

# Science Unit

## Consumer Product Testing

### Year: 10

In this unit, pupils will apply scientific methods to consumer testing of everyday products. This unit includes hands-on, problem-solving activities to help connect science lessons with real life. In this unit pupils will consider the factors that influence what they buy and use scientific methods to measure and compare these factors. They also analyse how scientific information is used in marketing strategies and explore issues around artificial food sweeteners and additives.

### Key Questions:

[How do we decide which soft drink to buy?](#)

[Which factors should we test?](#)

[Which product is best according to your tests?](#)

[How are the products distinctive?](#)

[Can soft drinks be part of a healthy diet?](#)

[What have you learned in this unit?](#)

Developing Pupils' Knowledge, Understanding and Skills	Links with Other Areas of Learning/Subject Strands
<p><b>Organisms and Health</b></p> <ul style="list-style-type: none"> <li>• Healthy Body</li> </ul> <p><b>Chemical and Material Behaviour</b></p> <ul style="list-style-type: none"> <li>• Uses of Materials</li> </ul> <p><b>Develop skills in scientific methods of enquiry to further scientific knowledge and understanding</b></p> <ul style="list-style-type: none"> <li>• planning for investigations,</li> <li>• obtaining evidence,</li> <li>• presenting and interpreting results,</li> </ul> <p><b>Develop creative and critical thinking in their approach to solving scientific problems;</b></p> <p><b>Research scientific information from a range of sources;</b></p> <p><b>Develop a range of practical skills, including the safe use of science equipment;</b></p> <p><b>Use investigative skills to explore scientific issues, solve problems and make informed decisions.</b></p>	<p>Maths Home Economics Employability</p>
Developing Pupils' Thinking Skills and Personal Capabilities	
<ul style="list-style-type: none"> <li>○ Analysing results and drawing conclusions from them</li> <li>○ Evaluating information and evidence</li> <li>○ Examining options and weighing up pros and cons</li> <li>○ Explaining the significance of what they have learned. <b>(Thinking, Problem-Solving And Decision-Making)</b></li>   <li>○ Classifying, comparing and evaluating information</li> <li>○ Asking focused questions</li> <li>○ Communicating with a sense of audience and purpose <b>(Managing Information)</b></li> </ul>	



Key Questions	Learning Intentions Pupils are learning ...	Possible Learning, Teaching and Assessment Activities	Opportunities for Development of Cross Curricular Skills
	<p>... to carry out an investigation in which two or more products are compared with respect to selected characteristics.</p>	<p><b>Possible Factors to Test</b></p> <ul style="list-style-type: none"> <li>• <b>Acidity</b> <ul style="list-style-type: none"> <li>(a) Investigate the effect of the acidity of the soft drink on egg shells (representing teeth). <i>And / Or</i></li> <li>(b) Measure the acid strength by determining the pH of the beverage using a pH meter or universal indicator (as solution or paper) <i>And / Or</i></li> <li>(c) Find out how many teaspoons of sodium bicarbonate need to neutralise a particular volume of soft drink. Add the sodium bicarbonate in ¼ teaspoon amounts. <i>And / Or</i></li> <li>(d) Estimate the total amount of available acid by titration with base of known concentration.</li> </ul> </li> <li>• <b>Sugar content</b> -Estimate the concentrations of sugar from measurements of their densities. Teacher could demonstrate how bottles / cans of diet soft drinks float while regular versions sink due to their sugar content.</li> <li>• <b>Fizziness</b> - The more carbon dioxide present, the fizzier the drink. The amount of carbon dioxide in a drink can be measured by heating a volume of drink and collecting the gas by the displacement of water. For safety use a hot</li> </ul>	

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		<p>water bath to heat the soft drink and possibly do as a teacher demonstration. (Be aware of possibility of rapid out-gassing). The volume of gas released may be greater than the volume of soft drink which could lead to some thought provoking questions about characteristics of gas.</p> <ul style="list-style-type: none"> <li>• <b>Taste</b> <i>(Taste tests must be done outside the lab environment - possibly in collaboration with Home Economics Department. or in the canteen. Use non-laboratory equipment, for example, disposable plastic cups).</i></li> </ul> <p>Pupils may choose to judge taste by any of the following criteria: colour, smell, thickness, texture of drink in the mouth, flavour, watery/ bland, strength, fruitiness, synthetic or natural aftertaste etc.</p> <p>The taste may be scored using sensory analysis methods to rate the intensity of selected criteria, for example:</p> <ul style="list-style-type: none"> <li>▪ Descriptive rating test using a 1 to 5 Scale with (for example colour): <ul style="list-style-type: none"> <li>○ 1 = very weak</li> <li>○ 2 = weak</li> <li>○ 3 = neither weak nor strong</li> <li>○ 4 = strong</li> <li>○ 5 = very strong</li> </ul> </li> </ul> <p><i>Or</i> a 0 to 5 scale with (for example sweetness):</p>	

