child to come and stand in B,5. Q. Is he/she stood in the correct square? That child can then call out another child to stand in a different square. Repeat this several times. You may want to do it until the whole class is in a square each.</p> <p>Start with the first child in their square again. Explain that you want him/her to move two squares to their right and one square down. Q. What square do you think he/she will end up in? Ask the child to move – were they correct? Repeat this using various children and different co-ordinates. It is possible to do this with several children on the grid at once.</p> <p>By the end of the lesson children should be able to: Use co-ordinates to describe spaces on grids. Draw objects in squares on grids using co-ordinates.</p>	

Planning sheet	Day Four	Unit 6 Shape and space	Term: Autumn	Year Group: 3
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>To describe 2-D shapes using their properties.</p> <p>VOCABULARY: Sides/edges Vertices Right-angle Symmetry Shape names Straight Curved Diagonal</p> <p>Informal language</p> <p>RESOURCES: Whiteboard and pen per child</p>	<ul style="list-style-type: none"> ✎ Put the children into pairs with a whiteboard and pen each. They must sit facing each other. ✎ Demonstrate to the class with a child. ✎ Draw a made-up shape on to your whiteboard without your partner seeing it. ✎ You must then describe your shape bit by bit as they did yesterday. ✎ As you describe it, your partner must draw what they think you are describing. ✎ You may repeat your description as often as you want, but do not look at the drawing. ✎ When you have finished, compare your drawings to see if they are the same. ✎ Encourage the children to discuss where they have gone wrong and how it could be better. ✎ Repeat this with the children the other way round. 	<p>Identify right-angles in 2-D shapes and in the environment.</p> <p>VOCABULARY: Turn Angle Right-angle</p> <p>RESOURCES: Large circle with a dot in the centre (on large paper, or chalked onto the floor) Scrap paper Years 1,2,3 ITP 'Polygon'</p>	<ul style="list-style-type: none"> ✎ Explain to the children that an angle is the measure of a turn. ✎ Use some practical examples to demonstrate this, such as opening and closing the door, or moving your thumb and first finger together then apart. ✎ Put a large circle with a central dot on the floor so that the children are all able to see it. ✎ Stand in the middle with both arms stretched out together towards the top of the circle. ✎ Tell the children you are going to do a whole turn, with your feet staying on the central dot. Q. Where will I end up? (back where you started) ✎ Then do half a turn in the same way. Q. Where will I end up? Q. How many half turns make a whole turn? ✎ Repeat for a quarter of a turn. Q. How many quarter turns will make a whole turn? ✎ Ask children to come up and demonstrate whole turns, half turns and quarter turns on the large circle. ✎ Draw a line from the centre to the top. ✎ Ask a child to do a quarter turn and draw a line where they finish. Draw an arrow from the first line to the second to show the turn. ✎ Explain that this quarter turn is also called a right-angle. ✎ Give each child a piece of scrap paper – the more torn and tattered around the edges the more effective this will be. ✎ Demonstrate to the children folding the paper roughly in half, and then in half again (making sure edges match the second time). ✎ They should all have a right angle. ✎ Tell them to close their eyes and feel the two smooth sides and the point at the corner. ✎ Ask four volunteers to the front with their right-angles and put them all together to show the 'whole turn' that we made earlier. ✎ Demonstrate how to use their right-angle to check the corners of a book or your board. Q. Are they right-angles? Q. Can you see anything else in the room that could be a right-angle? <p><u>Activity</u> Children to 'Hunt the right-angle'. They must find any right-angles in the classroom, test them with their own right-angle and then write down their findings. Encourage them to look all over the classroom.</p>	<p>Use the Polygon ITP or large shapes to show the children. Take them through a series of different shapes.</p> <p>Q. Are any of these angles right-angles? Encourage them to make sensible guesses, e.g. looking at their own right-angle and comparing from afar with the angle of the shape.</p> <p>Q. Can someone come and check these right-angles, then colour them in? Repeat this for a variety of shapes</p> <p>Look at the angles that are not right-angles.</p> <p>Q. Is this angle a larger or smaller turn than a right-angle? Encourage the children to say which angles are greater than or less than a right-angle.</p> <p>By the end of the lesson children should be able to: Know that an angle is a measure of turn. Know what a right-angle looks like. Find right-angles in the environment and 2-D shapes.</p>

