

Unit 8 Shape and space

Five daily lessons

National
Numeracy Strategy

Year 5
Autumn term

Unit Objectives

Year 5

- Recognise properties of rectangles. Classify triangles (isosceles, equilateral, scalene) using criteria such as equal sides and equal angles, lines of symmetry.
- Make shapes with increasing accuracy.
- Recognise positions and directions: read and plot co-ordinates in the first quadrant.
- Solve mathematical problems or puzzles, recognise and explain patterns and relationships, generalise and predict.
- **Explain method and reasoning.**

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Pages 82-89

This Unit Plan is designed to guide your teaching. You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Resource sheet 8.1
- Resource sheet 8.2
- Whiteboards
- Squared paper
- 2D shapes
- OHP calculator
- Calculators

Link Objectives

Year 4

Year 6

- Recognise equilateral and isosceles triangles. **Classify polygons using criteria such as number of right angles, whether or not they are regular, and symmetry properties.**
- Recognise positions and directions: for example, describe and find the position of a point on a grid of squares where the lines are numbered.
- Solve mathematical problems or puzzles.

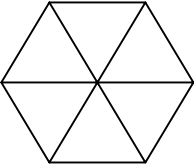
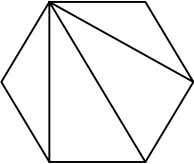
- Classify quadrilaterals, using criteria such as parallel sides, equal angles, and equal sides...
- **Read and plot co-ordinates in all four quadrants.**
- Solve mathematical problems or puzzles.
- **Explain method and reasoning.**

(Key objectives in bold)

