

BGE Progression Framework to N5

Subject: S3 Biology

Biology 

S1/S2 Science 

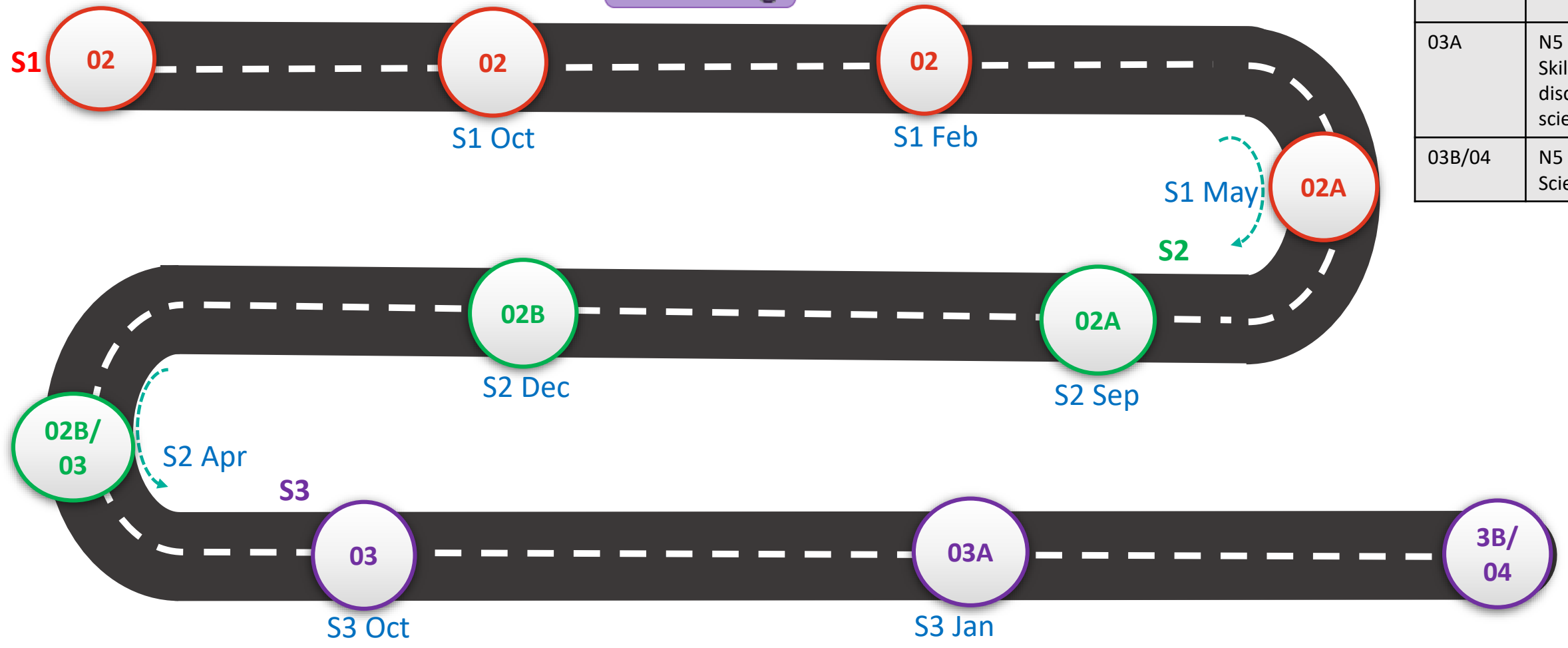
Chemistry 

N3/N4 Science 

Physics 

 **Next >**

By April S3	Pathway
03 (or below)	N3/N4 science
03A	N5 Lab Skills or N4 discrete science
03B/04	N5 discrete Science



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Year	Period	Course Overview
S3	May - December	Heart, Circulatory and Respiratory System Mitosis and Stem Cells Ecosystems, Energy and Evolution Woodlice Investigation
	January - May	Enzymes Respiration Respiration Investigation Distribution of Organisms (not examined)

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## S3 Biology Assessment Calendar

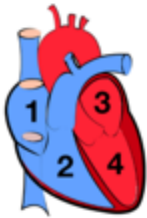
Type of Assessment

Ongoing  
High Quality  
Periodic

Year Group	June	August	September	October	November	December	January	February	March	April	May
S3	Circulatory and Respiratory Test		Mitosis and Stem Cells		Woodlice Investigation	Ecosystems Energy and Evolution	Enzymes	Respiration Investigation	Respiration		

Ongoing – includes jotter work/homework/observations/questioning/discussions/learning conversations.

## Example of Assessment Material

Everyone can...	Most People can also...	Some people can also...																										
<p><b>Identify the four chambers of the heart and whether they deal with oxygenated or deoxygenated blood.</b></p> <p>Expected response:</p> <p>The right atrium and right ventricle (1 and 2) deal with deoxygenated blood. The left atrium and ventricle (3 and 4) deal with oxygenated blood.</p> 	<p><b>Identify the four major blood vessels associated with each chamber of the heart.</b></p> <p>Expected Response:</p> <p>The vena cava = right atrium.            The pulmonary artery = right ventricle.            The pulmonary vein = left atrium.            The aorta = left ventricle.</p>	<p><b>Describe the direction of blood flow through the heart, lungs and body.</b></p> <p>Expected Response:</p> <p>Deoxygenated blood enters the right atrium of the heart via the vena cava, the blood is pumped to the right ventricle, and from here it travels in the pulmonary artery to the lungs. The blood collects oxygen at the lungs. The oxygenated blood returns to the right atrium via the pulmonary vein. It is pumped to the right ventricle where it is sent around the body via the aorta.</p>																										
<p><b>Carry out a division calculation (ratio)</b></p> <table border="1" data-bbox="300 915 922 996"> <thead> <tr> <th rowspan="2">Part of Body</th> <th colspan="2">Rate of blood circulating (cm<sup>3</sup>/minute)</th> </tr> <tr> <th>before exercise</th> <th>after exercise</th> </tr> </thead> <tbody> <tr> <td>Heart Muscle</td> <td>330</td> <td>990</td> </tr> </tbody> </table> <p>For heart muscle, how many times greater is the rate of blood circulating during exercise compared with before exercise?</p> <p>Expected response:</p> <p><math>990/330 = 3</math> times</p>	Part of Body	Rate of blood circulating (cm <sup>3</sup> /minute)		before exercise	after exercise	Heart Muscle	330	990	<p><b>Carry out a simple percentage</b></p> <table border="1" data-bbox="947 915 1454 1053"> <thead> <tr> <th>Blood Group</th> <th>Number of People</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>605</td> </tr> <tr> <td>B</td> <td>149</td> </tr> <tr> <td>AB</td> <td>76</td> </tr> <tr> <td>O</td> <td>680</td> </tr> </tbody> </table> <p>What percentage of the population has blood group O?</p> <p>Expected response:</p> <p><math>680/1510 \times 100 = 45\%</math></p>	Blood Group	Number of People	A	605	B	149	AB	76	O	680	<p><b>Carry out a percentage change</b></p> <table border="1" data-bbox="1595 915 2216 996"> <thead> <tr> <th rowspan="2">Part of Body</th> <th colspan="2">Rate of blood circulating (cm<sup>3</sup>/minute)</th> </tr> <tr> <th>before exercise</th> <th>after exercise</th> </tr> </thead> <tbody> <tr> <td>Heart Muscle</td> <td>275</td> <td>860</td> </tr> </tbody> </table> <p>For heart muscle, what is the percentage increase in blood flow through the heart during exercise?</p> <p>Expected response:</p> <p><math>\text{change/start value} \times 100</math>  <math>585/275 \times 100 = + 213\%</math></p>	Part of Body	Rate of blood circulating (cm <sup>3</sup> /minute)		before exercise	after exercise	Heart Muscle	275	860
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Everyone can...	Most People can also...	Some people can also...
<ul style="list-style-type: none"> <li>Rearrange diagrams of the <b>stages of mitosis (cell division) into the correct order</b></li> <li>State that the purpose of mitosis in <b>multicellular organisms</b> is for <b>growth and repair</b></li> <li>State that <b>unicellular (single-celled) organisms</b> use mitosis for <b>reproduction</b></li> <li>State that each parent cell produces <b>two genetically identical daughter cells</b></li> </ul>	<ul style="list-style-type: none"> <li>Describe what is happening <b>at each stage in mitosis using a given diagram</b> as a reference</li> <li>Give a description of what will happen in the <b>next stage of mitosis</b> when <b>given a diagram of a previous stage</b></li> </ul>	<ul style="list-style-type: none"> <li>Explain how mitosis is important in <b>maintaining the chromosome complement</b> of an organism</li> <li><b>Calculate the number of cells produced by mitosis</b> (using their knowledge of how many cells are produced by each parent cell during the process)</li> </ul>
<ul style="list-style-type: none"> <li>State that stem cells are <b>unspecialised cells</b> or are <b>undifferentiated cells</b></li> <li>State that stem cells can either <b>self-renew or differentiate</b></li> <li>Identify from a diagram which stem cell can produce the most types of cell</li> </ul>	<ul style="list-style-type: none"> <li>Give examples of the <b>types of stem cells</b> and their <b>level of specialisation</b></li> <li>e.g. <b>embryonic stem cells</b> are capable of becoming ANY cell type in the body as they are not specialised at all</li> <li>vs. <b>adult/tissue stem cells</b> which can only become cell types associated with the tissue they are found in (for example – bone marrow stem cells can only become types of blood cell)</li> </ul>	<ul style="list-style-type: none"> <li>Explain why the <b>use of embryonic stem cells is considered controversial</b></li> </ul>





# Clydeview Academy Science Dept Investigation Success Criteria

Use this checklist as you write your report – check off each point as you go along.

