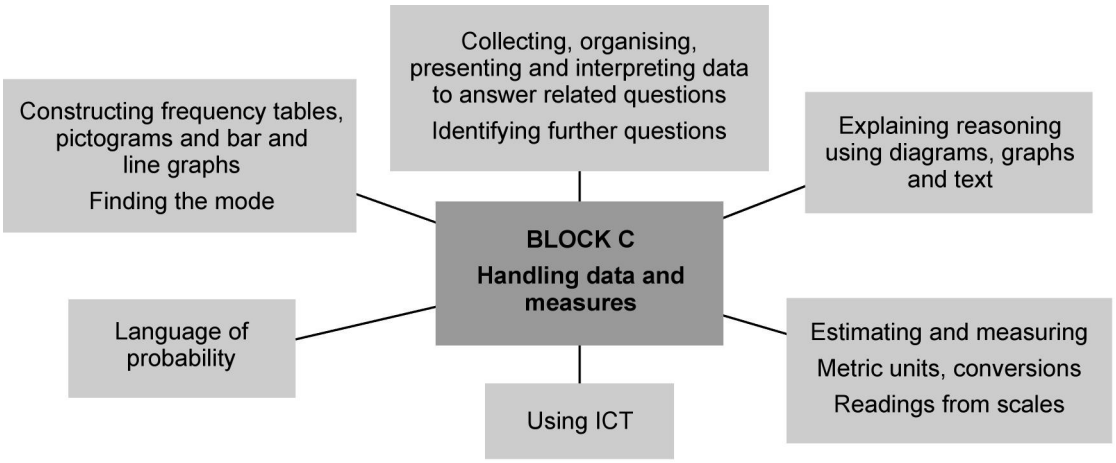
Year 5: Block C — Three 2-week units

Handling data and measures



Objectives	Units		
End-of-year expectations (key objectives) are highlighted	1	2	3
• Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry	✓	✓	✓
• Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols	✓	✓	✓
• Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask	✓	✓	✓
• Construct frequency tables, pictograms and bar and line graphs to represent the frequencies of events and changes over time	✓	✓	✓
• Find and interpret the mode of a set of data	✓		✓
• Describe the occurrence of familiar events using the language of chance or likelihood		✓	✓
• Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy (e.g. the nearest centimetre); convert larger to smaller units using decimals to one place (e.g. change 2.6 kg to 2600 g)	✓	✓	✓
• Interpret a reading that lies between two unnumbered divisions on a scale	✓	✓	✓

Speaking and listening objectives for the block

Objectives	Units		
	1	2	3
• Plan and manage a group task over time by using different levels of planning	✓		
• Understand the process of decision making		✓	
• Understand different ways to take the lead and support others in a group			✓

Opportunities to apply mathematics in science

Activities		Units		
		1	2	3
5a	Keeping healthy: Present results of pulse rate investigations by plotting points on a graph. Explain what they show.	✓		✓
5d	Changing state: Present results of the time taken for washing to dry in different conditions in tables and graphs, and use these to identify trends in results and make generalisations.		✓	
5e	Earth, Sun and Moon: Use data from timetables/calendars to describe sunrise, sunset, day length. Present data as a graph. Identify patterns.			✓

Key aspects of learning: focus for the block

Enquiry	Problem solving	Reasoning	Creative thinking
Information processing	Evaluation	**Self-awareness**	Managing feeling
Social skills	**Communication**	Motivation	Empathy

Vocabulary

problem, solution, calculate, calculation, method, explain, reasoning, reason, predict, pattern, relationship, classify, represent, analyse, interpret

fair, unfair, risk, doubt, likely, unlikely, likelihood, certain, uncertain, probable, possible, impossible, chance, good chance, poor chance, no chance, outcome

units of measurement and their abbreviations

data, information, survey, questionnaire, graph, chart, table, horizontal axis, vertical axis, axes, label, title, scale, pictogram, bar chart, bar-line chart, line graph, mode, maximum/minimum value

Building on previous learning

Check that children can already:

- collect, organise and interpret selected information to answer questions
- construct and interpret pictograms and bar charts using simple scales (e.g. numbered in 1s, 2s, 5s or 10s)
- use standard metric units to estimate and measure length, weight and capacity; where appropriate, use decimal notation to record measurements, e.g. 1.3 m or 0.6 kg
- interpret intervals and divisions on partially numbered scales

