

Unit 12

Handling data

Five daily lessons

National
Numeracy Strategy

Year 4
Spring term

Unit Objectives Year 4

- Solve a problem by collecting quickly, organising, representing and interpreting data in tables, charts, graphs and diagrams, including those generated by a computer, for example:
bar charts – intervals labelled in 2s, 5s, 10s or 20s;
Venn and Carroll diagrams (two criteria).

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Link Objectives

Year 3

Year 5

- Solve a given problem by organising and interpreting numerical data in simple lists, tables and graphs, for example:
bar charts – intervals labelled in ones then twos;
Venn and Carroll diagrams (one criterion).

(Key objectives in bold)

- Solve a problem by representing and interpreting data in tables, charts, graphs and diagrams, including those generated by a computer, for example:
bar line charts, vertical axis labelled in 2s, 5s, 10s, 20s or 100s, first where intermediate points have no meaning (e.g. scores on a dice rolled 50 times), then where they may have meaning (e.g. room temperature over time).
- Find the mode of a set of data.

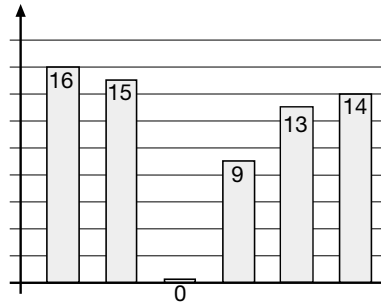
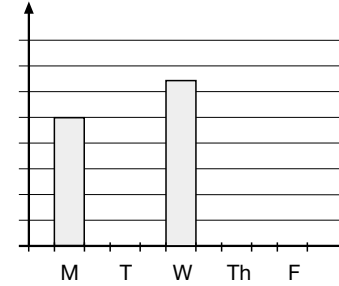
This Unit Plan is designed to guide your teaching.

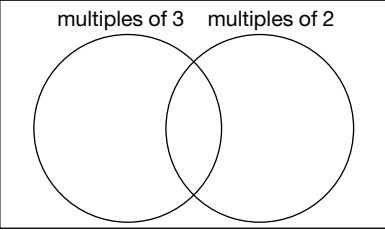
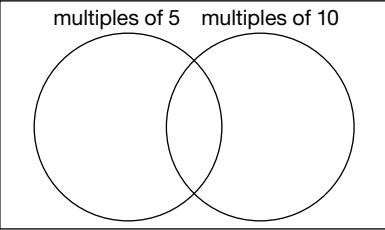
You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- Activity sheet 12.1
- Activity sheet 12.2
- Activity sheet 12.3
- OHT 12.1
- OHT 12.2
- OHT 12.3
- OHT 12.4
- OHT 12.5
- OHT 12.6
- Computer
- CD Rom from NNS pack using ICT to support mathematics in Primary Schools
- Large sheets of paper
- Set of 2-D and 3-D shapes
- Whiteboards
- Timer