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education and skills

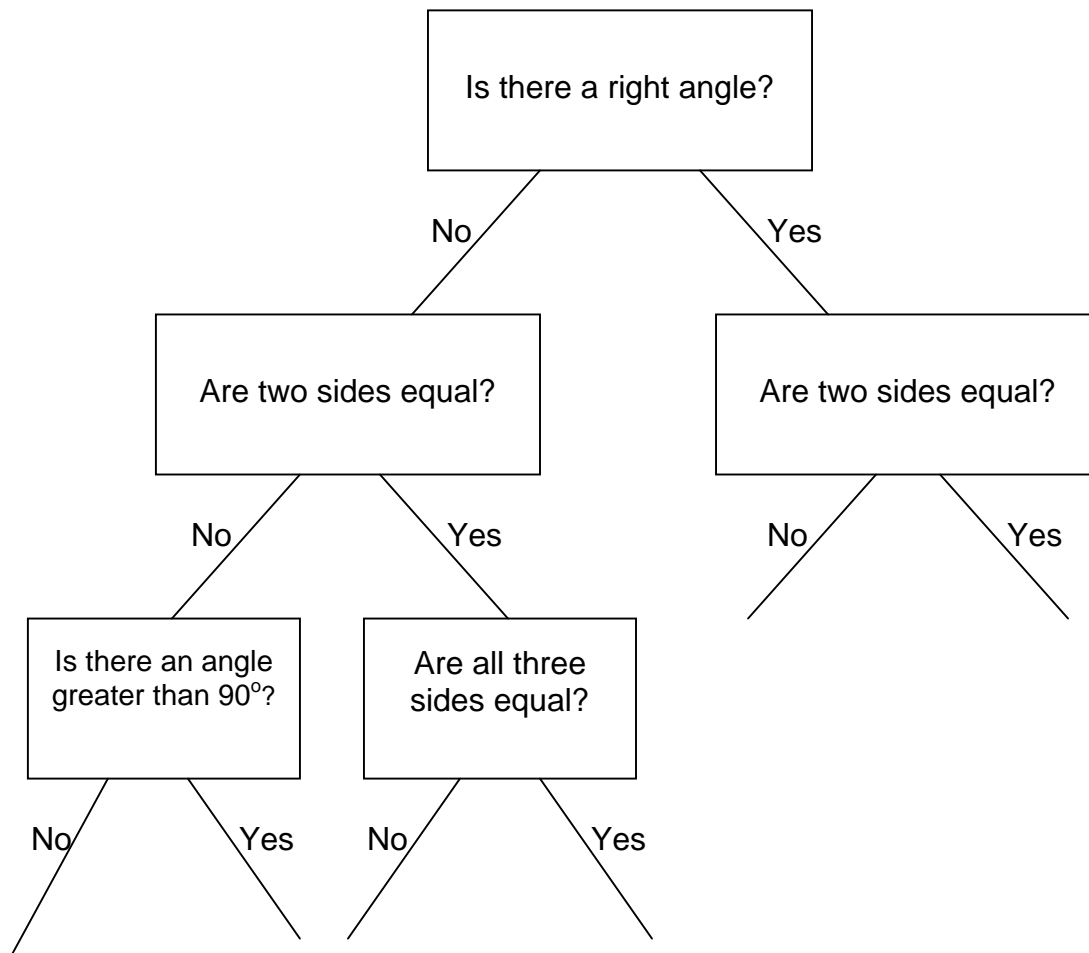
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|---|---|---------|--|---|--|---------------------|---|---------------|--|
| Planning sheet | | Day One | | Unit 8 <i>Shape and space</i> | | Term: <i>Autumn</i> | | Year Group: 5 | |
| Oral and Mental | | | Main Teaching | | | | Plenary | | |
| Objectives and Vocabulary | Teaching Activities | | Objectives and Vocabulary | Teaching Activities | | | Teaching Activities/Focus Questions | | |
| Describe 2D shapes and their properties. | <ul style="list-style-type: none"> Ask children to 'show' the names of shapes with different properties. Children can respond with either pre-prepared shape name cards or record on paper or whiteboards. <div> <p>Q Show me the names of the shapes with 4 sides.</p> <p>Q What shape has four right-angled corners and opposite sides the same length?</p> <p>Q What shape has 7 vertices?</p> <p>Q Which shapes have curved sides?</p> </div> | | <p>Recognise properties of rectangles.</p> <p>Children understand the term 'bisect'.</p> <p>Explaining method and reasoning.</p> | <ul style="list-style-type: none"> Draw an accurate square on the board (or use OHP) and ask the children what properties it has. <div> <p>Q What can you tell me about a square?.... the sides.... the angles.... symmetry... etc</p> </div> <ul style="list-style-type: none"> Draw the diagonals in the shape. <p>Define diagonal ' A straight line drawn from a vertex of a polygon to a non-adjacent vertex.</p> <div> <p>Q What do we call lines like these?</p> </div> <ul style="list-style-type: none"> Ask a child to come out and measure the diagonals. Write these measurements on the board. <div> <p>Q What would the measurement of half of this diagonal be?</p> </div> <ul style="list-style-type: none"> Ask a child to measure half of the diagonal. Explain to the children that when lines cut each other exactly in half we say they bisect each other. Repeat modelling with a different-sized square. <div> <p>Q Do diagonals of all rectangles bisect each other?</p> </div> <ul style="list-style-type: none"> Ask the children in pairs to investigate this statement by drawing different-sized rectangles on squared paper. | | | <ul style="list-style-type: none"> Ask children to say what they have found out about the diagonals of rectangles. <div> <p>Q Do you think this will work every time?</p> <p>Q Can you explain why?</p> <p>Q Have we got enough examples to prove this is true?</p> </div> <ul style="list-style-type: none"> Have two large identical oblongs. Cut one oblong along the two diagonals to make four triangles. <div> </div> <ul style="list-style-type: none"> Demonstrate by rotating one triangle onto the opposite one that the one half of the diagonal is the same length as the opposite half. Repeat with other opposite triangles. Reinforce the word bisect by explaining bi = two (as in bicycle) and sect = cut, so bisect – cut in two (halves). <div> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> Recognise properties of rectangles such as: All four angles are right angles; Opposite sides are equal; The diagonals bisect one another. <p>(Refer to supplement of examples, section 6, page 103.)</p> </div> | | |
| <p>VOCABULARY</p> <p>oblong</p> <p>equilateral triangle</p> <p>isosceles triangle</p> <p>heptagon</p> | | | <p>VOCABULARY</p> <p>parallel</p> <p>bisect</p> <p>diagonal</p> <p>square</p> <p>oblong</p> <p>rectangle</p> | <p>RESOURCES</p> <p>Squared paper</p> <p>Rulers</p> <p>Large cardboard</p> <p>Rectangles</p> | | | | | |