Unit 5C1 2 weeks

Objectives *Children's learning outcomes in italic*	**Assessment for learning**
• Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry *I can collect and organise data to find out about a subject or to answer a question*	What are you trying to find out? What information are you aiming to collect? How? What other questions could you ask now that you have finished your enquiry? What would you do differently if you carried out the enquiry again?
• Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols *I can use graphs to show findings about a subject or to help explain my answer to a question*	What does the data tell you about your original question? Why did you choose this type of table, graph or chart? What did you find out? What evidence do you have to support your conclusions? Are your results what you expected or were there any surprises?
• Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask *I can decide what information needs to be collected to answer a question and how best to collect it* *I can explain what a table or graph or chart tells us and consider questions that it raises*	What information will you need to collect to answer these questions? How will you collect it? What does this graph tell you? What makes the information easy or difficult to interpret? Does anything surprise you? Look at this graph, table or chart. Make up three questions that can be answered using the data that is represented. What were the advantages of using a computer? What further information could you collect to answer the question more fully?
• Construct frequency tables, pictograms and bar and line graphs to represent the frequencies of events and changes over time *I can explain why I chose to represent data using a particular table, graph or chart*	How will you display your data? How did you decide on the scale for this axis? What labels have you put on the axes? What titles have you given your graphs and charts? Why did you choose this type of graph?
• Find and interpret the mode of a set of data *I know that the 'mode' is the most common piece of information* *I can find the mode of a set of data that I have collected*	Sam found out the shoe sizes of people in his class. The mode was 4. Explain what this means using everyday language. What is the mode of the age of children on your table? How did you find out? Write a number in each of these boxes so that the mode of the five numbers is 11. ☐ ☐ ☐ ☐ ☐

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy (e.g. the nearest centimetre); convert larger to smaller units using decimals to one place (e.g. change 2.6 kg to 2600 g) *I can measure weight using appropriate measuring instruments. I can state measurements in kg and g*	Estimate the mass of this bag of carrots. Weigh the bag to see how close you are. Weigh this apple to the nearest 10 grams. Approximately how many apples of a similar size together would weigh 1 kg? How did you get your answer? Which of these sets of scales could you use to weigh out one portion of grapes? Which would you not use? Why? Would you prefer to use balance scales plus weights or dial scales to weigh a potato? Explain your choice. How would you find the mass of one counter? What is 26.5 kilograms in grams?
• Interpret a reading that lies between two unnumbered divisions on a scale *I find the value of each interval on a scale so that I can read measurements accurately*.	What is the value of each interval on this scale? What information did you read on the scale to help you? What calculations did you do? Find out how many grapes together weigh between 155 g and 160 g.
• Plan and manage a group task over time by using different levels of planning *I can plan and manage my own time when I do a long task with others*	You have an hour to find out which soft drink children in this class prefer. Work out how much time you will give to each part of the task.

Learning overview

Children **process, present and interpret data** to pose and answer questions. They **pose a question** such as:

What is the most popular boy's name and girl's name in the school?

What is the most popular hobby in the class?

They agree as a class what data they should collect to answer the question, then plan and organise how to collect it efficiently. They design an appropriate data collection table such as a frequency table or tally chart. Children recognise that they may be able to make use of existing data in order to collect information efficiently. For example, to find the most popular girl's and boy's names in the school, children may decide to use class registers and suggest that each group could add the names for one year group to a frequency table.

Children learn that the most common item in a set of data is called the **mode**. They use their collated data to **respond to questions** such as:

What are the five most popular boys' names in the school?

Which girl's name is the mode within the school?

How many girls have a name that no-one else in the school has?

How would you find out the total number of boys in the school from this chart or graph?

Children **suggest and explore extensions to their enquiry**. For example, they may suggest that the most popular names from 20 years ago would be different from the most popular names today (the website www.ssa.gov/OACT/babynames/ gives the most popular boys'/girls' names for particular years).

Children **plan and pursue an enquiry** related to a cross-curricular topic or area of interest to the class. For example, in the science topic 'Keeping healthy', children answer the question: *Do children in our class eat enough fruit and vegetables in a week?* They discuss, clarify and agree what is

involved in answering their question. For example, they research how many portions of fruit and vegetables are recommended. They weigh out 'portions' of particular fruit and vegetables in order to develop a shared understanding before children collect individual data. They agree how to collect the necessary information, for example, deciding that each child should keep a 'fruit and vegetable diary' or create a 'fruit and vegetable portion pictogram' over the week. All children appreciate how their individual data needs to be collected in order to contribute to the class data.