department for
education and skills

| Planning sheet | Day One | Unit 12 <i>Handling data</i> | | Term: <i>Spring</i> | Year Group: 4 |
|---|---|--|---|---|---|
| Oral and Mental | | Main Teaching | | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Teaching Activities / Focus Questions | |
| To count on or back in equal steps of 2s, 5s, 10s, 20s. | <ul style="list-style-type: none">Start the class counting together in 2s from zero. When they reach 20 say, stop the class and ask them to count on in 5s. At 40, change the count to 20s, then 10s, then back to 5s etc.On the board write: add 10, add 5 Start from zero counting in these steps to generate: 0, 10, 15, 25, 30, 40, 45 etc.Change the two numbers to 20 and 5, 5 and 2 etc.Count backwards from 100 in steps of 20, then 10s. Write 20, 10 on the board and count back from 100 to generate 100, 80, 70, 50 etc. | <p>Solve a problem by interpreting data in graphs and charts, including those generated by a computer.</p> <p>VOCABULARY data axis, axes horizontal vertical bar chart</p> <p>RESOURCES Computer Handy Graph from the NNS ICT pack OHT 12.1 OHT 12.2 Activity sheet 12.1</p> | <ul style="list-style-type: none">Before the lesson starts, load up Handy Graph from the NNS ICT pack NNS Interactive teaching programme bar chart, or use OHT 12.1. Input data from the graph below.  <p>Explain that the graph shows six triple jumps by the world-class British triple jumper Jonathan Edwards at one of his competitions. It does not show all the information you would normally expect.</p> <div>Q What information is missing?</div> <p>Identify the missing title, labels, units and numbers on axes.</p> <ul style="list-style-type: none">Ask questions that help children to interpret the graph. <div>Q If the first jump was 16m how should the horizontal and vertical axes be labelled?</div> <p>Emphasise that the vertical axis is the distance jumped and starts at zero.</p> <div>Q What is the scale of the vertical axis?</div> <p>Invite the children to work in pairs to explain the series of six jumps. Collect responses and ensure children recognise jump 3 was a no jump, the other jumps ranged from 9m to 16m.</p> <div>Q How far is 16m, as wide or as long as our classroom, or the hall?</div> <p>Pace out or measure the classroom to help children appreciate the distance.</p> | <p>Change the focus by using ‘what if’ questions:</p> <div>Q What if the graph represented me (teacher) doing six triple jumps? Would you change the numbers on the vertical axis? Why?</div> <div>Q What if the graph represented the total number of jumps over six seasons, and season 1 = 16 jumps? How would the vertical and horizontal axes change?</div> <p>Discuss children’s responses, enter some on the computer to change the graph. Emphasise how important it is to know the numbers on the vertical axis in order to interpret the graph.</p> <ul style="list-style-type: none">Show OHT 12.1 again and explain that the chart now shows how two classes of children travelled to school on a winter’s day. They came by train, school coach, walked, bike, car and bus. Activity sheet 12.1 <div>Q How should we label the axis?</div> <p>Agree the vertical axis should be in steps of 2. Say the first bar represents 16 children who came by train.</p> <div>Q What do the other bars represent?</div> <p>Ensure children can read the scale and make statements about each e.g. no children walked to school.</p> <p>Suppose we had asked children how they travelled to school on a bright summer’s day.</p> <div>Q Would the graph look different?</div> <p>Move the bars up or down as children suggest changes. Remind them that the number of children is the same. Agree a graph and ask children to make statements.</p> <div>Q What if the graph represented 600 children? How would the vertical axis change?</div> <p>Establish the vertical axis would be in steps of 20.</p> | <ul style="list-style-type: none">Show OHT 12.2 with the bar chart below:  <p>Explain this incomplete bar chart shows the video rentals from the local shop. Verbally present the following statements, one by one. In pairs, children discuss statements, then justify positioning of remaining bars.</p> <ul style="list-style-type: none">Thursday’s video rentals are $\frac{1}{3}$ of Wednesday’s.Monday’s video rentals are twice Friday’s.More videos are taken out on Tuesday than any other day.What do you think the bars would look like for Saturday and Sunday?If each interval on the vertical axis represents five videos, how many were taken on Wednesday?What if each interval represents 10?On Sunday fewer videos are rented than on Saturday but more than on Thursday. Saturday’s rentals are nearly as many as Tuesday’s and slightly more than Wednesday’s. <p>Discuss the children’s responses to each statement and sketch in the bars as they suggest. Encourage children to make up their own statements. Ensure children understand that the vertical axis starts at zero and to reach the heights of the bars we need to know the step sizes.</p> <div>By the end of the lesson the children should be able to:</div> <ul style="list-style-type: none">Answer questions by interpreting bar charts. <p>(Refer to supplement of examples, section 6, page 114.)</p> |