		Criteria	✓	Peer Assessed	Teacher Assessed
Planning	Aim	<ul style="list-style-type: none"> <li>You have given your investigation an informative title.</li> </ul>			
		<ul style="list-style-type: none"> <li>You have clearly stated the aim of your experiment (this is what you are trying to find out).</li> </ul>			
		<ul style="list-style-type: none"> <li>Your aim correctly identifies the <b>independent variable</b> (the variable being changed).</li> </ul>			
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	Hypothesis	<ul style="list-style-type: none"> <li>You have stated your <b>hypothesis</b>, predicting the result.</li> </ul>			
	Method	<ul style="list-style-type: none"> <li>You have included either a <b>labelled diagram</b> or a <b>list of apparatus</b>.</li> </ul>			
		<ul style="list-style-type: none"> <li>Your method describes the basic steps of the experiment and provides enough information to allow another student to carry out the same experiment.</li> </ul>			
		<ul style="list-style-type: none"> <li>You have stated what has been kept the same during the experiment (the <b>controlled variables</b>).</li> </ul>			
<ul style="list-style-type: none"> <li>You have included a <b>risk assessment</b> which notes the safety precautions taken before the experiment.</li> </ul>					
Collect and Record Results	Collection of Data	<ul style="list-style-type: none"> <li>You have taken appropriate measurements (sufficient number of readings across an appropriate range).</li> </ul>			
	Table	<ul style="list-style-type: none"> <li>A table with the first column having a heading that identifies the independent variable with its units in brackets.</li> </ul>			
		<ul style="list-style-type: none"> <li>A second column having a heading that identifies the dependent variable with its units in brackets.</li> </ul>			
Process and	Graph	Select an appropriate format of graph (line graph or bar graph)			

Present Results in a Graph	S	independent variable should be plotted on the x-axis (horizontal) and dependent variable should be plotted on the y-axis (vertical). Scales – should run from 0 and increase in equal increments. Scales that increase in multiples of 1, 2, 5, and 10 are easier to plot. Graph should use at least half the graph paper in both directions.			
		L	Labels – independent variable heading from table should be on the x-axis and the dependent variable heading from the table should be on the y-axis.		
		U	Units – make sure that each axis also includes the units for each of the variables.		
		R	Ruler – use a ruler to draw straight lines		
		P	Precise Points – points on a line graph, straight lines on a bar graph.		
		Conclusion	Your conclusion answers your aim.		
Evaluation	<p>You have evaluated you experiment and can suggest two improvements. These might refer to:</p> <ul style="list-style-type: none"> <li>Effectiveness/relevance of the method</li> <li>Control of the variables</li> <li>Limitations of the equipment</li> <li>Possible sources of error</li> <li>Reliability of data</li> </ul>			2 marks	

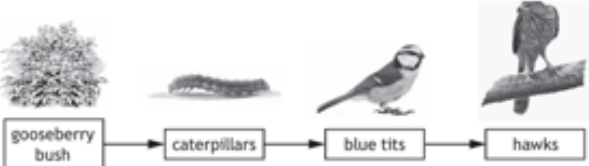
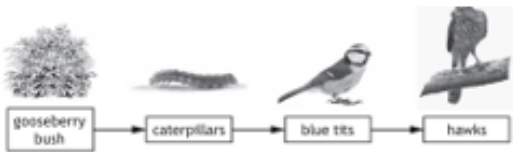

All - All would be expected to score between 0 and 11 marks

Most - Would be able to score between 12 and 16

Some - Would be able to score between 17 and 21

Example of Assessment



Everyone can...	Most People can also...	Some people can also...
<p><b>Construct a basic food chain from its constituent parts and explain the importance of the arrows in a food chain.</b></p> <p>Expected Response:</p>  <p>The arrows represent the flow of energy from one level to the next in the food chain.</p>	<p><b>Apply knowledge of food chains to identify producers, primary and secondary consumers, herbivores, omnivores, carnivores, predators and prey.</b></p> <p>Expected Response:</p>  <p>The gooseberry bush is a producer as it is a green plant that makes its own food through the process of photosynthesis. The caterpillar is the primary consumer, it is also <u>a</u> herbivore and prey to the blue tit. The blue tit is a secondary consumer, it is also a carnivore, predator to the caterpillar and prey of the hawk. The hawk is a top carnivore and predator of the blue tit.</p>	<p><b>Analyse the relationships between organisms in a food web and evaluate the impact of the removal of one species on others in the web.</b></p> <p>Expected Response:</p>  <p><b>If the freshwater shrimp numbers decreased dramatically predict the effect this will have on the number of mayfly nymphs.</b></p> <p>The numbers may increase as there will be more food in the form of microscopic algae (shrimp not eating algae).          The numbers may decrease due to increased predation from dragonfly nymphs and brown trout due to them losing a food source (the shrimp).          The numbers may stay the same due to the combination of both answers above.</p>



Everyone can...	Most People can also...	Some people can also...
<p><b>Give the definition of a mutations and name a mutagenic agent.</b></p> <p>Expected Response: A random change to the genetic material (DNA) of an organism.</p>	<p><b>Explain the importance of mutations in evolution.</b></p> <p>Expected Response: Allow organisms to adapt to and survive in a changing environment.</p>	<p><b>Describe the process of speciation.</b></p> <p>Expected Response: Initial population is split by an isolating barrier e.g. mountain range. Different mutations take place in each sub- population. Some mutations are advantageous. Advantageous mutations are selected for and increase in frequency in each population. If brought back together the sub-populations are no longer able to interbreed to produce fertile offspring.</p>



Example of Assessment Material

	Everyone can...	Most People can also...	Some people can also...
<b>Knowledge &amp; Understanding</b>	<p>State the role of an enzyme.</p> <p><i>Expected Response:</i></p> <p>An enzyme is a Biological Catalyst as it speeds up reactions in all living cells.</p>	<p>Define Degradation and Synthesis reactions.</p> <p><i>Expected Response:</i></p> <p>Degradation reactions are where enzymes break down large substrates, into smaller products.</p> <p>Synthesis reactions are where enzymes build up larger products from small substrate molecules.</p>	<p>Provide examples of Degradation and Synthesis reactions.</p> <p><i>Expected Response:</i></p> <p><u>Degradation reaction</u> =</p> <p style="text-align: center;">Amylase Starch <math>\longrightarrow</math> Maltose</p> <p><u>Synthesis reaction</u> =</p> <p style="text-align: center;">Phosphorylase Glucose-1-Phosphate <math>\longrightarrow</math> Starch</p>
<b>Scientific Skills</b>	<p>Drawing a bar graph:</p> <p>Assign a given label, including units, to the y axis of a graph.</p>	<p>Assign a scale to the y-axis.</p>	<p>Accurately plot the correct bars of the graph.</p>



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Present Results in a Graph			Independent variable should be plotted on the x-axis (horizontal) and dependent variable should be plotted on the y-axis (vertical). Scales – should run from 0 and increase in equal increments. Scales that increase in multiples of 1, 2, 5, and 10 are easier to plot. Graph should use at least half the graph paper in both directions.				
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All - All would be expected to score between 0 and 11 marks

Most Would be able to score between 12 and 16

Some Would be able to score between 17 and 21

**Exemplification of Standards – Respiration Assessment S3 Biology**

*Example of Assessment Material*

	Everyone can...	Most People can also...	Some people can also...
<b>Knowledge &amp; Understanding</b>	<p>Name a cellular process that produces energy.</p> <p><i>Expected Response:</i></p> <p>(Aerobic) Respiration</p>	<p>Explain why some cells have more mitochondria than others.</p> <p><i>Expected Response:</i></p> <p>Cells with more mitochondria have a higher energy requirement.</p>	<p>Explain why increasing the temperature can decrease the rate of respiration.</p> <p><i>Expected Response:</i></p> <p>Respiration is controlled by enzymes and enzymes become denatured at high temperatures.</p>
<b>Scientific Skills</b>	<p><b>Experimental Design:</b></p> <p>Describe how the reliability of the results is increased.</p> <p><i>Expected response:</i></p> <p>Repeat the experiment</p>	<p>State 2 factors, not mentioned, that should be controlled for a valid comparison of results.</p> <p><i>Expected response:</i></p> <p><b>Experiment dependent</b> e.g. volume/concentration of solutions, starting mass, length of time before measuring, etc.</p>	<p>Describe how to set up a control.</p> <p><i>Expected response:</i></p> <p>Set up the experiment exactly the same except remove (or replace with something inert) the factor you are investigating.</p>

BGE Progression Framework to N5

Subject: S3 Chemistry

Biology



S1/S2 Science



Chemistry



N3/N4 Science

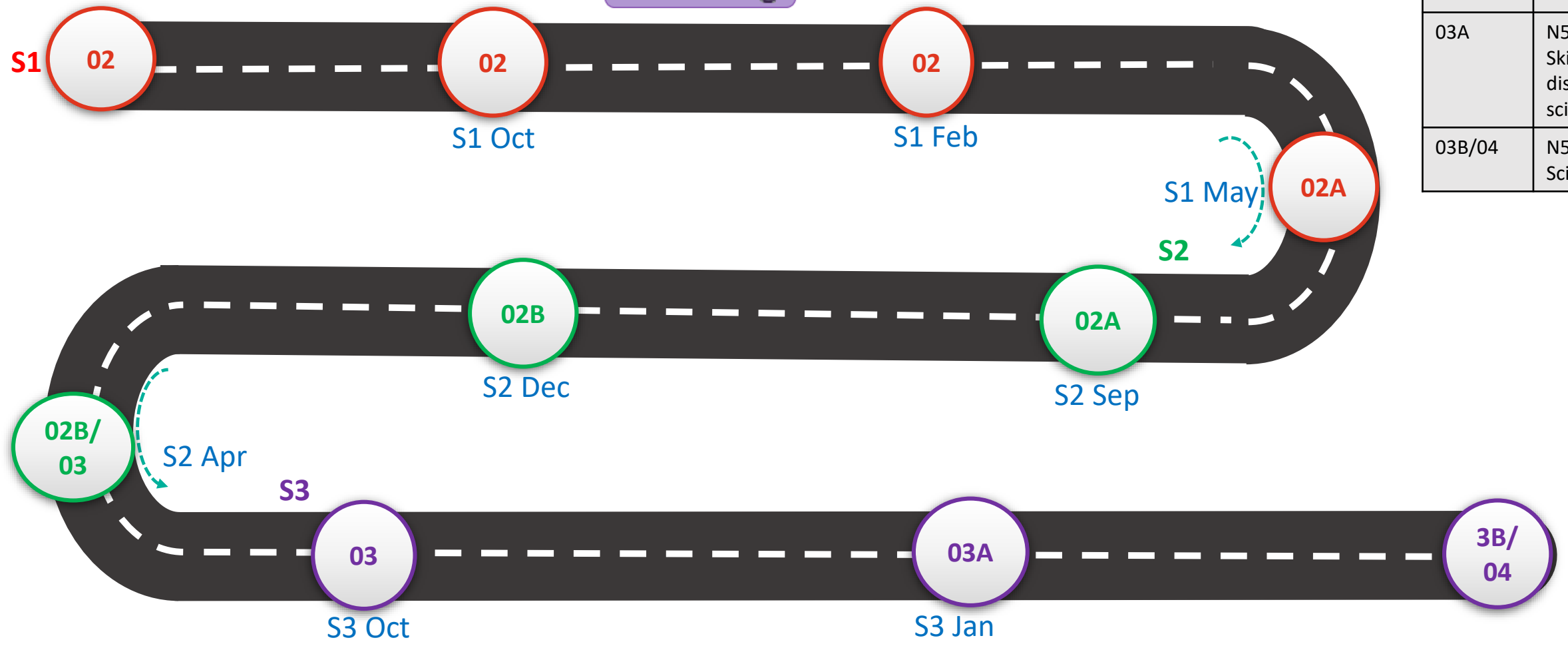


Physics



Next >

By April S3	Pathway
03 (or below)	N3/N4 science
03A	N5 Lab Skills or N4 discrete science
03B/04	N5 discrete Science





Year	Period	Course Overview
S3	May - December	Formula and Equations Chemical Reactions Rates of Reaction Rates of Reaction Practical Atomic Structure House Poster
	January - May	How Atoms Combine Bonding and Properties Conservation of Mass Practical Acids and Alkalis

## S3 Chemistry Assessment Calendar

Type of Assessment

Ongoing  
High Quality  
Periodic

Year Group	June	August	September	October	November	December	January	February	March	April	May
S3	<a href="#">Formula and Equations</a> <a href="#">Ink Exercise 1</a> <a href="#">Formula and Equations</a>			<a href="#">Rates of Reaction</a> <a href="#">Rates of Reactions Practical</a> Ink Exercise 2 Rates of Reaction	<a href="#">Atomic Structure</a> Ink Exercise 3 Atomic Structure	House Poster	Ink Exercise 4 How Atoms Combine	<a href="#">How Atoms Combine</a>	<a href="#">Bonding and Properties</a> Ink Exercise 5 Bonding and Properties		<a href="#">Conservation of Mass Practical</a>

Ongoing – includes jotter work/homework/observations/questioning/discussions/learning conversations.