Once the data is collected, children suggest how to present the information using **pictograms or bar charts** in order to answer their question. For example, they each find the total number of portions that they ate over the week and then collate this information in a class bar chart. Children suggest and produce alternative graphs and charts. They consider the most sensible scale to use when producing their graphs. They use the different representations to answer their question, discussing which graphs or charts show the information most clearly and why. They highlight and discuss other features of the data, suggesting other questions that can be explored such as: *Do children eat more fruit and vegetables at the weekend than on weekdays?* They find the modal number of portions of fruit and vegetables eaten in the week.

Children reflect on any difficulties they had in answering their question and how they might improve the data handling process if they went through it again.

Unit 5C2 2 weeks

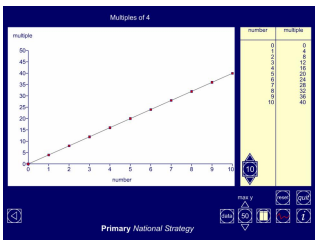
Objectives *Children's learning outcomes in italic*	Assessment for learning
• Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry *I can collect and organise data to find out about a subject or to answer a question*	What are you trying to find out? What information are you aiming to collect? How? What other questions could you ask now that you have finished your enquiry? What would you do differently if you carried out the enquiry again?
• Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols *I can use graphs to show findings about a subject or to help explain my answer to a question*	What does the data tell you about your original question? Why did you choose this type of table, graph or chart? What did you find out? What evidence do you have to support your conclusions? Are your results what you expected or were there any surprises?
• Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask *I can decide what information needs to be collected to answer a question and how best to collect it* *I can explain what a table, graph or chart tells us and consider questions that it raises*	What information will you need to collect to answer these questions? How will you collect it? What does this graph tell you? What makes the information easy or difficult to interpret? Does anything surprise you? Look at this graph, table or chart. Make up three questions that can be answered using the data that is represented. What were the advantages of using a computer? What further information could you collect to answer the question more fully?
• Construct frequency tables, pictograms and bar and line graphs to represent the frequencies of events and changes over time *I can explain why I chose to represent data using a particular table, graph or chart*	How will you display your data? How did you decide on the scale for this axis? What labels have you put on the axes? What titles have you given your graphs and charts? Why did you choose this type of graph?
• Describe the occurrence of familiar events using the language of chance or likelihood *I can describe how likely an event is to happen and justify my statement*	'It will snow tomorrow.' Suggest a place where this event is unlikely to happen and one where it is likely to happen. Tell me an event that is impossible. When you roll a normal dice, how likely are you to roll a number bigger than 2?
• Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy (e.g. the nearest centimetre); convert larger to smaller units using decimals to one place (e.g. change 2.6 kg to 2600 g) *I can measure capacity in litres and millilitres using appropriate measuring instruments. I can use decimals to record measurements*	Suggest some objects whose capacity could be measured using a 1 litre measuring jug. Suggest a sensible estimate for the capacity of a kettle. How did you decide on this estimate? Which measurement is equivalent to 1.3 litres: 130 ml, 1003 ml, 1300 ml or 103 ml? How do you know?

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Interpret a reading that lies between two unnumbered divisions on a scale *I can find the value of each interval on a scale and use this to give approximate values of readings between divisions*	What is the value of each interval on this scale? What information did you read on the scale to help you? What calculations did you do? What measurement would fall halfway between these two unnumbered divisions on this scale? Find out how many butter beans weigh between 65 g and 70 g.
• Understand the process of decision making *I can explain why I decided to use a particular piece of measuring equipment or unit of measurement*	Why did you decide to change all the units to metres rather than centimetres? Why did you decide to use the scales rather than the balance?

Learning overview

Children **create and interpret bar-line charts and bar charts**. For example, they create a graph with a scale of 0 to 10 along the horizontal axis and 0 to 100 along the vertical axis. For each number 0 to 10 along the horizontal axis they draw a vertical bar line to show the answer when the number is multiplied by 7. They label their graph and use it to respond quickly to questions such as: *What is the product of 7 and 6? What is 56 divided by 7?* They understand that this bar-line chart is similar to a bar chart.

Children draw similar axes and mark the location for each multiple of 7 with a cross. They join the crosses with a line to create a line graph and use this to answer questions such as: *What is 3 × 7? Approximately, what is 3.8 × 7? Find an approximate answer for 40 divided by 7.* They understand that they can join the tops of the bars on the bar-line chart to create a line graph because all the points along the line have meaning. They then create a line graph for multiplication by 4 and make up questions that they can answer using the graph. They use the ITP 'Data handling' to help them.



