

Topic: How Science Works 7		Year Group: 7	Subject: Science	Term: Autumn 1
		Shared resources: Shared Drive - Curriculum - Innovation - Science		
Rationale and Context for Unit		Specific Core Knowledge and skills		
<p>This unit prepares students that have had little science investigation experience at primary school.</p> <p>Students develop hands-on skills like using a Bunsen Burner to learning about lab safety and learning how to conduct a practical investigation. Students develop confidence in using scientific literacy, handling data and developing maths skills needed for science investigations.</p>		<p>Core Knowledge:</p> <p>Lesson 1: Safety</p> <p>Lesson 2: Hazard Symbols</p> <p>Lesson 3: Using a Bunsen Burner</p> <p>Lesson 4: Drawing scientific equipment</p> <p>Lesson 5: Putting it all together - CIA 1</p> <p>Lesson 6: Writing a method</p> <p>Lesson 7: Accuracy</p> <p>Lesson 8: Precision</p> <p>Lesson 9: Planning an investigation: Variables</p> <p>Lesson 10: Writing a plan - does temperature affect time for sugar to dissolve</p> <p>Lesson 11: Obtaining data - drawing a results table</p> <p>Lesson 12: Handling data - anomalies and calculating mean averages</p> <p>Lesson 13: Types of graph: Drawing a bar graph and writing a conclusion</p> <p>Lesson 14: Line graphs and Describing relationships & CIA 2</p> <p>Lesson 15: CIA 2 feedback and consolidation</p>		
Challenge and Support		Common misconceptions		
<p>Throughout this unit there is opportunity for all students to feel challenged and supported. There are extension tasks throughout the lessons to challenge HPA students. Also, support worksheets and frameworks for students with SEND. All homework will be available in hard copy as well as on SMHW.</p>		<ol style="list-style-type: none"> 1. What are the common misconceptions in this Unit of work? <ul style="list-style-type: none"> • Difference between accuracy and precision • Remembering how to calculate a mean (average) and different variables • Describing graphs using comparative data 2. How will these be addressed? <ul style="list-style-type: none"> • Through teaching and reinforcing through academic language and modelling of academic language from teacher and student. • Retrieval tasks 		
Assessment and Homework		Careers, Information, Advice, and Guidance		
AfL in lessons Retrieval tasks Check In Assessments throughout the	HW in line with school policy	TBC		

unit.		
Co-curricular links	Opportunities for Spiritual, Moral, Social and Cultural Development	
Revisited throughout the year in all 3 sciences and years 8-11.	Where and what are the Spiritual, Moral, Social and Cultural Development opportunities in this scheme? Opportunities for group work and discussions.	

Lesson	Learning objectives	Activities to support Core Knowledge	Vocabulary/ Terminology	Key Resources
<u>1</u> <u>Safety</u>	Know the safety rules and hazard symbols	LF - Safety in Lab Starter: Identify and discuss hazards in a cartoon Main activities: Discussions Safety rules in a lab Starter Picture Identify issues in given scenario. Safety in Lab picture Safety Scenarios Safety Scenario Table		Lab rules
<u>2</u> <u>Hazard Symbols</u>	Know the main hazard symbols	LF - Hazard Symbols Retrieval Task - review lab rules Main activities: Discussions	Corrosive Oxidising Harmful Irritant Hazard	Hazard symbols for each student Scissors and glue Print off answer bank in PPT

		<p>What is a hazard? Safety rules in a lab</p> <p>Introduce hazard symbols</p> <p>Students cut out hazard symbols, name them, describe them and methods to reduce the hazard (using an answer bank)</p> <p>Hazard Posters Worksheet Worksheet Hazard Scenarios</p>		
3 <u>Scientific equipment</u>	Identify and draw scientific equipment	<p>LF - Equipment</p> <p>Retrieval - sequence how to light a BB or identify key hazard symbols</p> <p>Main Activity Show key scientific equipment and introduce names</p> <p>Draw scientific equipment using a pencil and ruler.</p> <p>Put equipment together and draw more complex set-ups</p> <p>Worksheet</p> <p>Activity Sheet</p>		Trays of basic scientific equipment
4 <u>Using a Bunsen Burner</u>	Know how to safely light a BB	<p>LF - Bunsen burner</p> <p>Starter: Retrieval task - hazard symbols</p> <p>Main activities: Assess current knowledge Introduce the BB and benefits to society</p> <p>Students label the BB Teacher to demonstrate how to use a BB safely.</p> <p>Students recall how to safely light a BB (teacher robot)</p>	Chimney Collar Base Air hole Nozzle Safety flame Hot flame Roaring flame	BB BB diagrams