## Exemplification of Standards - S3 Chemistry - Formula, Equations & Formula Mass

Everyone can	Most people can also	Some people can also
<p>Write the formula for an element including the diatomic elements</p> <p><b>EXPECTED RESPONSE</b>                      Lithium = <math>Li</math>                      Carbon = <math>C</math>                      Hydrogen = <math>H_2</math></p>	<p>Write the formula for a simple 2 element compound using prefix rules (Name contains 1 prefix - mono ,di, tri) and valency rules</p> <p><b>EXPECTED RESPONSE</b>                      Carbon dioxide = <math>CO_2</math>                      Sodium chloride = <math>NaCl</math></p>	<p>Write the formula for 2 element compounds which include a transition metal whose valency is given in the name in roman numerals AND for compounds containing prefixes which include tetra, <u>penta</u> and <u>hexa</u>)</p> <p><b>EXPECTED RESPONSE</b>                      Nickel (II) chloride = <math>NiCl_2</math>                      Dinitrogen pentoxide = <math>N_2O_5</math></p>
<p>Write a word equation for a chemical reaction given a simple description</p> <p><b>EXPECTED RESPONSE</b>                      Magnesium metal reacts with oxygen to form magnesium oxide.</p> <p><math>Magnesium + Oxygen \rightarrow Magnesium\ oxide</math></p>	<p>Translate a given word equation into a formula equation for a simple reaction</p> <p><b>EXPECTED RESPONSE</b>                      Magnesium + Oxygen <math>\rightarrow</math> Magnesium oxide</p> <p><math>Mg + O_2 \rightarrow MgO</math></p>	<p>Translate a statement including the terms burning or combustion to form a word equations and formula equation which include appropriate state symbols</p> <p><b>EXPECTED RESPONSE</b>                      Magnesium metal burns to produce solid magnesium oxide.</p> <p><math>Magnesium + Oxygen \rightarrow Magnesium\ oxide</math>  <math>Mg(s) + O_2(g) \rightarrow MgO(s)</math></p>

S3 Rates of Reaction Exemplification

Example Question:

Scott and Susan, reacted magnesium metal with dilute hydrochloric acid solution and noticed magnesium chloride solution and a gas that burned with a pop were produced.

Write this as a word equation and convert to formula.

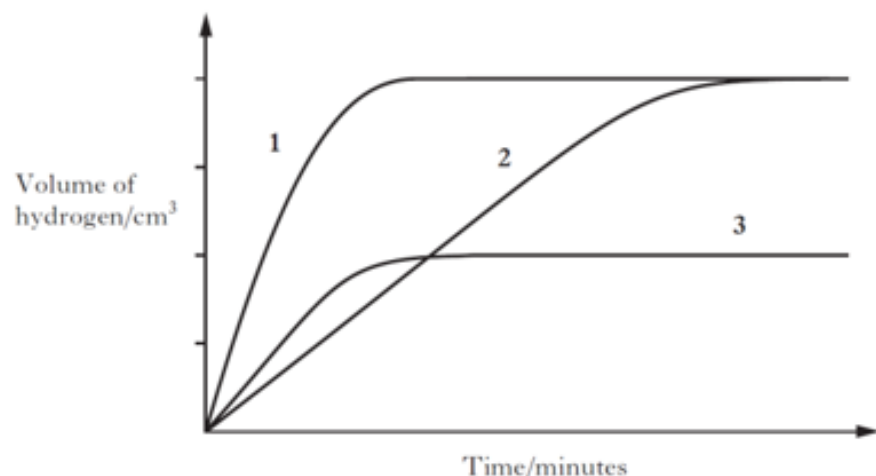
Everyone can.....	Most people can also.....	Some people can also.....
Identify the reactants as magnesium metal and hydrochloric acid solution and the products in the reaction as magnesium chloride solution and a gas that burns with a pop.	Identify the gas that burns with a pop as hydrogen and can therefore form the word equation:  <u>Hydrochloric</u> + <u>Magnesium</u> → Magnesium + Hydrogen Acid Chloride	Form the formula equation and apply state symbols.  $\begin{array}{ccccccc} \text{Mg}_{(s)} & + & 2\text{HCl}_{(aq)} & \longrightarrow & \text{MgCl}_{2(aq)} & + & \text{H}_{2(g)} \\ \text{Magnesium} & & \text{Hydrochloric} & & \text{Magnesium} & & \text{Hydrogen} \\ & & \text{acid} & & \text{chloride} & & \text{gas} \end{array}$



Example Question:

11. A student carried out some experiments between zinc and excess 1 mol/l hydrochloric acid.

The graph shows the results of each experiment.



(a) In which experiment did the reaction take longest to finish, 1, 2 or 3?

\_\_\_\_\_ 1

(b) In **all** three experiments she kept the temperature the same and used the same volume of 1 mol/l hydrochloric acid.

(i) Suggest one factor that could have been changed from experiment 1 to produce the results in experiment 2.

\_\_\_\_\_ 1

(ii) 1 g of zinc was used in experiment 1.

What mass of zinc was used in experiment 3?

Everyone can.....	Most people can also.....	Some people can also.....
Identify that the steeper the slope the faster the reaction. Line 1 is the fastest and line 2 is the slowest.	Identify that when the same quantity of reactants are used no matter what independent variable has been changed the final volume of gas released will be the same. Therefore lines 1 & 3 used the same mass and volume of reactants.	Predict how each line would vary if another variable is applied. As in Question (b) (ii) where it can be assumed that if half the volume of gas is produced, half the mass of Zinc must have been used (0.5g)



# Clydeview Academy Science Dept Investigation Success Criteria

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Collect and Record Results	Collection of Data	• You have taken appropriate measurements (sufficient number of readings across an appropriate range).			
	Table	• A table with the first column having a heading that identifies the independent variable with its units in brackets.			
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Evaluation	You have evaluated you experiment and can suggest two improvements. These might refer to: <ul style="list-style-type: none"> <li>• Effectiveness/relevance of the method</li> <li>• Control of the variables</li> <li>• Limitations of the equipment</li> <li>• Possible sources of error</li> <li>• Reliability of data</li> </ul>			2 marks	

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Most - Would be able to score between 12 and 16

Some - Would be able to score between 17 and 21



### S3 Atomic Structure Exemplification

#### Example Question:

Magnesium chloride is an ionic compound containing magnesium ions and chloride ions. The nuclide notation for these two ions are shown.

Complete the table to show the number of electrons and neutrons in these ions.

	Electrons	Neutrons
${}_{12}^{24}\text{Mg}^{2+}$		12
${}_{17}^{37}\text{Cl}^{-}$	18	

#### Everyone can.....

Identify the atomic number is on the bottom left and the mass number is on the top left.

Atomic Number = protons = electrons in a neutral atom

Mass Number = protons + neutrons

Identify an Ion is an atom that carries a charge due to the loss or gain of electrons.

#### Most people can also.....

Calculate the number of neutrons using the formula:

(Mass Number – Atomic Number)

In the Example above:

Mg)  $24 - 12 = 12$  neutrons

Cl)  $37 - 17 = 20$  neutrons

#### Some people can also.....

Understand that when an atom loses or gains electrons it forms an ion.

If an electron is lost it becomes a positively charged ion and a negatively charged ion when it gains electrons.

In the example shown Mg would have 12 electrons when neutral but as it is  $\text{Mg}^{2+}$  it has 10 electrons.

Cl should have 17 electrons when neutral but as it is  $\text{Cl}^{-}$  it must have 18 electrons.



**Example Question:**

The covalent radius is a measurement used to indicate the size of an atom.

The diagram below shows the covalent radius for elements in groups 1 to 7 of the periodic table.

H ● 32						
Li ● 130	Be ● 99	B ● 84	C ● 75	N ● 71	O ● 64	F ● 60
Na ● 160	Mg ● 140	Al ● 124	Si ● 114	P ● 109	S ● 104	Cl ● 100
K ● 200	Ca ● 174	Ga ● 123	Ge ● 120	As ● 120	Se ● 118	Br ● 117
Rb ● 215	Sr ● 174	In ● 142	Sn ● 140	Sb ● 140	Te ● 137	I ● 136

covalent radius (picometres)

(a) (i) Describe the trend in covalent radius going from sodium to chlorine.

(ii) Describe the general trend in covalent radius going down a group in the periodic table.

(iii) Predict a value, in picometres, for the covalent radius of strontium.

Everyone can.....

Identify the atoms from Na to Cl and state the atom size is decreasing.

Identify that going down a group shows an increase in atomic size.

Most people can also.....

Predict the size of the missing values using the patterns in the periodic table given

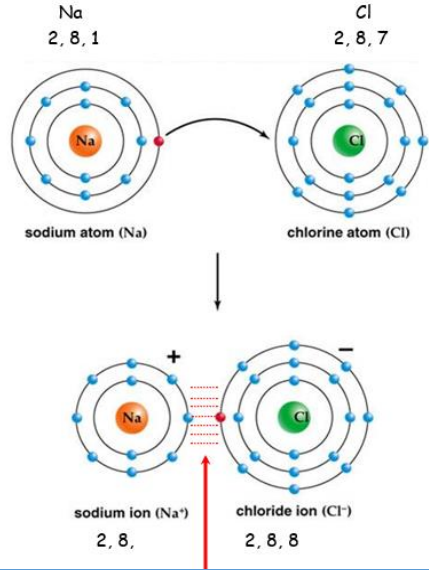
Some people can also.....

Explain the increase in size going down a group is due to an extra occupied energy level.