| Planning sheet | Day Two | Unit 12 <i>Handling data</i> | Term: <i>Spring</i> | Year Group: 4 |
|--|--|--|--|---|
| Oral and Mental | | Main Teaching | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Teaching Activities / Focus Questions |
| <p>Recall multiplication facts for 2, 3, 4, 5 and 10 times tables and derive division facts.</p> <p>RESOURCES Timer Whiteboards Tables cards</p> | <ul style="list-style-type: none"> Get the class to recite the 2, 3, 4, 5 and 10 times tables twice. Divide class into five groups and give each group one of the tables to be responsible for. Say you will ask each group for a particular multiplication factor and an associated division fact, say 3 times. The 4 times table group will give $3 \times 4 = 12$ and $12 \div 4 = 3$ or $12 \div 3 = 4$. <p>The groups will have 15 seconds to agree their answers.</p> <p>They write them on whiteboards and you award a point for two correct answers.</p> <ul style="list-style-type: none"> Ask each group a number of questions, then change the multiplication tables around and reduce the time to build up speed of response. <p>(Low attaining children to be supported with tables cards.)</p> | <p>Solve a problem by organising, representing and interpreting data in Venn diagrams.</p> <p>VOCABULARY intersection Venn diagram multiples common</p> <p>RESOURCES Large sheets of sugar paper</p> | <ul style="list-style-type: none"> On the board write headings: 'multiples of 3 up to 30' 'multiples of 2 up to 30' <p>Ask the children to list the two sets of numbers starting at 3 and ending at 30.</p> <p>Q Are there any numbers that appear in both lists?</p> <ul style="list-style-type: none"> Agree there are, children to list them under a new heading: 'multiples in both lists.' <p>Q Are there any numbers up to 30 that are not in the lists?</p> <p>Agree there are, children to list these under 'Numbers not in the lists.'</p> <p>Q How many numbers are there in each list? (10, 15, 5, 10)</p> <p>Use these answers to check children have the right number in the lists.</p> <p>Q How could we represent these lists using Venn diagrams?</p> <p>Remind children of their previous work on Venn diagrams and draw this Venn diagram on the board.</p>  <p>Q What numbers go in each circle?</p> <ul style="list-style-type: none"> Before children start identifying these numbers ask: Q Can you think of a number which would fit in the intersection? <p>Establish that these are the numbers on both lists. Children to start with these numbers and add the other multiples of 3 and 2.</p> <p>Q Where do the numbers in our fourth list go?</p> <p>Agree that these do not go in either circle but go inside the rectangle.</p> <p>Q Can we describe all the numbers in the rectangle?</p> <p>Establish the numbers in the rectangle include those in the circle and all numbers up to 30.</p> <ul style="list-style-type: none"> In groups of four, ask children to complete the Venn diagram shown below.  <p>Numbers up to 50</p> <p>Collect answers and ask children to think about how they approached the task.</p> <p>Ask each group to prepare at least one question based on their Venn diagram that they could pose to the rest of the class.</p> | <ul style="list-style-type: none"> Ask children to pose their question and invite class response. <p>Discuss different ways in which groups approached the task, e.g.</p> <ul style="list-style-type: none"> Working through numbers in order. Selecting numbers. Listing multiples first, identifying numbers for the intersection, then placing numbers not yet used in the rectangle. <p>Q Which is the most effective/efficient way? Why? Q How might you approach a similar task next time?</p> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Sort and represent data in Venn diagrams with two criteria; Ask and respond to questions about Venn diagrams. <p>(Refer to supplement of examples, section 6, page 116.)</p> |