| Planning sheet | | Day Two | Unit 8 <i>Shape and space</i> | Term: <i>Autumn</i> | Year Group: 5 |
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| Oral and Mental | | Main Teaching | | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Teaching Activities/Focus Questions | |
| <p>Use mental imagery to draw shapes.</p> <p>Recognise properties of 2D shapes.</p> <p>VOCABULARY isosceles diagonal</p> | <ul style="list-style-type: none"> Tell the children to close their eyes. Give them these instructions. Imagine a square. Put in the diagonals of the square. Now cut out one of the triangles that you have made. Open your eyes. Draw the shape that you have left. Talk to your partner about what it is called and anything else you can say about it. Take feedback from the children – stress the correct vocabulary. Repeat with a rectangle. | <p>Classify triangles (isosceles, equilateral, scalene) using criteria such as equal sides and angles, lines of symmetry.</p> <p>RESOURCES Resource sheet 8.1 Resource sheet 8.2</p> <p>VOCABULARY scalene right-angled equilateral isosceles</p> | <ul style="list-style-type: none"> Ask the children to look at the shapes they drew in the oral/mental starter and either use a large isosceles triangle or draw one on the boards. Establish that they are the same type of triangle. <div> <p>Q What is the name of this triangle?</p> <p>Q What properties does it have?</p> <p>Q What other triangles do you know?</p> <p>Q What is special about them?</p> </div> <ul style="list-style-type: none"> Introduce the scalene triangle. Show several large versions (including right-angled). Ask children what they can tell you about them. Using an A3 size version of resource sheet 8.1 and large triangles get some children to sort them out. With the children working in pairs ask them to cut out and sort the triangles on Resource sheet 8.2 using the tree diagram on Resource sheet 8.1. | <ul style="list-style-type: none"> Discuss names of triangles sorted onto different branches of tree diagram. <div> <p>Q Are all the triangles at one end of the tree the same kind?</p> <p>Q Is there any branch of the tree with no triangles?</p> </div> <ul style="list-style-type: none"> Play 'Properties of Triangles' quiz. Tell the children the name of a triangle and, in pairs, they have to stand up as soon as they have thought of two properties. Repeat with other triangles. <div> <p>By the end of the lesson, the children should be able to:</p> <ul style="list-style-type: none"> Name and classify triangles; Know some of their properties. <p>(Refer to supplement of examples, section 6, page 103.)</p> </div> | |