## Exemplification – S3 How Atoms Combine

Everyone can...	Most People can also...	Some people can also...
<p data-bbox="180 372 504 396"><b>State the name of the bond</b></p> <p data-bbox="180 482 417 506"><b>Expected Response:</b></p> <p data-bbox="180 554 843 611"><b>State that a covalent bond is formed between non-metal atoms</b></p>	<p data-bbox="876 372 1365 396">Describe how the covalent bond is formed.</p> <p data-bbox="876 482 1105 506">Expected Response:</p> <p data-bbox="876 554 1523 611">A covalent bond is a sharing of electrons in partially filled orbitals between non-metal atoms.</p>	<p data-bbox="1567 372 2186 468">Explain how the atoms are held together in a covalent bond by using a diagram and describing the forces of attraction involved.</p> <p data-bbox="1567 515 1798 539">Expected Response:</p> <p data-bbox="1567 586 2204 682">‘The covalent bond holds atoms together by the mutual attraction that each positive nucleus has for the shared and overlapping electrons.’</p> <p data-bbox="1567 715 2074 739">Consider the bonding diagram for hydrogen:</p> <div data-bbox="1633 782 2063 1058"></div> <p data-bbox="1727 1143 2091 1243">area of attraction - both positive nuclei are attracted to the shared pair of negatively charged electrons.</p>

Everyone can...	Most People can also...	Some people can also...
<p><b>State the name of the bond</b></p> <p><b>Expected Response:</b></p> <p><b>An ionic bond is formed between metal and non-metal elements in a compound.</b></p>	<p>Describe how the ionic bond is formed.</p> <p><b>Expected Response:</b></p> <p>An ionic bond involves a transfer of electrons. Metals lose electrons to form positive ions and non-metals gain electrons form negative ions.</p>	<p>Explain how the ions are held together in an ionic bond by using a diagram and describing the forces of attraction involved.</p> <p><b>Expected Response:</b></p> <p>The oppositely charged ions are attracted towards each other. This electrostatic force of attraction between the positive ion and the negative ion is called an <b>IONIC bond</b>.</p> <p>The formation of sodium chloride can be summed up as follows:</p>  <p>The diagram illustrates the formation of sodium chloride. At the top, a sodium atom (Na) with 11 electrons (2, 8, 1) and a chlorine atom (Cl) with 17 electrons (2, 8, 7) are shown. An arrow indicates the transfer of one electron from the sodium atom to the chlorine atom. Below, the resulting sodium ion (Na<sup>+</sup>) with 10 electrons (2, 8) and the chloride ion (Cl<sup>-</sup>) with 18 electrons (2, 8, 8) are shown. A red arrow points to the chloride ion, and a '+' sign is above the sodium ion.</p>



Example KU Question:

When metals and non-metals form compounds together, they form ionic bonds within their structures. Using lithium and fluorine in your example, explain clearly how lithium fluoride forms. (3 marks)

Everyone can.....	Most people can also.....	Some people can also.....
<ul style="list-style-type: none"> <li>State that <b>lithium (Li)</b> is a metal and <b>fluorine (F)</b> is a non-metal.</li> <li>Mention that <b>electrons are transferred</b> from lithium to fluorine.</li> <li>State that <b>Li<sup>+</sup></b> and <b>F<sup>-</sup></b> ions are formed and attracted to each other to make <b>lithium fluoride (LiF)</b></li> </ul>	<ul style="list-style-type: none"> <li>Explain that <b>lithium loses one electron</b>, becoming a <b>Li<sup>+</sup> ion</b>, and <b>fluorine gains one electron</b>, becoming an <b>F<sup>-</sup> ion</b>.</li> <li>Describe how this transfer of electrons leads to the formation of <b>oppositely charged ions (Li<sup>+</sup> and F<sup>-</sup>)</b>.</li> <li>State that these oppositely charged ions are held together by <b>electrostatic attraction</b>, forming an <b>ionic bond</b>.</li> <li><b>Include an illustration</b> showing lithium losing an electron to fluorine, resulting in Li<sup>+</sup> and F<sup>-</sup> ions.</li> </ul>	<ul style="list-style-type: none"> <li>Provide a full explanation that <b>lithium</b>, a metal, has one electron in its outer shell, which it <b>loses to fluorine</b>, a non-metal with seven electrons in its outer shell. This transfer allows both elements to achieve <b>stable electron arrangements</b> (full outer shells).</li> <li>Describe that the <b>Li<sup>+</sup> ion (positive)</b> and the <b>F<sup>-</sup> ion (negative)</b> are formed, and they are held together by the strong <b>electrostatic forces of attraction</b> between the oppositely charged ions.</li> <li>Explain that this results in the formation of the <b>ionic compound lithium fluoride (LiF)</b>, which forms a <b>lattice structure</b> due to these strong ionic bonds.</li> <li><b>Include a detailed illustration</b>, showing both the electron transfer and the final arrangement of ions in a <b>lattice structure</b>, emphasising the electrostatic attraction.</li> </ul>



Example PS Question:

Ethyne is the first member of the alkyne family.

It can be produced by the reaction of calcium carbide with water.

The equation for this reaction is



- (a) The table shows the results obtained in an experiment carried out to measure the volume of ethyne gas produced.

<i>Time (s)</i>	0	30	60	90	120	150	180	210
<i>Volume of ethyne (cm<sup>3</sup>)</i>	0	60	96	120	140	148	152	152

Draw a line graph of the results. (4 marks)

Everyone can.....	Most people can also.....	Some people can also.....
Correctly label the <b>x-axis</b> as <b>Time (s)</b> and the <b>y-axis</b> as <b>Volume of Ethyne (cm<sup>3</sup>)</b>  <b>Must include units</b>	<ul style="list-style-type: none"><li>• Correctly label the <b>x-axis</b> as <b>Time (s)</b> and the <b>y-axis</b> as <b>Volume of Ethyne (cm<sup>3</sup>)</b>, with appropriate <b>units</b>.</li><li>• Choose a suitable <b>scale</b> for both axes so the graph uses most of the available space.</li><li>• Accurately plot <b>all data points</b> from the table on the graph</li></ul>	<ul style="list-style-type: none"><li>• Correctly label the <b>x-axis</b> as <b>Time (s)</b> and the <b>y-axis</b> as <b>Volume of Ethyne (cm<sup>3</sup>)</b>, with appropriate <b>units</b>.</li><li>• Choose a suitable <b>scale</b> for both axes so the graph uses most of the available space.</li><li>• Accurately plot <b>all data points</b> from the table on the graph</li><li>• Draw a <b>smooth curve of best fit</b> (not connecting the dots) that best represents the trend.</li></ul>



BGE Progression Framework to N5

Subject: S3 Physics

Biology 

S1/S2 Science 

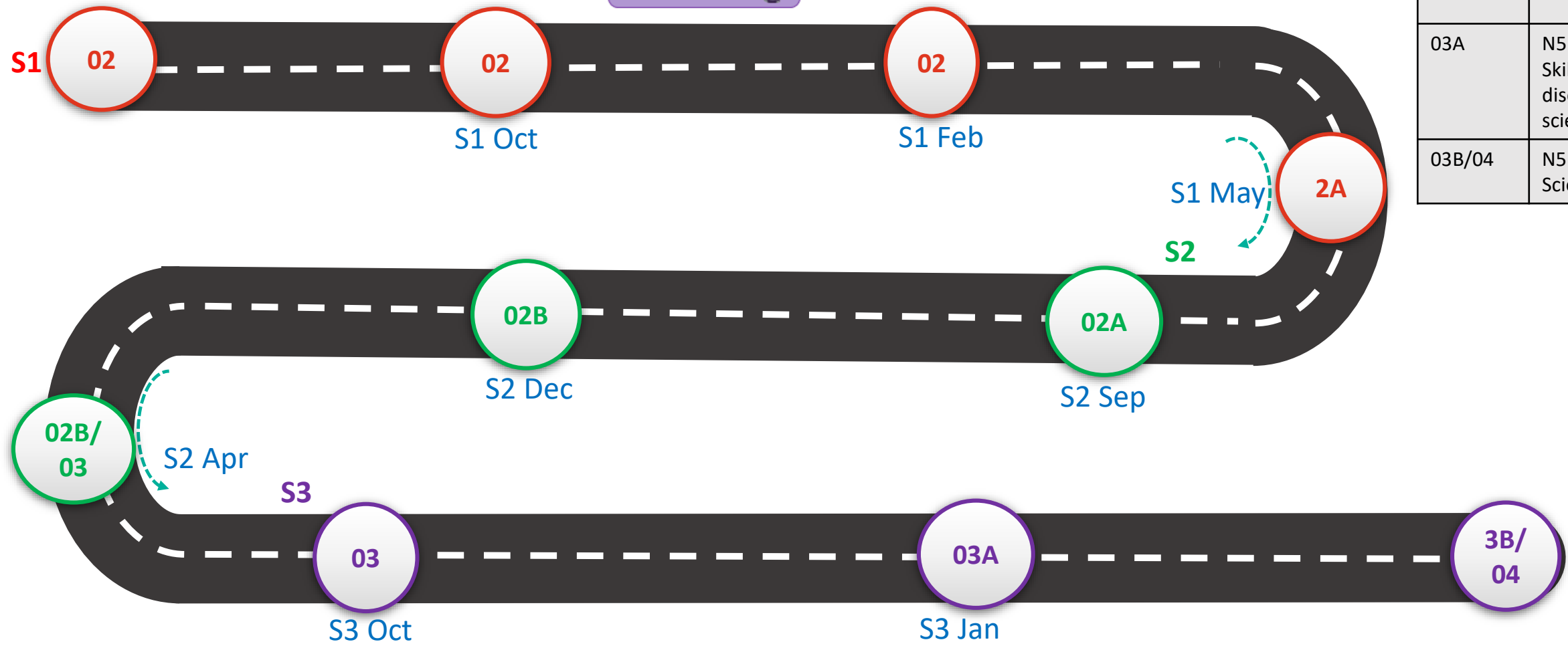
Chemistry 

N3/N4 Science 

Physics 

 **Next >**

By April S3	Pathway
03 (or below)	N3/N4 science
03A	N5 Lab Skills or N4 discrete science
03B/04	N5 discrete Science





Year	Period	Course Overview
S3	May - December	Dynamics: Speed, Distance, Time, Acceleration, Speed-time graphs. Forces, Newton's Laws and Gravitational Forces.  Astronomy and Waves: Cosmology, Frequency and Period, Wave Speed and Wave Equation, Diffraction.
	January - May	EM Spectrum, Light (reflection, refraction, spectra).  Electricity: Electric Charge, Circuits, Current and Voltage (series and parallel circuits), Resistance, Ohm's Law, Power, Fuses.

## S3 Physics Assessment Calendar

Type of Assessment

Ongoing

High Quality

Periodic

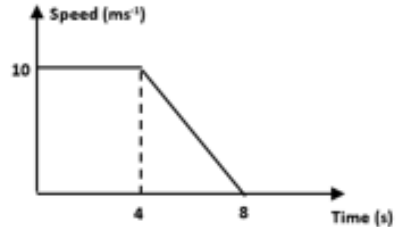
Year Group	May	August	September	October	November	December	January	February	March	April	May
S3	<a href="#">Dynamics I Assessment</a>		<a href="#">Spring Extension Investigation</a>	<a href="#">Dynamics II Assessment</a>		<a href="#">Astronomy Assessment</a>		<a href="#">EM Spectrum Research</a>	<a href="#">EM Spectrum Assessment</a>		<a href="#">Electricity</a>

Ongoing – includes jotter work/homework/observations/questioning/discussions/learning conversations.