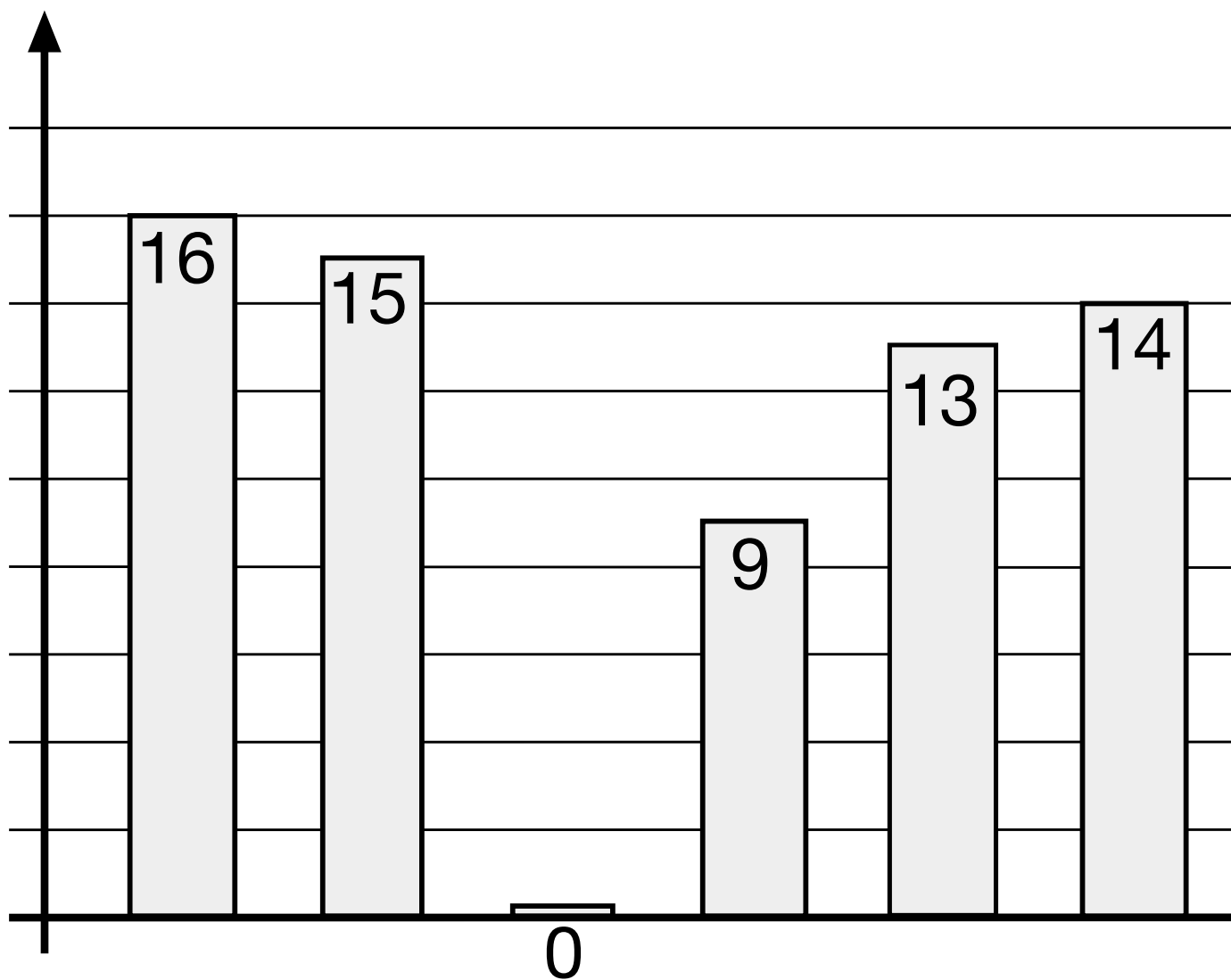
| Planning sheet | Day Three | Unit 12 <i>Handling data</i> | Term: <i>Spring</i> | Year Group: 4 |
|--|--|--|--|--|
| Oral and Mental | | Main Teaching | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Teaching Activities / Focus Questions |
| <p>Describe 2-D and 3-D shapes.</p> <p>VOCABULARY names of shapes lines of symmetry right angle regular/irregular</p> <p>RESOURCES Variety of 2-D and 3-D shapes</p> | <ul style="list-style-type: none"> Pass the shape. <p>Divide the class into teams (no more than 4 teams).</p> <p>Hold up a shape and ask a team to tell you a property of the shape e.g. 2-D, 3-D, number of sides/edges, lines of symmetry etc. The team wins the shape if the following team can name no more properties.</p> <p>Repeat with a selection of shapes – avoid octagon and pentagon as used in main teaching.</p> | <p>Solve a problem by organising, representing and interpreting data in Carroll diagrams.</p> <p>VOCABULARY names of shapes on Activity sheet 12.3 Carroll diagram regular irregular</p> <p>RESOURCES Activity sheet/OHT 12.3 OHT 12.6 Variety of 2-D and 3-D shapes – already on tables</p> | <ul style="list-style-type: none"> Show children an octagon. <div>Q Can you tell me some properties of this shape?</div> <p>Record on board.</p> <p>Show children a pentagon.</p> <p>Repeat the question and record.</p> <div>Q What properties do these shapes have in common?</div> <p>Establish 2-D, straight sides, possibly regular depending on image shown.</p> <p>Invite the children to think of a way of showing some of the properties which involves less writing.</p> <p>Discuss charts, tick list Venn diagram, Carroll diagram. Show the children OHT 12.3 and explore the layout.</p> <p>Explain that we need to have a criteria in the boxes marked x and in these sort of charts we have the criteria and not...</p> <p>Discuss what criteria we could have for sorting shapes e.g.</p> <p>2-D, not 2-D all edges are straight, not all edges are straight regular, not regular/irregular</p> <p>Fill in the criteria that the class decides upon. Return to the octagon.</p> <div>Q Where should I place this shape? Which column? Which row? Explain why.</div> <p>Repeat with an appropriate selection of shapes. Point to one box.</p> <div>Q Name a shape that could be put in this category. Justify your choice.</div> <p>Repeat.</p> <p>Give children a copy of OHT/Activity sheet 12.3, remind them that the names and spelling of some shapes are written to help them. For their selection of shapes decide the criteria and complete the Carroll diagram.</p> | <ul style="list-style-type: none"> Fill in the criteria regular, not regular even number of sides/not even number of sides on OHT/Activity sheet 12.3. <p>Show children a variety of shapes, especially irregular and in different orientations to place on Carroll diagram.</p> <p>Discuss the properties of shapes as they are placed on diagram.</p> <div> <p>By the end of the lesson the children should be able to:</p> <ul style="list-style-type: none"> Design and use a sorting diagram to display information about shapes. <p>(Refer to supplement of examples, section 6, page 116.)</p> </div> |