| Planning sheet | Day Three | Unit 8 <i>Shape and space</i> | Term: <i>Autumn</i> | Year Group: 5 |
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| Oral and Mental | | Main Teaching | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Teaching Activities/Focus Questions |
| <p>Double and halve any whole number to 100, and multiples of 10 to 1000.</p> <p>Children double the number and cross out the answer if it is on their grid.</p> <p>RESOURCES OHP calculator Class set of calculators</p> | <ul style="list-style-type: none"> Play 'Doubles Bingo'. <p>Ask the children to draw a 2 x 3 grid on a piece of paper.</p> <p>Write ten two-digit numbers or multiples of 10 between 100 and 1000 on the board.</p> <p>Ask each child to choose six numbers and double them and write down the answers in their grid.</p> <p>The teacher then calls out a number from the board.</p> <p>First child to cross out all six numbers wins.</p> <ul style="list-style-type: none"> Repeat, but for halves bingo. | <p>Solve mathematical problems and puzzles.</p> <p>Explain method and reasoning.</p> <p>Introduce diagonals of polygons.</p> <p>VOCABULARY vertex polygon hexagon diagonal regular</p> <p>RESOURCES Regular Pentagons/ Hexagons to draw around Coloured pens Rulers</p> | <ul style="list-style-type: none"> Draw a regular hexagon on the board. <div> <p>Q What is this shape called?</p> <p>Q What properties does it have?</p> </div> <ul style="list-style-type: none"> Ask a child to draw in the diagonals.  <p>Remind pupils of diagonals of rectangles from day 1.</p> <ul style="list-style-type: none"> Re-define diagonal: a straight line drawn from a vertex of a polygon to a non-adjacent vertex. e.g.  <p>Demonstrate this on the board.</p> <div> <p>Q How many diagonals will a regular hexagon have altogether? (9)</p> </div> <ul style="list-style-type: none"> Children can investigate this statement in pairs using hexagons to draw around, and rulers. Take feedback from the children. <div> <p>Q What are the most diagonals anyone has drawn?</p> <p>Q What shapes can you see inside your hexagon?</p> <p>Q Have any of them got special names?</p> </div> <ul style="list-style-type: none"> Draw a square on the board. Ask a child to draw the diagonals on it.. <div> <p>Q How many triangles are there? (8 – 4 smaller and 4 larger.)</p> </div> <ul style="list-style-type: none"> Children discuss this in pairs. Children to investigate how many triangles are formed when you join diagonals of a regular pentagon in every possible way. More able could do Spot the Shape 2, Activity 58 Able Challenges Book | <div> <p>Q How many triangles did you find? (at least 35 possible!).</p> <p>Q What strategies did you use to help you count the triangles?</p> <p>Q How can you be sure you've found them all?</p> </div> <ul style="list-style-type: none"> Refer back to the hexagon. <div> <p>Q How many triangles do you think would be in this hexagon? (at least 114 are possible!).</p> </div> <p>HOMEWORK: Find all the triangles generated by the diagonals of a regular hexagon.</p> <div> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> Continue to name and describe shapes; Know that a diagonal is a straight line draw from a vertex of a polygon to a non-adjacent vertex; Solve puzzles and problems. <p>(Refer to supplement of examples, section 6, pages 103, 109, 79.)</p> </div> |

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| Planning sheet | | Day Four | Unit 8 <i>Shape and space</i> | Term: <i>Autumn</i> | Year Group: 5 |
| Oral and Mental | | Main Teaching | | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Teaching Activities/Focus Questions | |
| Classify triangles using criteria such as equal sides and angles, lines of symmetry. | <ul style="list-style-type: none"> Ask children to name a triangle and record on board with its properties. Slide a triangle from behind a wall slowly. <div> Q What could this shape be? Q Look at the angle, what shape isn't it? </div> <p>Repeat with different triangles.</p> | Recognise positions and directions: read and plot co-ordinates in the first quadrant. Make shapes with increasing accuracy. | <ul style="list-style-type: none"> Draw two axes on the board. <div> Q What do we call lines that go up? Q What do we call lines that go across? </div> <ul style="list-style-type: none"> Explain to the children that the horizontal line is called the x-axis, and the vertical line is called the y-axis. <p>Establish that this is known as the first quadrant.</p> <ul style="list-style-type: none"> Question the children as to how these axes are labelled (the numbers are written on the lines, not in the spaces). <div> Q Where is the origin, and what notation is used for the origin? </div> <ul style="list-style-type: none"> Instruct the children to record these new facts by drawing x and y-axes, and labelling the x-axis, y-axis and origin. Draw a set of axes on the board or large squared paper up to 6 on each axis. Ask children out to mark these co-ordinates on the grid: (2, 1), (2, 4), (5, 4), (5, 1). <div> Q What shape would it be if we joined the co-ordinates up? </div> <ul style="list-style-type: none"> As the children to draw a set of axes up to 6 on squared paper and label correctly using the new vocabulary they have been taught. Each child has to work with a partner. Each child has to draw a 2D shape in their grid. They then have to give the co-ordinates of this shape to their partner who has to draw the shape on their grid and name the shape. The children then compare shapes – are they the same? Repeat this. | <ul style="list-style-type: none"> Ask the children for examples of their most complex shape. Ask a child to read the co-ordinates out while another child marks them on the grid that is on the board. <div> Q How can we remember that the x-axis is horizontal and that the x co-ordinate comes first? Q How can we remember that the y-axis is vertical and that the y co-ordinate comes second? </div> <ul style="list-style-type: none"> Assess understanding of vocabulary 'origin' by asking the children to discuss in pairs and write down the co-ordinates of a rectangle where one corner is at the origin. <div> By the end of the lesson, children should be able to: <ul style="list-style-type: none"> Read and plot points using coordinates in the first quadrant. (Refer to supplement of examples, section 6, page 109.) </div> | |
| RESOURCES Large triangles including isosceles Equilateral and scalene | | RESOURCES Large squared paper Squared paper VOCABULARY x axis y axis first quadrant origin (0,0) | | | |