S3 Physics: Unit I Dynamics

Assessment I – Motion Ms Bell

Exemplification of Standards

Outcome	Use the relationship between distance, speed and time to perform calculations		
	Everyone can...	Most people can also...	Some people can also...
Example	$d = vt$ $d = 20 \times 10$ $d = 200m$	$d = vt$ $250 = 20 \times t$ $20 \times t = 250$ $t = 12.5 s$	 <p> <math>distance\ travelled = Area\ under\ v - t\ graph</math>  <math>distance\ travelled = (4 \times 10) + \left(\frac{1}{2} \times 4 \times 10\right)</math>  <math>distance\ travelled = 60\ m</math> </p>
Criteria	<p>Everyone should be able to:</p> <ul style="list-style-type: none"> <li>Select the correct equation from the relationship sheet.</li> <li>Enter the data correctly.</li> <li>Calculate the final answer and include the correct unit in the answer.</li> </ul>	<p>Most people can also</p> <ul style="list-style-type: none"> <li>Select the correct equation from the relationship sheet.</li> <li>Enter the data correctly.</li> <li><b>Re-arrange the equation to make the unknown the subject of the equation.</b></li> <li>Calculate the final answer and include the correct unit in the answer.</li> </ul>	<p>Recognise that there is not a single value of speed for the journey. Understand that in this situation, it is not appropriate to use <math>d = vt</math>. Be able to calculate the distance travelled by calculating the area under the speed-time graph.</p>



# Clydeview Academy Science Dept Investigation Success Criteria

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Use this checklist as you write your report – check off each point as you go along.

		Criteria	✓	Peer Assessed	Teacher Assessed
Planning	Aim	• You have given your investigation an informative title.			
		• You have clearly stated the aim of your experiment (this is what you are trying to find out).			
		• Your aim correctly identifies the <b>independent variable</b> (the <b>variable being changed</b> ).			
		• Your aim correctly identified the <b>dependent variable</b> (the <b>variable that is measured/observed</b> ).			
	Hypothesis	• You have stated your <b>hypothesis</b> , predicting the result.			
	Method	• You have included either a <b>labelled diagram</b> or a <b>list of apparatus</b> .			
		• Your method describes the basic steps of the experiment and provides enough information to allow another student to carry out the same experiment.			
		• You have stated what has been kept the same during the experiment (the <b>controlled variables</b> ).			
• You have included a <b>risk assessment</b> which notes the safety precautions taken before the experiment.					
Collect and Record Results	Collection of Data	• You have taken appropriate measurements (sufficient number of readings across an appropriate range).			
	Table	• A table with the first column having a heading that identifies the independent variable with its units in brackets.			
		• A second column having a heading that identifies the dependent variable with its units in brackets.			
Process and	Graph	Select an appropriate format of graph (line graph or bar graph)			

Present Results in a Graph	S	independent variable should be plotted on the x-axis (horizontal) and dependent variable should be plotted on the y-axis (vertical). Scales – should run from 0 and increase in equal increments. Scales that increase in multiples of 1, 2, 5, and 10 are easier to plot. Graph should use at least half the graph paper in both directions.			
		L	Labels – independent variable heading from table should be on the x-axis and the dependent variable heading from the table should be on the y-axis.		
		U	Units – make sure that each axis also includes the units for each of the variables.		
		R	Ruler – use a ruler to draw straight lines		
		P	Precise Points – points on a line graph, straight lines on a bar graph.		
		Conclusion	Your conclusion answers your aim.		
Evaluation	You have evaluated you experiment and can suggest two improvements. These might refer to: <ul style="list-style-type: none"> <li>• Effectiveness/relevance of the method</li> <li>• Control of the variables</li> <li>• Limitations of the equipment</li> <li>• Possible sources of error</li> <li>• Reliability of data</li> </ul>			2 marks	

All - All would be expected to score between 0 and 11 marks

Most - Would be able to score between 12 and 16

Some - Would be able to score between 17 and 21

Exemplification of Standards – Dynamics Assessment (S3 assessment II)

Solving problems on Newton's 2<sup>nd</sup> Law. Mrs Church

Everyone can...	Most People can also...	Some people can also...
Use the equation $F = ma$ to calculate an unbalanced force.	Use the equation $F = ma$ to calculate mass or acceleration.	Use $F = ma$ to calculate the acceleration of a vehicle in the presence of a frictional force.
Example: What unbalanced <u>force</u> <u>accelerates</u> a 2kg mass at $1.5\text{ms}^{-2}$ along a surface? $F = ma$ $= 2 \times 1.5$ $= 3\text{N}$	Example: An unbalanced force of <u>100N</u> is applied to a trolley of mass 15kg. Calculate the acceleration of the trolley. $F = ma$ $100 = 15a$ $15a = 100$ $a = 100/15 = 6.7\text{ms}^{-2}$	Example: A car of mass 1000kg has an engine force of 550N. Calculate its acceleration if there is a friction force of 80N between the tyres and the road. Unbalanced force $F = \text{engine force} - \text{friction force}$ . $F = 550 - 80 = 470\text{N}$ $F = ma$ $470 = 1000a$ $1000a = 470$ $a = 470/1000 = 0.47\text{ms}^{-2}$

## Exemplification of Standards – Astronomy (S3 assessment)

**Cosmology** Mrs Nicholls

Using astronomical terms.

Everyone can...	Most People can also...	Some people can also...
State the meaning of basic astronomical terms, such as: planet, moon, Sun, star, solar system, exo-planet, galaxy and universe.	State the definition of a light year.	State the meaning of more complex astronomical terms, such as: dwarf planet and asteroid and relate the two terms.
Example: State what is meant by the term <i>exo-planet</i> .  An exo-planet is a planet which orbits a star other than our sun.	Example: State what is meant by the term <i>light year</i> .  A light year is the distance travelled by light in one year.  Pupils should recognise that a light year is a unit of distance rather than time.	Example: Distinguish between the definitions of <i>dwarf planet</i> and <i>asteroid</i> .  Pupils should be able to distinguish between a dwarf planet and an asteroid, recognising that a dwarf planet has a clear orbital path, whereas an asteroid does not.

## Waves

### Electromagnetic Spectrum



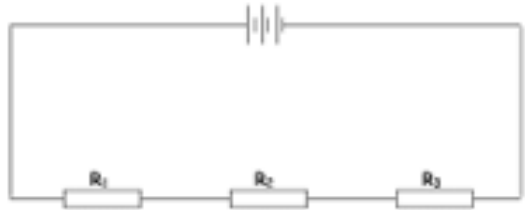
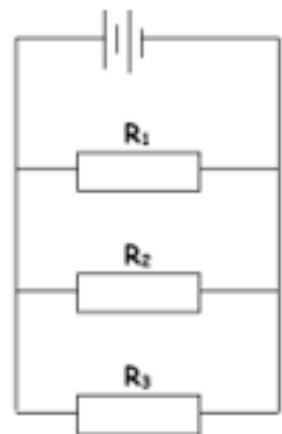
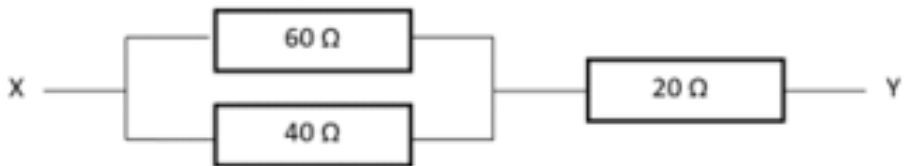
Everyone can...	Most People can also...	Some people can also...
State the 7 members of the electromagnetic spectrum and the speed at which they travel.	Identify a suitable source, application and detector for each type of radiation.	Carry out calculations involving speed, frequency and wavelength of EM waves.
<p>Example: State the 7 members of the EM spectrum and at what speed they travel.</p> <p>Radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, gamma rays.</p> <p>All travel at the speed of light (<math>3 \times 10^8 \text{ ms}^{-1}</math>)</p>	<p>Example: State a source, application and detector for ultraviolet radiation.</p> <p>Source: the Sun. Application: detecting forged bank notes. Detector: fluorescent chemicals.</p>	<p>Example: A pager receives radio waves of frequency 153 MHz. Calculate the wavelength of the radio waves.</p> $v = f\lambda$ $3 \times 10^8 = (153 \times 10^6) \times \lambda$ $\lambda = (3 \times 10^8) / (153 \times 10^6)$ $\lambda = 1.96 \text{m}$





## S3 Electricity exemplification of Standards (Mr Wyllie)

## Calculation of total Resistance

	Everyone can	Most people can also	Some people can also
Criteria	Calculate total resistance in a series circuit	Calculate total resistance in a parallel circuit	Calculate the total resistance in a mixed circuit
Example	 $R_T = R_1 + R_2 + R_3$	 $1/R_T = 1/R_1 + 1/R_2 + 1/R_3$	 Total resistance is found by adding the parallel section: $(1/R_T = 1/R_1 + 1/R_2)$ to the series section: $R_3$ Total = $(1/R_T = 1/R_1 + 1/R_2) + R_3$

BGE Progression Framework to N5

Subject: Science

Biology 

S1/S2 Science 

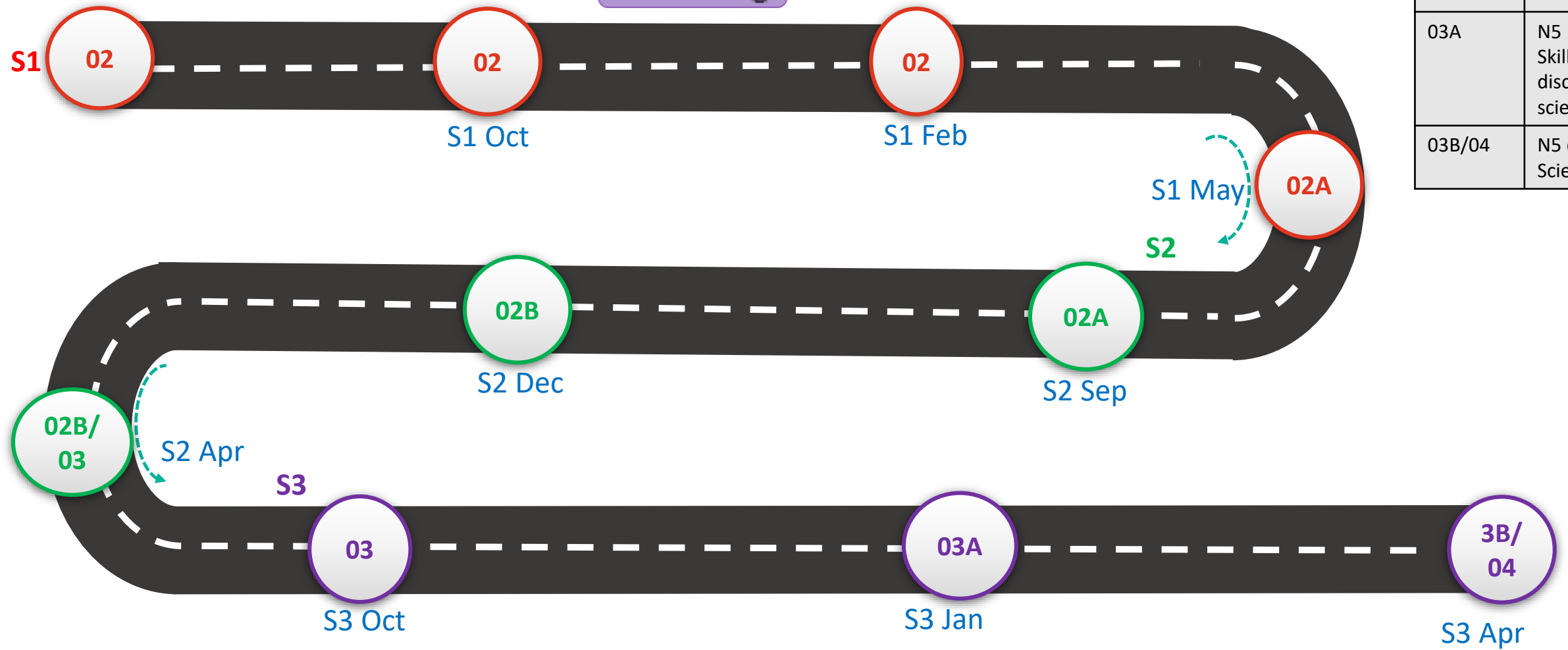
Chemistry 

N3/N4 Science 

Physics 

 **Next >**

By April S3	Pathway
03 (or below)	N3/N4 science
03A	N5 Lab Skills or N4 discrete science
03B/04	N5 discrete Science