| Planning sheet | Day Four | Unit 12 <i>Handling data</i> | Term: <i>Spring</i> | Year Group: 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|------------------------------|---------------------|---------------|--|---|---|--|------------------|----------------------------|---------------|--|--|-------------------|--|--|---|--|---------|-------------|---------------|--|--|-------------------|--|--|--|--|----------------|-------------------|----------|---|---|-------------|---|---|
| Oral and Mental | | Main Teaching | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | Plenary | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Read and write whole numbers in figures, knowing what each digit represents.</p> <p>VOCABULARY digit</p> <p>RESOURCES 0-9 digit cards Whiteboards</p> | <ul style="list-style-type: none">‘Generate a number’. Children to work with a partner. Divide whiteboard into four columns. <table><tr><td></td><td></td><td></td><td></td></tr></table> <p>Explain you have a pack of 0-9 digit cards (one of each). You will turn one over and then need to decide which column to put it in to generate a number. However, you will give them a target to reach for e.g:</p> <p>7500 between 2900 and 3100 the largest even number smallest odd number a multiple of 5.</p> <p>Turn over a digit, children to choose a column and record on whiteboards.</p> <p>Repeat until there is a digit in each column. Take feedback as to who was closest to the target.</p> <div><p>Q What strategy did you use?</p></div> <div><p>Q What digit did you need? Why?</p></div> | | | | | <p>Solve a problem by organising, representing and interpreting data in Carroll diagrams.</p> <p>VOCABULARY Carroll diagram regular irregular right angle</p> <p>RESOURCES Selection of 2-D shapes in a bag</p> | <ul style="list-style-type: none">Draw Carroll diagram below on the board: <table><tr><td></td><td>has right angles</td><td>does not have right angles</td></tr><tr><td>quadrilateral</td><td></td><td></td></tr><tr><td>not quadrilateral</td><td></td><td></td></tr></table> <div><p>Q What is a right angle?</p></div> <p>Establish it is a quarter turn of 90°, and there are 4 right angles in a whole turn. Pull out a shape from the bag.</p> <p>Ask children to discuss in pairs and decide where to place shape in Carroll diagram. Repeat with other shapes.</p> <div><p>Q Could all 2-D shapes be placed in this Carroll diagram?</p></div> <p>Establish that any shape is either a quadrilateral or not a quadrilateral – it cannot be both. Establish it has right angles or it does not have right angles – it cannot satisfy both requirements. Yes, all 2-D shapes can be placed in the Carroll diagram.</p> <div><p>Q What other ways could we sort 2-D shapes? What could we write in our Carroll diagrams?</p></div> | | has right angles | does not have right angles | quadrilateral | | | not quadrilateral | | | <p>Collect different classifications, e.g. has a line of symmetry, is a triangle, has all its sides equal, is regular. Discuss the way these statements are made into two criteria that cannot be satisfied together.</p> <ul style="list-style-type: none">Write on the board: might have some straight edges might not have some straight edges <div><p>Q Are these helpful when sorting shapes?</p></div> <p>Establish they are not helpful. Show a semi-circle.</p> <div><p>Q Where would we put a semi-circle?</p></div> <p>Agree it has some (one) straight edges and it has some (one) curved edges. It satisfies both statements, which we do not allow.</p> <ul style="list-style-type: none">Draw the following Carroll diagram on the board: <table><tr><td></td><td>4 sides</td><td>not 4 sides</td></tr><tr><td>quadrilateral</td><td></td><td></td></tr><tr><td>not quadrilateral</td><td></td><td></td></tr></table> <p>Agree it is not and why.</p> | | 4 sides | not 4 sides | quadrilateral | | | not quadrilateral | | | <div><p>Q What else could we use Carroll diagrams for?</p></div> <p>Discuss.</p> <p>Draw on board:</p> <table><tr><td></td><td>with pineapple</td><td>without pineapple</td></tr><tr><td>with ham</td><td>7</td><td>5</td></tr><tr><td>without ham</td><td>4</td><td>3</td></tr></table> <div><p>Q What could this be about?</p></div> <div><p>Q How many people had pineapple on their pizza?</p></div> <div><p>Q How many people had ham on their pizza?</p></div> <div><p>Q How many people had pizza?</p></div> <div><p>Q How many people only had ham on their pizza?