Children **understand the language of probability**. They use previous experience or research to say how likely events are to happen, using vocabulary such as *likely*, *unlikely*, *impossible*, *certain*, *even chance*. They place on a probability scale statements such as:

Tomorrow will be Sunday.

It will rain this month in Delhi.

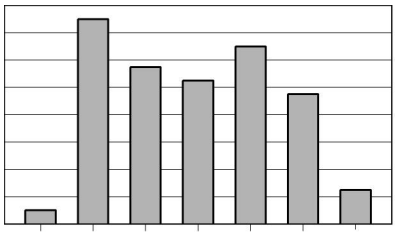
I will eat five portions of fruit and vegetables today.

Children **consolidate their understanding of likelihood through practical activity**. For example, they play 'Play your cards right'. They shuffle 1 to 9 digit cards and turn over the top card. They discuss the probability of the next card being higher or lower, using the language of probability. They decide which of these it will be before turning the next card over. If their prediction is correct, they continue to play; if not, they start again. Children see how long a run of cards they can get.

Children **test a hypothesis** such as: *Each child in our class uses over 100 litres of water each day*. They decide what data is needed and discuss how they will collect the data. For example, they may decide to keep a diary of when they use water and how they use it for a day, or to create a frequency table to keep track of how many times a day they wash their hands, take a drink, and so on. They appreciate that they need to work out how much water they use, say, to clean their teeth,

wash their hands, take a shower or flush the toilet. Children estimate the amount of water used for each of these, then work in groups to find the approximate amounts of water used per day. They consider the units that they will use to measure the actual amount of water used for some of the activities (e.g. hand washing, teeth cleaning, a typical drink) and how accurate their measurements need to be. Children work as a class to decide how they should record the total amount of water used by each child to help them to respond to the initial hypothesis, possibly using ICT. Children comment on the results of their investigation and suggest extensions to it. For example, they may suggest that they should find out ways of saving water and what difference it would make.

Unit 5C3 2 weeks

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry *I can collect and organise data to find out about a subject or to answer a question*	What are you trying to find out? What information are you aiming to collect? How? What other questions could you ask now that you have finished your enquiry? What would you do differently if you carried out the enquiry again?
• Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols *I can use graphs to show findings about a subject or to help explain my answer to a question*	What does the data tell you about your original question? Why did you choose this type of table, graph or chart? What did you find out? What evidence do you have to support your conclusions? Are your results what you expected or were there any surprises?
• Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask *I can decide what information needs to be collected to answer a question and how best to collect it* *I can explain what a table, graph or chart tells us and consider questions that it raises*	What information will you need to collect to answer these questions? How will you collect it? What does this graph tell you? What makes the information easy or difficult to interpret? Does anything surprise you? Look at this graph, table or chart. Make up three questions that can be answered using the data that is represented. What were the advantages of using a computer? What further information could you collect to answer the question more fully?
• Construct frequency tables, pictograms and bar and line graphs to represent the frequencies of events and changes over time *I can explain why I chose to represent the data using a particular table, graph or chart*	What is this type of graph called?  What is missing from it? (a title and labels on the axes) Suppose the horizontal axis shows the days of the week. What could the vertical axis show? [Label the horizontal axis 'Days of week' and the individual bars 'Sun', 'Mon', 'Tue', 'Wed', 'Thu', 'Fri', 'Sat'.] The bar chart shows the number of people treated for minor injuries at a hospital on each day of the week. What title should the chart have? The greatest number of people treated in a day was just over 70. What numbers should we put on the vertical scale? [Label the vertical scale by marking the gridlines in steps of 10.] Estimate the number of people treated on each day of the week.
• Find and interpret the mode of a set of data *I know that the 'mode' is the most common piece of information* *I can find the mode of a set of data that I have collected*	A dice is rolled 10 times. The mode of the scores is 3. What does this mean? Look at these graphs from newspapers [show frequency tables, bar charts and pie charts]. What is the mode of the data shown in this graph/chart? What does it tell you?