		<p>Students light a BB and gain confidence changing the flames and discussing their use</p> <p>Students draw and colour in each type of flame</p> <p>Focus on safely handling a hot BB</p> <p>BB Worksheets</p> <p>BB Flames worksheet</p>		
<p>5</p> <p><u>Putting it all together</u></p>	<p>Heat up some ice in a beaker</p>	<p>LF - Putting it all together</p> <p>Retrieval task - Review names of key pieces of equipment/diagrams</p> <p>Main Activity</p> <p>Set up equipment to heat some ice or water.</p> <p>Students could simply record how long it takes to boil or measure temperature water boils at - something simple to do.</p> <p>Draw diagram of equipment using pencil and ruler.</p> <p>Complete CIA 1</p> <p>Extension - start to introduce how to write a method</p>		
<p>6</p> <p><u>Writing a method</u></p>	<p>Write a clear, concise set of instructions for a method</p>	<p>LF - Writing a Method</p> <p>Starter: Retrieval task: hazards, equipment, BB</p> <p>Feedback CIA 1</p> <p>Main activities:</p> <p>Students write a method to make a cup of tea</p> <p>Focus on starting each sentence with a verb and using short sentences</p> <p>Students to peer assess each others methods</p> <p>Teacher to use a selection of students' methods to make a cup of tea. Students review and improve the methods used.</p>		<p>PPT in shared area</p> <p>Tea bags</p> <p>Kettle</p> <p>Cup</p> <p>Spoon</p> <p>Sugar</p> <p>Milk</p>

<p><u>7</u></p> <p><u>Accuracy</u></p>	<p>Explain what accuracy means</p>	<p>LF - Accuracy</p> <p>Why is Science so important? Groups discussion and feedback. Show Chris Packham's video about Alan Turing.</p> <p>Starter: Name the equipment</p> <p>Main activities: Introduce a parallax error Key term: accuracy</p> <p>Introduce unit of measurement for volume - cm³ Which team of students can be the most accurate when measuring out 100cm³ of water (use a balance and water density to determine the most accurate measurements - print off slide 10) AfL task</p> <p>Results Table</p>	<p>Parallax error Meniscus Accuracy Precision Resolution intervals</p>	<p>PPT in shared area</p> <p>Practical: Measuring accuracy and precision using a beaker, conical flask, 100cm³ or 250cm³ measuring cylinders, water and a balance</p>
<p><u>8</u></p> <p><u>Precision</u></p>	<p>Explain what precision means.</p> <p>Describe how measuring equipment can affect precision</p>	<p>LF - Precision</p> <p>Retrieval Task</p> <p>Key term: precision - students repeat the task 3 times for each piece of equipment and work out the range</p> <p>Introduce key term: intervals with a range of examples Digital scales, glassware etc.</p> <p>Teacher explains why a measuring cylinder is the most precise piece of equipment - smaller intervals</p> <p>Compare accuracy and precision using the dartboard example.</p>		

<p>9</p> <p><u>Identifying Variables</u></p>		<p>LF - Identifying Variables</p> <p>Starter: Retrieval task - using specific language</p> <p>Main activities: Key term: hypothesis with examples</p> <p>Introduce variables with examples Highlight the correct language that needs to be used Students practise identifying variables in a range of investigations These can be demos around the lab or just using the examples on the PPT</p>	<p>Hypothesis Controlled variables Independent variable Dependent variable</p>	<p>PPT in shared area</p> <p>Optional Investigation circus e.g. pendulum Lamp and plant with metre rule</p>
<p>10</p> <p><u>Planning an experiment</u></p>	<p>Writing a basic plan</p>	<p>LF - Writing a Plan</p> <p>Retrieval - what does IV, DV and CV mean from previous lesson.</p> <p>Main activity</p> <p>Hypothesis - The hotter the water, the slower the sugar dissolves.</p> <p>Identify IV and DV from hypothesis.</p> <p>Provide students with equipment and ask them to devise a plan.</p> <p>Q&A to come up with key ideas as to how to carry out experiment. Reinforce control variables - what will we keep the same each time.</p> <p>Introduce meaning of terms range and interval. At this point keep the range simple to hot, cold and medium.</p> <p>Write up plan - clear instructions and identifying Cv, range and interval or provide a poor plan and ask students to improve it.</p>		