Year	Period	S1/S2 Science Assessment Overview
		Science
S1	August - December	Becoming a Scientist Properties of Matter (Chemistry) Scottish Scientist Research Project
	January - June	Cells Alive (Biology) Scientific Investigation Our Place in the Universe (Physics) Climate Change Week Atoms, Elements and Compounds (Chemistry)
S2	August - December	Photosynthesis (Biology) Scientific Investigation Light (Physics) Celebration of Scotland Event
	January - May	Acids and Alkalis (Chemistry) Biodiversity (Biology) Electricity (Physics) Covid Research Project

# S1/S2 Assessment Calendar



## Type of Assessment

Ongoing

High Quality

Periodic

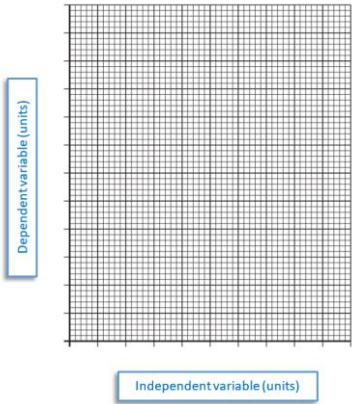
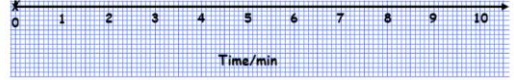
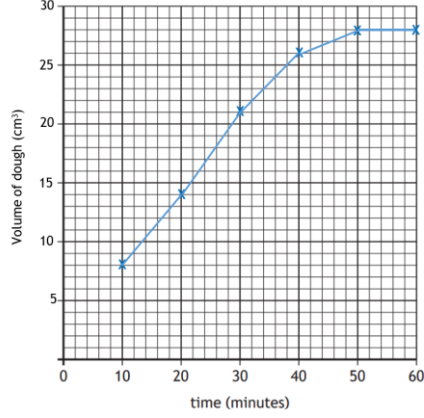
Year Group	August	September	October	November	December	January	February	March	April	May	June
S1		Becoming a Scientist		Properties of Matter Scientist Research		Cells Alive	Investigation	OPU Climate Change Week		Atoms, Elements and Compounds	
S2		Photosynthesis		Light Investigation		Acids and Alkalis	Covid Research	Biodiversity		Electricity	

Ongoing – includes jotter work/homework/observations/questioning/discussions/learning conversations.

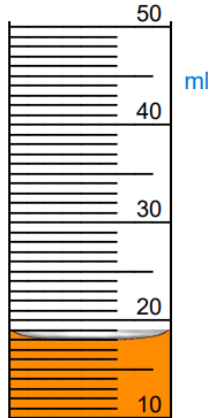
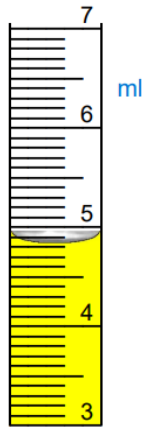
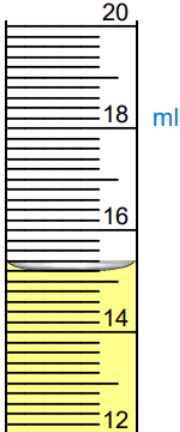
Rotation 2 includes Photosynthesis and Light.

Rotation 3 includes Biodiversity, Electricity and Acids and Alkalis.

Example of Assessment – Drawing a line graph

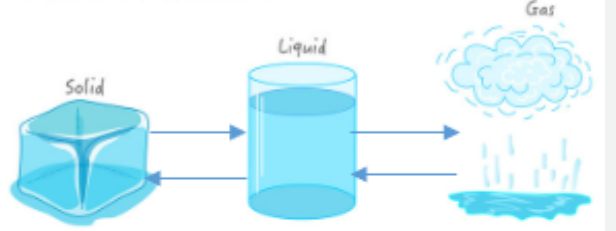
Everyone can...	Most people can also...	Some people can also...
<p>Label the axes of a graph using the dependent and independent variables (including the appropriate unit).</p>	<p>Add a scale to each axis, starting at zero and increasing by the same amount.</p>	<p>Plot the points accurately and use an appropriate line to show the trend.</p>
		

Example of Assessment – Reading a scale

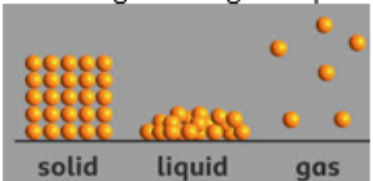
Everyone can...	Most people can also...	Some people can also...
Read a simple scale on a measuring device	Read a scale involving a simple decimal value	Read a scale requiring a more complex decimal
<p>Sub-divisions of scale correspond one unit</p> 	<p>Sub-divisions of scale correspond to 0.1 of a unit</p> 	<p>Sub-divisions of scale correspond to 0.2 of a unit</p> 

Example Question:

State of Matter



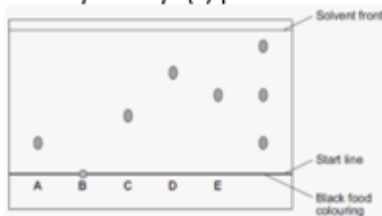
Identify the processes occurring between each change of state.

Everyone can.....	Most people can also.....	Some people can also.....
Identify that the change from solid to liquid is melting. Liquid to gas is evaporating. Gas to liquid is condensing and liquid to solid is freezing	Explain that the space between particles increases as the state is changed from solid to liquid and liquid to gas and the space decreases from gas to liquid and liquid to solid.	Correctly draw the particle arrangement in solids, liquids and gases and explain how this changes during each process 

Example Question:

Extracting information.

Identify the dye(s) present in Black food colouring.



Everyone can.....	Most people can also.....	Some people can also.....
Identify that black food colouring contains 3 dyes.	Identify that the dyes present in the sample are A and E.	Explain that one of the dyes isn't showing on this sample and that further dyes would need to be measured to identify it.



# S1 Science Scottish Scientists Report

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Next >

I have collaborated with others to find and present information on how scientists from Scotland and beyond have contributed to innovative research and development. SCN 3-20a

I can independently select ideas and relevant information for different purposes, organise essential information or ideas and any supporting detail in a logical order, and use suitable vocabulary to communicate effectively with my audience. LIT 3-06a

I can consider the impact that layout and presentation will have on my reader, selecting and using a variety of features appropriate to purpose and audience. LIT 3-24a

**Everyone can... = Bronze award, Most people can... = Silver award, Some people can also... = Gold**

## Task

Many scientists from Scotland and beyond have contributed to innovative research and development.

Your task is to research the work of a Scottish scientist and produce a detailed report of your findings.




- The research stage can be done with a partner, but you must produce your report on your own.
- You will have a choice of scientist. Your teacher will let you choose your scientist from a set of worksheets.
- Your report can be typed or handwritten and must include each of the facts as shown on your worksheet.
- On your worksheet you should tick off each fact as you find it.
- Remember to write your report in your own words – do not just copy and paste information that you do not understand.
- Remember to keep a note of the addresses of any websites you use. These are called your **references**.

## How will your report be assessed?

3 marks are awarded for each “Gold”, 2 marks for each “Silver” and 1 mark for each “Bronze”.

- Gold – You have made very good progress in meeting the success criteria of the task and achieved 20 marks or more.
- Silver- You have made good progress in meeting the success criteria of the task and achieved 15 to 19 marks.
- Bronze- You have made some progress in meeting the success criteria of the task and achieved up to 14 marks.



Success Criteria			
Name, place of birth, year of birth, picture	You have included all 4.	You have included 3.	You have included 2 or less.
Invention, year of invention, branch of <a href="#">Science</a> .	You have included all 3.	You have included 2.	You have included 1 or none.
Any prizes for their work? Did they invent anything else? Age when they made their invention.	You have included all 3.	You have included 2.	You have included 1 or none.
How has their invention been developed since?	You have given clear examples/explanations of further developments which are relevant to the invention.	You have given some details of recent developments.	You have included no information about further developments.
What was <a href="#">life like</a> for people before this invention? How did it change life for the better?	You have given information on both.	You have given information on one of these.	You haven't given information on either.

Presentation of report	Your report has an appropriate structure, the findings are given clearly and concisely. You have <u>made an effort</u> with your visual presentation.	Your report has an appropriate <u>structure</u> but findings are not always clearly presented.	Your report does not have a clear structure. The findings are not clear.
Sources of information	You have included a full reference for at least one source which would allow someone to retrieve the information.	You have included a note of where you found your information.	You have not included where you found your information.
Written in your own words	You have used your own words throughout your report. Where new words or terms have been introduced you have explained what they mean.	You have made a good attempt to use your own words but not always explained the meaning of new words or terms.	You appear to have copied and pasted information from websites without using your own words.

### Overall Award

20 -24 marks



15 – 19 marks



14 marks or less



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## Exemplification of Standards - Cells Alive Assessment S1

### Example of Assessment Material Mrs McAdam

Everyone can...	Most People can also...	Some people can also...
<p>Give examples of different cell types found in animals and plants.</p> <p>Expected Response e.g. Red blood cell, Sperm Cell, Root hair Cell, Nerve Cell.</p>	<p>Describe the function of some of the different cell types found in plants and animals.</p> <p>Expected Response e.g. Red blood cells carry oxygen, root hair cells absorb water.</p>	<p>Apply knowledge to relate the structure of a cell to its specific function.</p> <p>Expected Response e.g. Root hair cells/Red blood cells have a large surface area over which to absorb water/oxygen. Sperm cells have a tail to swim to and fertilise the egg cell.</p>
<p>Drawing a line graph:</p> <p>Assign a given label, including units, to the x and y axis of a graph.</p>	<p>Assign a scale to the x-axis (y-axis is already complete).</p>	<p>Accurately plot and join the points on a line graph. Describe the relationship between the independent and dependant variable.</p>



# Clydeview Academy Science Dept Investigation Success Criteria

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Use this checklist as you write your report – check off each point as you go along.