Objectives *Children's learning outcomes in italic*	Assessment for learning
• Describe the occurrence of familiar events using the language of chance or likelihood *I can describe how likely an event is to happen and justify my statement*	Suggest an event which is *likely* for your friend but *unlikely* for you. Tell me an event that is *certain*. Suggest a way to label a blank dice so that rolling an odd number is very unlikely.
• Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy (e.g. the nearest centimetre); convert larger to smaller units using decimals to one place (e.g. change 2.6 kg to 2600 g) *I can estimate and measure length in kilometres, metres, centimetres and millimetres using appropriate measuring instruments. I can use decimals to record measurements*	What would you measure using a ruler? a tape measure? a surveyor's tape? kitchen scales? bathroom scales? a measuring cylinder? Estimate the height of this room, the capacity of this bucket, the length of this pen, the width of the window, the mass of your chair, … What units did you choose? How accurate do your estimates need to be? Suggest a sensible estimate for how far you could kick a football. How did you decide on this estimate? Which of these measurements is equivalent to 2.07 metres: 270 cm, 2007 cm, 207 cm or 270 cm? How did you know?
• Interpret a reading that lies between two unnumbered divisions on a scale *I can find the value of each interval on a scale and use this to give approximate values of readings between divisions*	What is the value of each interval on this scale? What information did you read on the scale to help you? What calculations did you do? Suggest a measurement that would fall in the middle of two of the unnumbered divisions on this scale.
• Understand different ways to take the lead and support others in a group *I can lead a group and make sure that tasks are shared fairly* *I can support others in a group by helping them with their tasks when I have finished mine*	I want you to find out whether practice improves performance in PE. You will have one week to plan and carry out your survey and draw conclusions. Start by deciding on your roles in the group and what tasks you need to carry out.

Learning overview

Children **investigate a problem that involves measurement**. For example, they consider: *Does practice improve performance in PE?* They discuss how they could test this. For example, they might agree some activities to practise for a week (e.g. timing a 100 m run, measuring a standing jump, measuring a throw, seeing how many goals out of ten can be scored from a certain distance, and so on). They recognise that they need to establish performance at the beginning of the week and at the end, and that this may affect the type of activity they choose. They consider how they will measure each activity accurately, design a recording sheet or database for their data (or create one using ICT), and then collect their initial information. They practise the activities over several days and measure performance again at the end of the time period. Children decide how to present the evidence most effectively to help them to answer the question. They **use ICT to help them present graphs and charts** quickly, and **interpret** their graphs and charts to draw their conclusion. They suggest and consider further questions such as:

Which activity improved most with practice?

Was this a fair test? What could we have done to improve the test?

Children **create and interpret line graphs**, for example to answer the question: *What type of exercise results in the greatest increase in heart rate?* (linking to the science unit 'Keeping healthy'.

Children determine several kinds of exercise to investigate, such as jogging, throwing balls, walking, skipping, … Children speculate on what factors could change their heart rate. They predict and discuss what the outcome of the investigation will be and why. They practise how to measure their pulse to determine their heart rate. They agree how they will work together to collect the necessary data and create a data collection sheet. Children measure their pulse at rest, then carry out the activity for an extended period, stopping at timed intervals to have their pulse measured before carrying on.

Once all the data is collected, children **draw a line graph** (or create one using ICT) for each activity to show the change in pulse rate over time. They discuss whether it is meaningful to join the points and what the line between points tells you. They **interpret their graphs** and discuss issues that may affect its shape (e.g. stopping to have pulse rate measured). They answer questions such as:

What sort of activity raised heart rate the most? Was this what you expected?

Does heart rate keep rising if you keep exercising?

They **suggest extensions to their enquiry** such as:

Does heart rate increase similarly for boys and girls?

How quickly after exercise does the heart rate return to normal?

Children reflect on the data handling process and consider some of the limitations of their work.

Children review the **language of probability**, placing words such as *certain*, *likely*, *even chance*, *unlikely* and *impossible* on a probability line. They **carry out an experiment** with a hexagonal spinner with equal sections labelled 1, 2, 3, 4, 5, 6. They recognise that each of the numbers 1 to 6 is equally likely to be spun. They spin the spinner 30 times and use a **frequency diagram** to record their results. Children compare results and answer questions such as:

Which number is likely to occur most often?

Which score was the mode?

Are all the results the same?

Children collaborate to bring together the results for the whole class. They produce a **bar chart** using ICT to show the frequency of each score. They comment on the results.

Children change the numbers on their spinner to 4, 4, 4, 5, 6, 6 and **predict what differences this will make** to the experiment. They order these statements according their likelihood:

The next spin of the spinner will land on number 4.

The next spin of the spinner will land on number 5.

The next spin of the spinner will land on number 6.

The next spin of the spinner will land on number 7.

Children compare the order of their statements with others, and **discuss their reasons** for placing each event where they have. Children then spin the spinner 30 times, noting the frequencies. They record the frequencies and compare them with their predictions.