</p></div> <p>HOMEWORK – Design your own Carroll diagram and three questions to ask your neighbour based on ice-cream flavours and toppings. E.g: vanilla, not vanilla with nuts no nuts etc.</p> <div><p>By the end of the lesson the children should be able to:</p><ul style="list-style-type: none">Sort and represent data in a two criteria Carroll diagram;Ask and respond to questions about Carroll diagrams.<p>(Refer to supplement of examples, section 6, page 102.)</p></div> | | with pineapple | without pineapple | with ham | 7 | 5 | without ham | 4 | 3 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | has right angles | does not have right angles | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| quadrilateral | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| not quadrilateral | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4 sides | not 4 sides | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| quadrilateral | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| not quadrilateral | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | with pineapple | without pineapple | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| with ham | 7 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| without ham | 4 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Planning sheet | Day Five | Unit 12 <i>Handling data</i> | | Term: <i>Spring</i> | Year Group: 4 |
|--|--|---|---|--|---|
| Oral and Mental | | Main Teaching | | | Plenary |
| Objectives and Vocabulary | Teaching Activities | Objectives and Vocabulary | Teaching Activities | | Teaching Activities / Focus Questions |
| Solve a problem by interpreting data in a Carroll diagram. | <ul style="list-style-type: none">Ask children to give their homework to a partner (Carroll diagram and three questions).Give children time to locate answers. <div>Q Did anyone have a question they could not answer?</div> <p>Discuss if appropriate.</p> <p>Invite class members to share a question and explain how they found the answer.</p> | Solve a problem by organising, representing and interpreting data in Venn and Carroll diagrams. | <ul style="list-style-type: none">Show OHT 12.5. Say this represents a number of people you met over a weekend. The letters on the initials of the people's names (make some up or use real ones). <div>Q How many people did I meet?</div> <p>Agree there were 12 people. Say you met LB first.</p> <div>Q Can you describe LB?</div> <p>Establish that LB has dark hair but not blue eyes.</p> <ul style="list-style-type: none">Select other initials. Children to describe these people. Ensure one from each of the four categories is represented.Say the last person I met had blue eyes and wore glasses. <div>Q Who did I meet last?</div> <p>Agree that there are four possibilities but there is no information about who wore glasses.</p> <ul style="list-style-type: none">Give out Activity sheet 12.2. Explain that the first diagram is called a Carroll diagram and it is similar to a Venn diagram and the information from the OHT is to be added to this diagram. Point to the dark hair box. Explain that those people with dark hair will go in this column. Point to the empty box next to it. | <div>Q What should go in this box?</div> <p>Establish it refers to those whose hair is not dark. Write 'not dark hair' in the box.</p> <ul style="list-style-type: none">Point to the blue eyes box. Say that people who have blue eyes go in this row. <div>Q What should we write in the box below this?</div> <p>Establish it refers to those who do not have blue eyes. Write 'not blue eyes' in the box. Point to the top left-hand corner box.</p> <div>Q What does this box represent?</div> <p>Agree it is the people with dark hair and blue eyes. Enter the initials in the box and complete the Carroll diagram.</p> <ul style="list-style-type: none">Discuss the other questions on the activity sheet and ask children to complete them.Collect answers and discuss strategies for questions 1 and 2. Correct any errors and misunderstandings. | <ul style="list-style-type: none">Discuss some of the children's descriptions for question 4. <div>Q Are they accurate?</div> <p>Deal with any misconceptions arising.</p> <div><p>By the end of the lesson the children should be able to:</p><ul style="list-style-type: none">Understand the representation of data in a two-criteria Carroll diagram and extract/interpret information presented in this way.<p>(Refer to supplement of examples, section 6, page 116.)</p></div> |