Key Questions	Learning Intentions Pupils are learning ...	Possible Learning, Teaching and Assessment Activities	Opportunities for Development of Cross Curricular Skills
		<ul style="list-style-type: none"> <li>○ 0 = not at all</li> <li>○ 1 = weak</li> <li>○ 2 = fairly</li> <li>○ 3 = moderate</li> <li>○ 4 = quite</li> <li>○ 5 = very</li> </ul> <ul style="list-style-type: none"> <li>▪ (average) scores plotted on a star diagram</li> </ul> <p><i>Extension activity involving taste:</i> Can pupils correctly identify the provided well-known and less well-known brands of cola?</p> <p>Is there any relationship between the ability to taste differences and how strongly a person feels that one brand is better than another?</p>	
<p><b>Which product is best according to your tests?</b></p>	<p><i>... to analyse results and draw conclusions for them.</i></p>	<p>Ask pupils to draw their conclusions on which soft drink was the best after analysis of their evidence and answering the following questions:</p> <p>What product is the best value?</p> <p>Which product is preferred (sensory analysis)? Each pupil rates each product using a Likert scale: <i>Strongly like; like; neither like or dislike; dislike; strongly dislike.</i></p>	<p>Thinking, Problem-Solving and Decision-Making</p>

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	<p>... to evaluate their investigation and state any improvements.</p> <p><i>... to evaluate information and evidence.</i></p> <p>... how to write up a scientific report.</p>	<p>Ask pupils to state any improvements they could make to their investigation and discuss if the brand of soft drink that was the ‘best’ according to their investigation was the favourite one at the start of the unit.</p> <p>Pupils write up their investigation as a report for a consumer magazine.</p> <p>Pupils examine different consumer reports and agree on what makes a good consumer report. These will become the success criteria for this task.</p> <p>At the end of the task, pupils review each others reports. In small groups, they give each of their peers’ reports a positive comment. For their own, they list one improvement that they could make.</p>	<p>Thinking, Problem-Solving, Decision-Making</p> <p>Opportunity to Assess Communication</p>
<p><b>How are the products distinctive?</b> (Media Awareness)</p>	<p>... about the impact of marketing strategies on consumer choices.</p> <p><i>... to examine options, to weigh up pros and cons.</i></p>	<p>Ask pupils to:</p> <ul style="list-style-type: none"> <li>• Discuss any strategies used by the manufacturers to get their products noticed among competing products.</li> <li>• Discuss what the manufacturer might want to communicate through its packaging strategy (e.g., value, performance).</li> <li>• Think about the packaging that you might want to use in introducing a new brand within that category. What would be your</li> </ul>	<p>Thinking, Problem-Solving, Decision-Making</p>

Key Questions	Learning Intentions Pupils are learning ...	Possible Learning, Teaching and Assessment Activities	Opportunities for Development of Cross Curricular Skills
		<p>objectives with respect to your packaging choices, and might there be any conflicts between these objectives?</p> <ul style="list-style-type: none"> <li>• Consider the possible implications of the above issues for the retailer.</li> </ul>	
<p><b>Can soft drinks be part of a healthy diet?</b> (Personal Health)</p>	<p><i>... to ask focused questions.</i></p>	<p>Give pupils copies of the soft drinks labels. Ask pupils to make a list of questions in terms of the suspected adverse long-term health effects of the ingredients in the soft drinks, for example,</p> <ul style="list-style-type: none"> <li>• Should I be concerned about the amount of sugar or calories in soft drinks?</li> <li>• Does sugar make children hyperactive?</li> <li>• Are soft drinks bad for my teeth?</li> <li>• Do soft drinks have a lot of caffeine?</li> <li>• Is caffeine safe?</li> <li>• Is caffeine addictive?</li> <li>• What is aspartame?</li> <li>• Is aspartame safe?</li> <li>• What is phenylketonuria (PKU)?</li> <li>• What is phenylalanine?</li> <li>• Is there a connection between soft drinks</li> </ul>	<p>Managing Information</p>

Key Questions	Learning Intentions Pupils are learning ...	Possible Learning, Teaching and Assessment Activities	Opportunities for Development of Cross Curricular Skills
<p><b>What have you learned in this unit?</b></p>	<p><i>... to communicate with a sense of audience and purpose.</i></p> <p><i>... to explain the significance of what they have learned.</i></p>	<p>and bone health?</p> <p>Ask pupils to research their questions and present their findings.</p> <p><i>3-2-1 Activity*</i>  3 new things they have learned  2 ways they would do the experimental tests differently  1 favorite soft drink!</p>	<p>Managing Information</p> <p>Communication</p> <p>Thinking, Problem-Solving and Decision-Making.</p>

Links with Key Elements:	Links with Learning for Life and Work
<p>Economic Awareness Personal Health Media Awareness</p>	<p>Home Economics Key Concepts - Healthy Eating and Independent Living</p> <p>Employability Key Concept - Work in the local and global economy.</p> <p>Personal Development Key Concept: Personal Health</p>
<b>Development of Learning Outcomes</b>	
<ul style="list-style-type: none"> <li>• demonstrate a range of practical skills in undertaking experiments, including the safe use of scientific equipment and appropriate mathematical calculations;</li> <li>• use investigative skills to explore scientific issues, solve problems and make informed decisions;</li> <li>• research and manage information effectively, using Mathematics and ICT where appropriate;</li> <li>• show deeper scientific understanding by thinking critically and flexibly, solving problems and making informed decisions, using Mathematics and ICT where appropriate;</li> <li>• demonstrate creativity and initiative when developing ideas and following them through;</li> <li>• work effectively with others;</li> <li>• demonstrate self-management by working systematically, persisting with tasks, evaluating and improving own performance;</li> <li>• communicate effectively in oral, visual, written, mathematical and ICT formats, showing clear awareness of audience and purpose.</li> </ul>	