		Criteria	✓	Peer Assessed	Teacher Assessed
Planning	Aim	• You have given your investigation an informative title.			
		• You have clearly stated the aim of your experiment (this is what you are trying to find out).			
		• Your aim correctly identifies the <b>independent variable</b> (the <b>variable being changed</b> ).			
		• Your aim correctly identified the <b>dependent variable</b> (the <b>variable that is measured/observed</b> ).			
	Hypothesis	• You have stated your <b>hypothesis</b> , predicting the result.			
	Method	• You have included either a <b>labelled diagram</b> or a <b>list of apparatus</b> .			
		• Your method describes the basic steps of the experiment and provides enough information to allow another student to carry out the same experiment.			
		• You have stated what has been kept the same during the experiment (the <b>controlled variables</b> ).			
• You have included a <b>risk assessment</b> which notes the safety precautions taken before the experiment.					
Collect and Record Results	Collection of Data	• You have taken appropriate measurements (sufficient number of readings across an appropriate range).			
	Table	• A table with the first column having a heading that identifies the independent variable with its units in brackets.			
		• A second column having a heading that identifies the dependent variable with its units in brackets.			
Process and	Graph	Select an appropriate format of graph (line graph or bar graph)			

Present Results in a Graph	S	independent variable should be plotted on the x-axis (horizontal) and dependent variable should be plotted on the y-axis (vertical). Scales – should run from 0 and increase in equal increments. Scales that increase in multiples of 1, 2, 5, and 10 are easier to plot. Graph should use at least half the graph paper in both directions.			
		L	Labels – independent variable heading from table should be on the x-axis and the dependent variable heading from the table should be on the y-axis.		
		U	Units – make sure that each axis also includes the units for each of the variables.		
		R	Ruler – use a ruler to draw straight lines		
		P	Precise Points – points on a line graph, straight lines on a bar graph.		
		Conclusion	Your conclusion answers your aim.		
Evaluation	You have evaluated you experiment and can suggest two improvements. These might refer to: <ul style="list-style-type: none"> <li>• Effectiveness/relevance of the method</li> <li>• Control of the variables</li> <li>• Limitations of the equipment</li> <li>• Possible sources of error</li> <li>• Reliability of data</li> </ul>			2 marks	

All - All would be expected to score between 0 and 11 marks

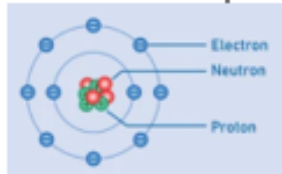
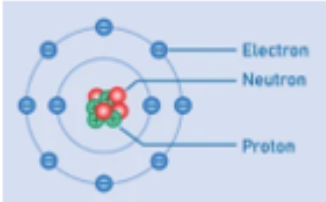
Most - Would be able to score between 12 and 16

Some - Would be able to score between 17 and 21

Exemplification of Standards – Our Place in the Universe S1 – Mrs Church

Everyone can...	Most People can also...	Some people can also...
<p>Drawing and interpreting a line graph.</p> <p>On a set of axes, accurately plot points and complete a line of best fit.</p>	<p>Drawing and interpreting a line graph.</p> <p>On a line graph, identify a point which is inaccurate, (an outlier which does not appear in line with other points.)</p>	<p>Drawing and interpreting a line graph.</p> <p>By looking at the line of best fit, estimate what the correct value should be of the point should be.</p>
<p>Identify the difference between mass and weight.</p> <p>Mass is a measure of the amount of material in a substance measured in kilograms while weight is the number of Newtons applied to each kilogram by the force of gravity.</p>	<p>Calculate the weight of an object on earth using <math>W = mg</math>.</p> <p>Ex. If a boy has a mass of 45kg, what is his weight on Earth?</p> $W = mg$ $W = 45 \times 10$ $= 450N$	<p>Calculate the weight of an object in a location other than earth using the correct gravitational field strength.</p> <p>Ex. What would be the weight of an 80kg astronaut on the moon?</p> <p>On the Moon, <math>g = 1.6</math></p> $W = mg$ $W = 80 \times 1.6$ $= 128N$

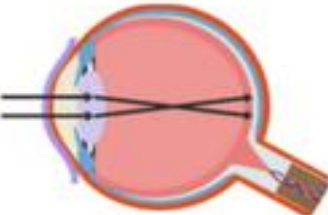
## Exemplification - Atoms, Elements and Compounds - Mrs Higgins

Everyone can	Most people can also	Some people can also
<p>State the definition of Atomic Number of an element</p> <p><b>EXPECTED RESPONSE</b></p> <ul style="list-style-type: none"> <li>Atomic number is the number of protons in the nucleus of an atom.</li> </ul>	<p>Given information about the structure of an atom and the sub-atomic particles</p>  <p>identify the <b>NUCLEUS</b> of an atom as being the part where the positively charged protons are held.</p>	<p>Given information about the structure of an atom and the sub-atomic particles</p>  <p>name the structures where the electrons are found in an atom as <b>ENERGY LEVELS</b> or <b>ELECTRON SHELLS</b>.</p>
<p>Using their Periodic table state the <b>atomic number, symbol, group number</b> and the <b>number of protons</b> in the nucleus when given the <b>name</b> of an element</p> <p><b>EXPECTED RESPONSE</b> For Lithium:</p> <p>Atomic Number = 3 Symbol is Li Group Number = 1 Number of Protons = 3</p>	<p>Using their Periodic table state the <b>name, symbol, group number</b> and the <b>number of protons</b> in the nucleus when given the <b>atomic number</b> of an element</p> <p><b>EXPECTED RESPONSE</b> For Atomic Number 17</p> <p>Name = Chlorine Symbol is Cl Group Number = 7 Number of Protons = 17</p>	<p>Using their Periodic table state the <b>name, symbol, group number, the number of protons</b> in the nucleus and the <b>Group Name</b> when given the <b>Number of protons</b> in the nucleus of an element</p> <p><b>EXPECTED RESPONSE</b> For Number of protons = 17</p> <p>Name = Chlorine Symbol is Cl Group Number = 7 Atomic Number = 17 Group Name = Halogens</p>

	Everyone can...	Most People can also...	Some people can also...														
<b>Knowledge &amp; Understanding</b>	<p>State the essential requirements needed for photosynthesis.</p> <p><i>Expected response:</i></p> <p>Chlorophyll and light</p>	<p>In an experiment, different plants are set up in varying conditions. Identify 2 plants that will allow you to compare if carbon dioxide is a requirement.</p> <p><i>Expected response:</i></p> <p>Choose the plant in the light and the plant with no carbon dioxide (with no other variables changed).</p>	<p>Measuring the rate of photosynthesis:</p> <table border="1" data-bbox="1898 321 2318 564"> <thead> <tr> <th>Light intensity (lux)</th> <th>Rate of photosynthesis (number of O<sub>2</sub> bubbles per minute)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>5</td> <td>2</td> </tr> <tr> <td>10</td> <td>4</td> </tr> <tr> <td>15</td> <td>8</td> </tr> <tr> <td>20</td> <td>8</td> </tr> <tr> <td>25</td> <td>8</td> </tr> </tbody> </table> <p>The rate of photosynthesis has been limited (reached its maximum rate). As an investigator, is there anything we could change in the experiment to increase the rate?</p> <p><i>Expected response:</i></p> <p>Increase carbon dioxide concentration</p>	Light intensity (lux)	Rate of photosynthesis (number of O <sub>2</sub> bubbles per minute)	0	0	5	2	10	4	15	8	20	8	25	8
Light intensity (lux)	Rate of photosynthesis (number of O <sub>2</sub> bubbles per minute)																
0	0																
5	2																
10	4																
15	8																
20	8																
25	8																
<b>Scientific Skills</b>	<p><i>Drawing a line graph:</i></p> <p>Add numbers for the scale on both x- and y- axis</p>	<p>Plot the points and join together with a ruler.</p>	<p>Correctly identify which data should be on the x-axis and y-axis. Label both axes, using headings from the table, including units.</p> <p>Describe what happens to the dependent variable as the independent variable is increased.</p>														

| Light – Exemplification of Standards – Ms Bell

<b>Example Question</b>	A girl visits the opticians, and the optometrist prescribes lenses of focal length 10 cm for her spectacles. Calculate the power of the lenses.		
	<b>Everyone can...</b>	<b>Most people can also...</b>	<b>Some people can also...</b>
<b>Expected Response</b>	$P = \frac{1}{f}$	$P = \frac{1}{f}$ $P = \frac{1}{10}$ $P = 0.1 D$	$P = \frac{1}{f}$ $f = \frac{10}{100} = 0.1 m$ $P = \frac{1}{0.1}$ $P = 10 D$
<b>Criteria</b>	All pupils expected to identify the equation that describes the relationship between power and focal length.	Most pupils expected to be able to substitute the appropriate numbers into the equation and state the calculate the correct answer (with unit).	Some pupils would correctly identify that to calculate the lens power the focal length must be in metres and perform the appropriate conversion from cm to m.

<b>Example Question</b>	<p>An optometrist is carrying out a yearly eye test on a patient. The diagram below shows two rays of light from a nearby object passing into the left eye of the patient. The patient can see nearby objects clearly but distant objects appear blurred.</p> 		
	(a) State the term that describes the sight condition of the patient.	(b) Name the type of lens that is needed to enable the patient to see the distant object clearly	(c) Explain why the patient does not see distant objects clearly.
	<b>Everyone can...</b>	<b>Most people can also...</b>	<b>Some people can also...</b>
<b>Expected Response</b>	Long-sight	A concave lens	The light from the distant object does not focus on the retina but focuses in front of it.
<b>Criteria</b>	All pupils would be expected to name the eye defect.	Most pupils would be expected to correctly identify the lens used to correct the defect.	Some pupils would be able to explain the reason for the defect.



# Clydeview Academy Science Dept Investigation Success Criteria

Use this checklist as you write your report – check off each point as you go along.