VOCABULARY
Carroll diagram

RESOURCES
OHT 12.4
Activity sheet 12.2
Activity sheet 12.3



| | | |
|------------------|------------------|--|
| 1. | Dark hair | |
| Blue eyes | | |
| | | |

| | | |
|---|-------------|-----------------------|
| 2. Put these numbers in the boxes: 30, 17, 14, 25, 60, 100, 22, 23, 6, 10, 101, 75 | Even | Not even (Odd) |
| Multiple of 5 | | |
| Not multiple of 5 | | |

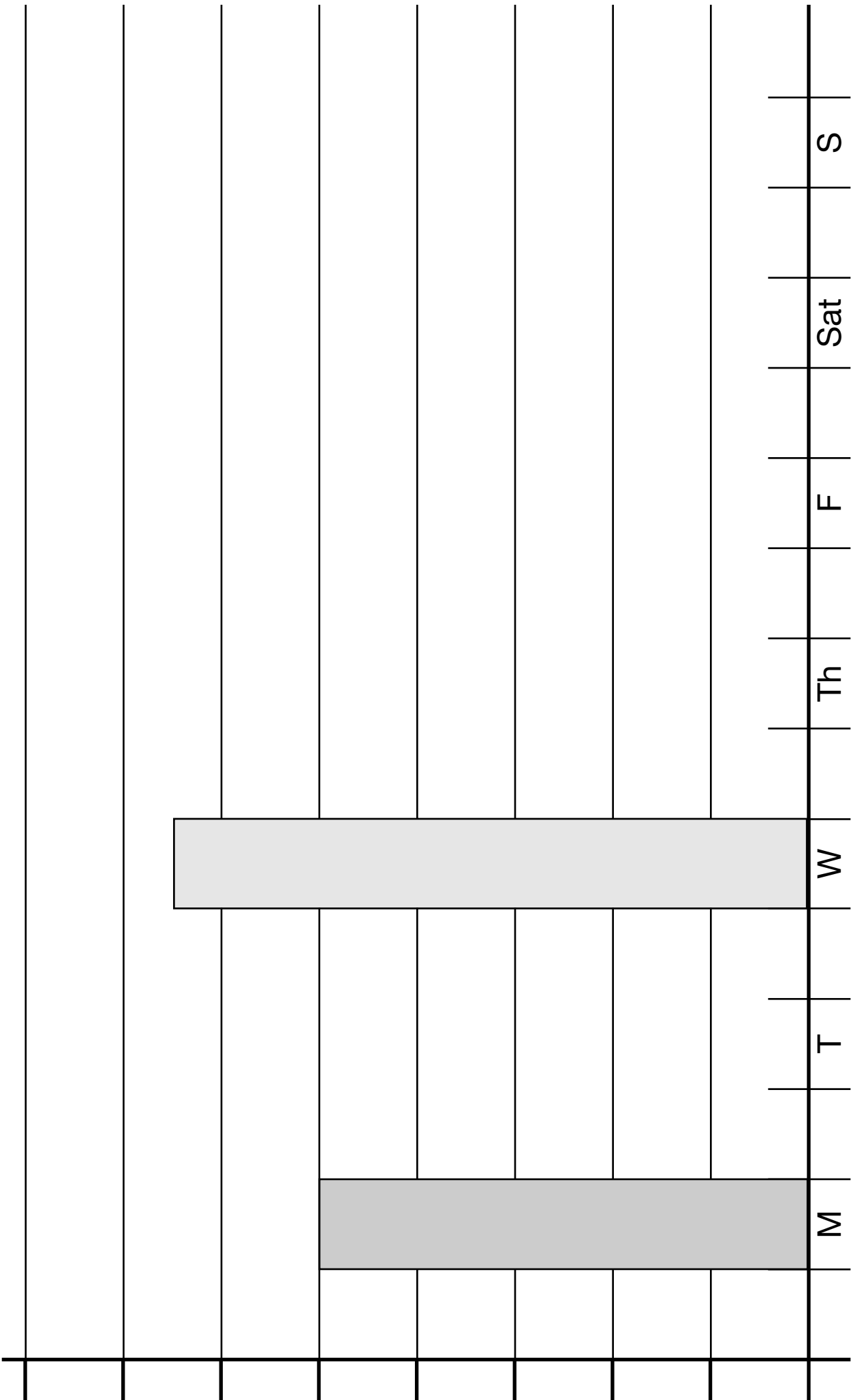
| | | |
|--|--------------|--------------------|
| 3. Put these letters in the boxes: r, S, w, y, R, O, a, B, E, i, f, U, L, e. J, n | Vowel | Not a vowel |
| Capital letter | | |
| Not a capital letter | | |

| | | |
|--|--------------------------------|---------------------------------------|
| 4. Put descriptions in the boxes. | | |
| | 12, 8, 20, 16, 4 | 28, 32, 36, 40, 24 |
| | 21, 19, 9, 7, 13, 15, 1 | 39, 25, 23, 27, 29, 33, 35, 37 |

Here are some names of shapes. Put them in the correct box in the Carroll diagram.

octagon, cube, square, isosceles triangle, cuboid, cone, semi-circle, tetrahedron, pentagon, rectangle, quadrilateral, circle, sphere, triangular prism, hexagon, oblong, hemi-sphere, cylinder, square-based pyramid, equilateral triangle.

| | A 2-D SHAPE | NOT A 2-D SHAPE |
|----------------------------|-------------|-----------------|
| ALL EDGES ARE STRAIGHT | | |
| NOT ALL EDGES ARE STRAIGHT | | |