<p>11</p> <p><u>Obtaining data</u></p>	<p>Drawing a results table and carrying out experiment</p>	<p>LF - Obtaining Data</p> <p>Retrieval Task - what does IV, DV and CV mean.</p> <p>Main activity</p> <p>Demonstrate how to draw a good results table. Students to draw results table into exercise book.</p> <p>Students carry out practical - dissolve 1 spatula of sugar into different temperatures of water. Time how long it takes to dissolve.</p> <p>Keep range simple at this point - to focus upon bar graphs.</p> <p>Extension - how could we improve the range?</p> <p>Pool class data for next lesson on a spreadsheet.</p>		
<p>12</p> <p><u>Handling data - bar graphs</u></p>	<p>Drawing a bar graph and writing a conclusion</p>	<p>LF - Handling Data</p> <p>Starter: retrieval task - identifying anomalies and calculating means</p> <p>Main activities: Teacher compares bar charts and line graphs - introduce terms continuous and categoric.</p> <p>Write meanings into book and link to type of graph drawn.</p> <p>Teacher models how to draw the axes of a graph - for dissolving experiment this is likely to be a bar graph.</p> <p><i>Draw a bar graph of their data.</i></p> <p>Write a conclusion <i>I have found out....</i> <i>I know this because....(data from results needs to be used here)</i> <i>I agree or disagree with the hypothesis.</i></p>	<p>Continuous Discontinuous Categoric</p>	<p>PPT in shared area</p>

<p>13 <u>Handling data</u></p>	<p>Know what is meant by an anomaly and calculate mean</p>	<p>LF - Handling Complex Data</p> <p>Starter:</p> <p>Main activities: Introduce concept of an anomaly - write definition of anomaly into exercise book.</p> <p>Recap how to calculate a mean average.</p> <p>Maths skill revisiting decimal places and rounding up/down numbers</p> <p>Introduce key terms - repeatable and reproducible. Write them into exercise book.</p> <p>Use live data or provide data for students identify anomalies and calculate mean average for data from dissolving experiment.</p> <p>Key term: anomaly, anomalies, anomalous results</p>	<p>Anomaly Anomalies Anomalous results</p>	<p>PPT in shared area</p>
<p>14 <u>Line graphs and describing relationships between variables</u></p>	<p>Describing relationships in line graphs</p>	<p>LF - Describing Relationships</p> <p>Retrieval activity - recap on key information from unit.</p> <p>Main activities:</p> <p>Teacher models how to draw a line graph (students given a print off of the relevant slide 12) Discussion about the line of best fit.</p> <p>Teacher models how to write a sentence describing the relationship between 2 variables in a table of data (no data included in description) Students practise some examples (slides 13-17 print offs) Comparative data examples discussed (multiples identified)</p>	<p>Positive correlation Negative correlation</p>	<p>PPT in shared area Printed slides for graph examples</p>

		<p>Teacher models how to describe a simple relationship between 2 variables in a line graph Discussion of positive and negative correlation Students sketch graphs to show these terms Add comparative data in the description. Students to practise more examples (slides 20-25)</p> <p>Students then practise drawing a range of line graphs Peer assess each others</p> <p>Complete CIA 2</p>		
<p>15</p> <p><u>Consolidation and review</u></p>		<p>This lesson is an additional lesson to provide time for:</p> <p>Feedback from CIA 2</p> <p>Spend more time on lesson 13 - practising line graphs and writing descriptions Identifying any misconceptions which arise within the unit.</p> <p>WS KO</p>		