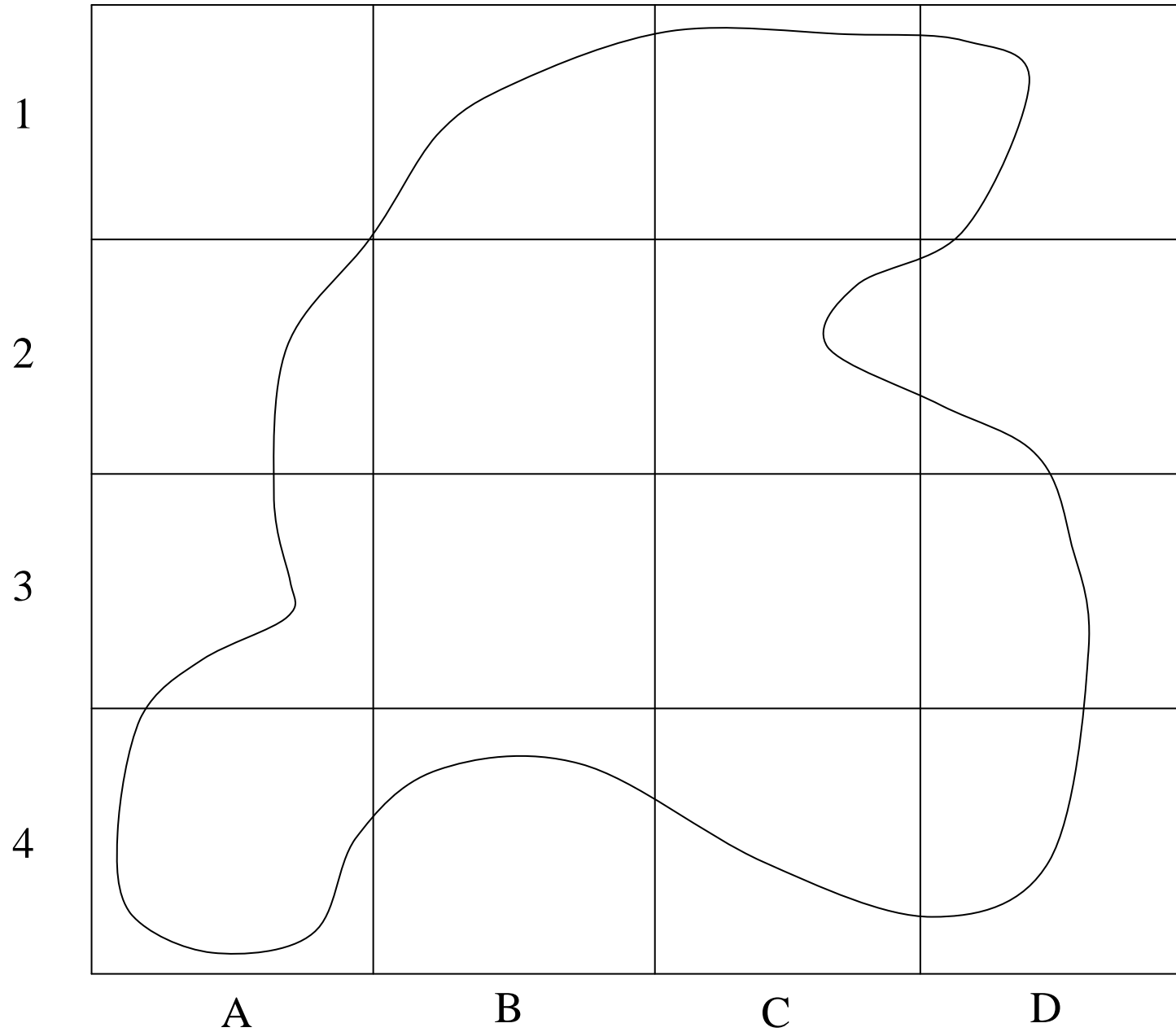
Planning sheet	Day Five	Unit 6 Reasoning about shapes		Term: <i>Autumn</i>	Year Group: 3
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions	
<p>To classify 2-D and 3-D shapes according to their properties.</p> <p>VOCABULARY: 2-D/3-D sides/edges vertices faces right angles lines of symmetry</p> <p>RESOURCES: Ways of making two groups on the floor, e.g. 2 hoops, 2 pieces of sugar paper, etc. 2-D and 3-D shapes.</p>	<p>☞ Show the children a selection of shapes and explain that you will be sorting them into groups.</p> <p>☞ The children will not know your criteria for the groups – they will have to work this out.</p> <p>☞ Possible 'secret criteria' can be 4 or more sides/less than 4 sides; 2-D/3-D; right-angles/no right-angles; etc</p> <p>☞ After you have sorted the first few, the children will need to tell you where the rest must go.</p> <p>☞ Hold up the first shape and discuss some of the properties.</p> <p>☞ Place it in one of the two groups.</p> <p>☞ Repeat this for a shape that goes into the other group.</p> <p>Q. Can you give some ideas as to what the criteria may be?</p> <p>☞ Sort three or four more shapes so that each group is clear.</p> <p>☞ Hold up the next shape and ask children to suggest which group it goes in.</p> <p>Q. Can you justify that choice?</p> <p>☞ As long as they can justify their choice, it doesn't matter if they are right or wrong.</p> <p>☞ Repeat with other shapes.</p> <p>Q. What are the criteria for the two groups?</p> <p>Q. Is that the only possible answer?</p>	<p>Investigate general statements about shapes.</p> <p>VOCABULARY: 2-D shape names sides/edges</p> <p>RESOURCES: For each child a paper oblong (A4 or A5) Scissors Resource Sheet 6.4</p>	<p>☞ Explain that today we are going to investigate a problem all about shape.</p> <p>☞ Give each child piece of paper and ask them to fold it diagonally and then cut it from corner to corner.