CIRCLE

SEMI-CIRCLE

TRIANGLE

EQUILATERAL TRIANGLE

ISOSCELES TRIANGLE

QUADRILATERAL

SQUARE

RECTANGLE

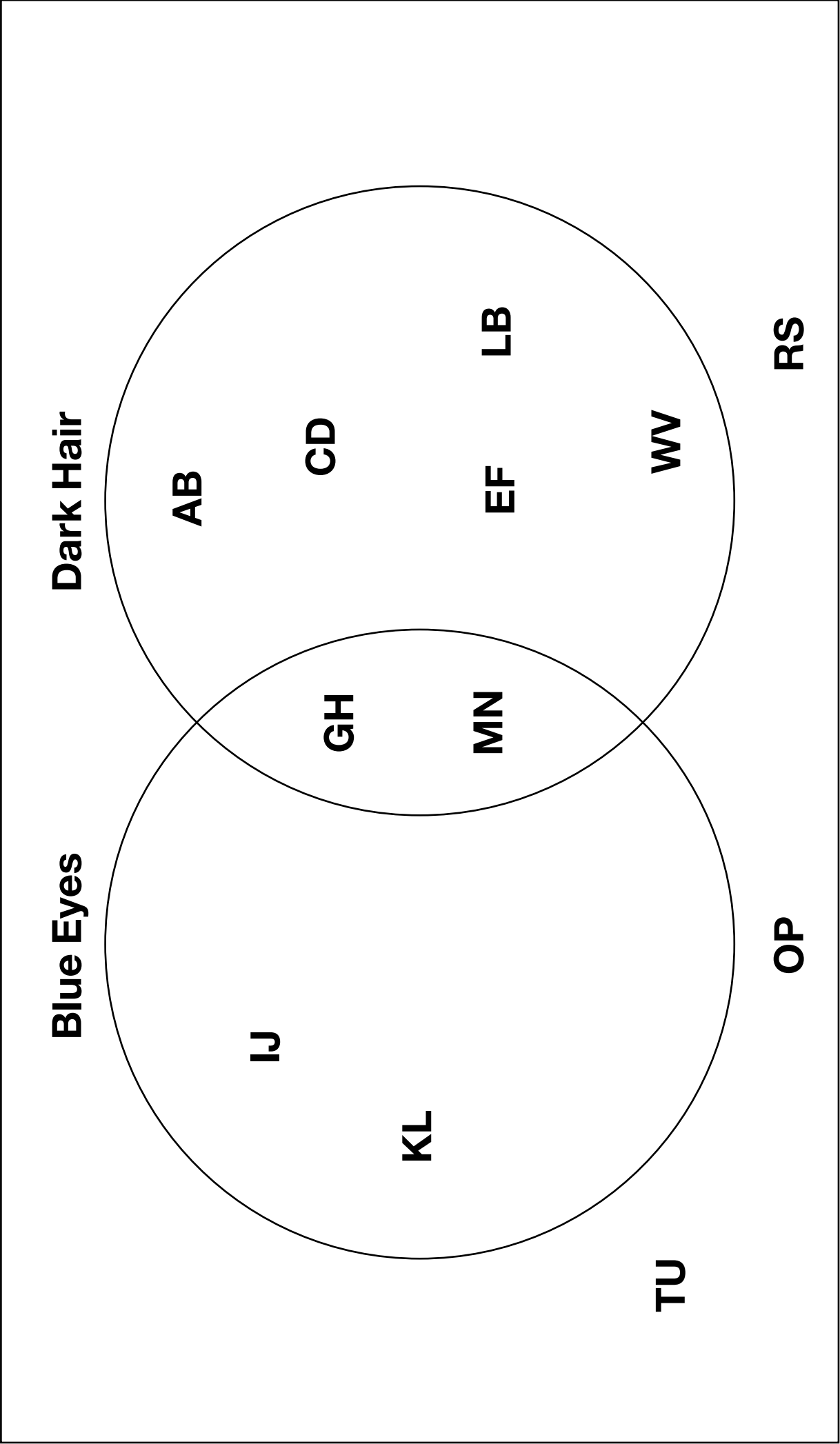
OBLONG

PENTAGON

HEXAGON

HEPTAGON

OCTAGON



OCTAGON

CUBE

SQUARE

ISOSCELES TRIANGLE

CUBOID

CONE

SEMI-CIRCLE

TETRAHEDRON

PENTAGON

RECTANGLE

QUADRILATERAL

CIRCLE

SPHERE

TRIANGULAR PRISM

HEXAGON

OBLONG

HEMI-SPHERE

CYLINDER

SQUARE-BASED PYRAMID

EQUILATERAL TRIANGLE