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| Planning sheet | Day Five | Unit 8 <i>Shape and space</i> | Term: <i>Autumn</i> | Year Group: 5 |
| Oral and Mental | | Main Teaching | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Teaching Activities/Focus Questions |
| <p>Recognise positions and directions: read and plot co-ordinates in the first quadrant.</p> | <ul style="list-style-type: none"> Each child draws a set of axes up to 6 on squared paper, labelling the points on the x and y-axes. The children then write down 6 coordinates to form their 'Bingo' board. Co-ordinates are generated by rolling two dice, one to represent the x and one the y-axis. Ask one child to write the co-ordinates on the board. e.g. (4,3). As in Bingo, children mark the point if the given co-ordinates match one of their own. <div> <p>Q Which axis is the x/y - axis?</p> <p>Q Where do you label the axes?</p> <p>Q How do you write down a co-ordinate?</p> <p>Q What does the first/second number represent?</p> <p>Q What do we call the position (0,0)?</p> </div> | <p>Recognise positions and directions: read and plot co-ordinates in the first quadrant.</p> <p>Solve mathematical problems and puzzles (involving shape).</p> <p>Explain method and reasoning.</p> <p>RESOURCES Squared paper</p> <p>VOCABULARY x-axis y-axis first quadrant origin (0,0) vertex vertices</p> | <ul style="list-style-type: none"> Ask the children to draw axes up to 10 on squared paper. Explain that today's challenge is similar to yesterday's. Working with a partner, each child has to draw as many different regular 2D shapes as they can within the axes. They then have to give the co-ordinates of each shape to their partner who has to draw the shape on a blank set of axes and name each shape. They then have to compare. Then the other child repeats the activity. Tell the children they are going to play 'Co-ordinate Confusion!'. The children have to each draw another set of axes up to ten and label the axes correctly. The first child has to draw a regular 2D shape somewhere on their grid. The second child has to say co-ordinates to try and work out where the shape is and what it is. After the second child has said a pair of co-ordinates the first child has to say 'in' or 'out'. The second child marks on their blank grid a tick or cross to record their guesses. After they have played the game once they can reverse roles. | <ul style="list-style-type: none"> Discuss with the children what shapes they drew and what strategies they used to try and work out what the shapes were. Ask the children in pairs to draw a set of axes up to 10. Give children the co-ordinates of the vertices of a triangle, and ask them to decide which type of triangle it is: <p>Isosceles (2,2) (6,2) (4,8) (2,2) (6,2) (4,1)</p> <p>Right-angled isosceles (0,0) (0,4) (4,0)</p> <p>Scalene (0,0) (5,1) (1,3) (2,3) (2,6) (5,3)</p> <div> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> Read and plot points using co-ordinates in the first quadrant; Know the convention that (3,2) describes a point found by starting from the origin (0,0) and moving 3 squares across and 2 squares up. Continue to name and describe shapes. <p>(Refer to supplement of examples, section 6, pages 107, 109.)</p> </div> |



Note: This resource sheet should show a range of equilateral, isosceles and scalene triangles. Add some more triangles.

e.g.