</p> <p>Q. Name the two shapes you have now ended up with?</p> <p>Q. What shape did you start with?</p> <p>Q. Can you join the triangles back together to recreate the rectangle?</p> <p>☞ Now ask the children to flip one of the triangles over and join the two long sides together.</p> <p>Q. What shape have we made?</p> <p>☞ Give them the shape name if they are unsure and draw the shape on the board.</p> <p>☞ Join two other matching sides together and ask a child to come out and draw the shape on the board.</p> <p>Q. What shape have we made?</p> <p>Q. How many shapes do you think we could make in this way?</p> <p><u>Activity</u> Challenge the children to find out what shapes can be made by joining the two triangles along any two matching (in length) sides. Remind them that they must be careful not to repeat any shape, even in a different orientation. Give them some time to investigate this and then ask them which shapes they have come up with. Draw them on the board. There are six possible solutions (see Resource Sheet 6.4).</p> <p>Q. What is similar/different about these shapes that you have made?</p> <p>Q. Can you name any of the shapes you have made?</p>	<p>Extend the challenge by removing the 'matching sides' restriction. Ask the children to create other shapes. Demonstrate putting together the two points and drawing the shape, or a short and long side together and drawing the shape.</p> <p>Q. How many can we think of as a class? Ask the children to work with a partner to come up with a shape. Draw all the shapes on the board.</p> <p>Q. Are any the same? (different orientations etc.)</p> <p>By the end of the lesson children should be able to: Understand how shapes can be combined to make new shapes. Organise themselves in order to complete an investigation methodically.</p>	



















Shape	Number of faces	Number of edges	Number of vertices



1				
2				
3				
4				
	A	B	C	D

1				
2				
3				
4				
	A	B	C	D