		Criteria	✓	Peer Assessed	Teacher Assessed
Planning	Aim	<ul style="list-style-type: none"> <li>You have given your investigation an informative title.</li> </ul>			
		<ul style="list-style-type: none"> <li>You have clearly stated the aim of your experiment (this is what you are trying to find out).</li> </ul>			
		<ul style="list-style-type: none"> <li>Your aim correctly identifies the <b>independent variable</b> (the <b>variable being changed</b>).</li> </ul>			
		<ul style="list-style-type: none"> <li>Your aim correctly identified the <b>dependent variable</b> (the <b>variable that is measured/observed</b>).</li> </ul>			
	Hypothesis	<ul style="list-style-type: none"> <li>You have stated your <b>hypothesis</b>, predicting the result.</li> </ul>			
	Method	<ul style="list-style-type: none"> <li>You have included either a <b>labelled diagram</b> or a <b>list of apparatus</b>.</li> </ul>			
		<ul style="list-style-type: none"> <li>Your method describes the basic steps of the experiment and provides enough information to allow another student to carry out the same experiment.</li> </ul>			
		<ul style="list-style-type: none"> <li>You have stated what has been kept the same during the experiment (the <b>controlled variables</b>).</li> </ul>			
<ul style="list-style-type: none"> <li>You have included a <b>risk assessment</b> which notes the safety precautions taken before the experiment.</li> </ul>					
Collect and Record Results	Collection of Data	<ul style="list-style-type: none"> <li>You have taken appropriate measurements (sufficient number of readings across an appropriate range).</li> </ul>			
	Table	<ul style="list-style-type: none"> <li>A table with the first column having a heading that identifies the independent variable with its units in brackets.</li> </ul>			
		<ul style="list-style-type: none"> <li>A second column having a heading that identifies the dependent variable with its units in brackets.</li> </ul>			
Process and	Graph	Select an appropriate format of graph (line graph or bar graph)			

Present Results in a Graph	S	independent variable should be plotted on the x-axis (horizontal) and dependent variable should be plotted on the y-axis (vertical). Scales – should run from 0 and increase in equal increments. Scales that increase in multiples of 1, 2, 5, and 10 are easier to plot. Graph should use at least half the graph paper in both directions.			
		L	Labels – independent variable heading from table should be on the x-axis and the dependent variable heading from the table should be on the y-axis.		
		U	Units – make sure that each axis also includes the units for each of the variables.		
		R	Ruler – use a ruler to draw straight lines		
		P	Precise Points – points on a line graph, straight lines on a bar graph.		
		Conclusion	Your conclusion answers your aim.		
Evaluation	<p>You have evaluated you experiment and can suggest two improvements. These might refer to:</p> <ul style="list-style-type: none"> <li>Effectiveness/relevance of the method</li> <li>Control of the variables</li> <li>Limitations of the equipment</li> <li>Possible sources of error</li> <li>Reliability of data</li> </ul>			2 marks	

All - All would be expected to score between 0 and 11 marks


Most - Would be able to score between 12 and 16

Some - Would be able to score between 17 and 21



# Exemplification – S1-2 Acids and Alkalis

## Example of assessment (L. Kelly)

Everyone can...	Most People can also...	Some people can also...
<p><b>State an indicator used to identify the pH of a solution.</b></p> <p>Expected Response: Universal indicator</p>	<p><b>Give examples of household acids, alkalis and neutral solutions.</b></p> <p>Expected Response: An acid found at home would be: vinegar An alkali found at home would be: toothpaste A neutral solution found at home would be: water</p>	<p><b>Describe an experiment used to collect the product of a neutralisation reaction.</b></p> <p>Expected Response: “During the neutralisation of an acid with an alkali a salt is formed. Draw a labelled diagram of the apparatus you would use to collect a dry sample of the salt”</p>
<p><b>State whether the solutions are acid, alkali or neutral using their pH number</b></p> <p>Expected Response:  pH = 4 is an acidic solution</p>	<p><b>State the name of a salt from the acid and alkali used to make it.</b></p> <p>Expected Response:  The name of the salt made from hydrochloric acid and sodium hydroxide is sodium chloride.</p>	<p></p> <p>Must include Bunsen burner, heat mat, tripod stand and evaporating basin with sample</p> <p>2 marks – fully labelled diagram and all apparatus 1 mark – correct diagram drawn with 1 missing label 0 marks – diagram without labels</p> <p><b>Describe a use for neutralisation reactions.</b></p> <p>Expected Response:  Farmers can add an alkalis to their fields if the soil is too acidic.</p>

| **Third Level: COVID-19 Assessment**

How will your COVID-19 assessment be assessed?

Your assessment will be given a rating using a **Gold Silver and Bronze** system. What does this mean?



- **Gold - (Some people can also....)** You have made **very good** progress in meeting the success criteria of the investigation
- **Silver - (Most people can...)** You have made **good** progress in meeting the success criteria of the investigation
- **Bronze (Everyone can...)** - You have made **some** progress in meeting the success criteria of the investigation

You should aim to produce a 'Gold' assessment. Tick (✓) off each success criteria as you achieve it.

A <b>GOLD</b> assessment:		An <b>SILVER</b> assessment:		A <b>BRONZE</b> assessment:	
	Have a <b>developed structure</b>		Have a <b>basic structure</b>		Have a <b>limited structure</b>
	A <b>detailed introduction</b> outlining what a virus is		A <b>basic introduction</b> outlining what a virus is		A <b>limited introduction</b> outlining what a virus is
	<b>Section 1</b> - A <b>detailed</b> description of the COVID-19 including the cause		<b>Section 1</b> - A <b>basic</b> description of the COVID-19 including the cause		<b>Section 1</b> - A <b>limited</b> description of the COVID-19 including the cause
	<b>Section 2</b> - A <b>detailed</b> description of at least <b>3</b> ways COVID-19 affected <b>people's health and wellbeing</b>		<b>Section 2</b> - A description of <b>2</b> ways the COVID-19 affected <b>people's health and wellbeing</b>		<b>Section 2</b> - A description of <b>1</b> way COVID-19 affected <b>people's health and wellbeing</b>
	<b>Section 3</b> - A <b>detailed</b> description of at least <b>3</b> ways COVID-19 affected <b>wildlife and/or environment</b>		<b>Section 3</b> - A description of <b>2</b> ways COVID-19 affected <b>wildlife and/or environment</b>		<b>Section 3</b> - A description of <b>1</b> way COVID-19 affected <b>wildlife and/or environment</b>
	<b>Section 4</b> - A <b>detailed</b> description of at least <b>3</b> types of short-term aid		<b>Section 4</b> - A description of <b>2</b> types of short-term aid		<b>Section 4</b> - A description of <b>1</b> type of short-term aid
	<b>Section 5</b> - A <b>detailed</b> description of <b>long-term aid</b> (Mentioning <b>3</b> vaccines and boosters)		<b>Section 5</b> - A description of <b>long-term aid</b> (Mentioning <b>2</b> vaccines)		<b>Section 5</b> - Mentioning <b>one</b> type of long-term aid
	<b>Conclusions</b> - a <b>detailed summary</b> of your key findings		<b>Conclusions</b> - a <b>basic summary</b> of your key findings		<b>Conclusions</b> - a <b>limited summary</b> of your key findings
	<b>References</b> - <b>all</b> references included		<b>References</b> - <b>most</b> references included		<b>References</b> - <b>One or two</b> references included

**Exemplification of Standards - Biodiversity Assessment S2**

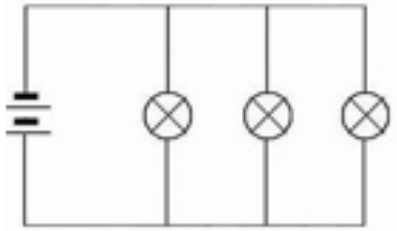
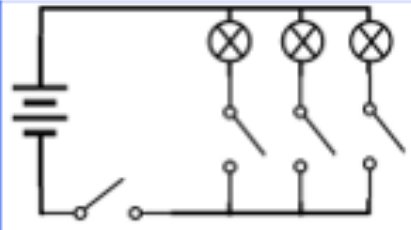
Example of Assessment Material Miss Hackney

	Everyone can...	Most People can also...	Some people can also...				
<b>Knowledge &amp; Understanding</b>	<p>Extract information from a passage to complete a food chain.</p> <p><i>Expected response:</i></p> <p>Greenfly feed on Oak trees. Ladybirds feed on <u>Greenfly</u>, but are also prey for Blackbirds.</p> <p>Oak Tree → Greenfly → Ladybird → Blackbird</p>	<p>Extract information from a passage and align this with previous knowledge of Biodiversity Terms e.g. Ecosystem, Producer, Habitat etc.</p> <p><i>Expected response:</i></p> <p>Greenfly feed on Oak trees. Ladybirds feed on <u>Greenfly</u>, but are also prey for Blackbirds.</p> <table border="1" data-bbox="1108 842 1541 963"> <thead> <tr> <th>Term</th> <th>Named example</th> </tr> </thead> <tbody> <tr> <td>Predator</td> <td>Ladybird</td> </tr> </tbody> </table>	Term	Named example	Predator	Ladybird	<p>Explain the impact of the increased numbers of specific organisms on the size of population of another organism.</p> <p><i>Expected response:</i></p> <p>As the numbers of Greenfly increase, the numbers of Ladybirds would also increase as their food source has been increased.</p>
Term	Named example						
Predator	Ladybird						
<b>Scientific Skills</b>	<p>Drawing a bar graph:</p> <p>Assign a given label, including units, to the x and y axis of a graph.</p>	<p>Assign a scale to the x-axis.</p>	<p>Accurately plot the correct bars of the graph.</p> <p>Extract information from a table to carry out a percentage calculation.</p>				



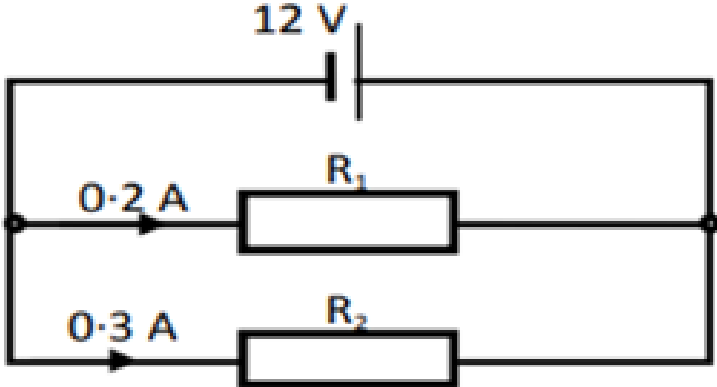
## Electricity S2 – Exemplification of Standards Mr Wyllie

**Example Question:** Draw a circuit that will allow 3 bulbs to be switched on and off separately. Each bulb will require its own switch. The circuit should operate from 2 batteries connected in series.

	Everyone can	Most people can also	Some people can also
<b>Expected response:</b>	Draw a complete circuit, using a ruler, which includes 3 bulbs and a battery	Choose to draw a circuit with the bulbs in parallel and the battery in series. 	Include 3 switches placed in the parallel branches. 
<b>Criteria:</b>	All pupils expected to recognise that the circuit should have no gaps and that the bulbs and batteries should not be placed on corners	Most pupils expected to be able to identify and draw parallel circuit with the batteries together in series.	Some pupils would be able to insert the switches appropriately within the parallel branches.

**Example Question:** Two resistors are connected in parallel to a 12 V battery.

- (a) What is the voltage across  $R_1$ .
- (b) What is the voltage across  $R_2$ .
- (c) Calculate the current drawn from the battery



	Everyone can	Most can also	Some can also
	Recognise that the battery delivers 12v.	Recognise that in a parallel circuit the voltage remains the same at all points and $R_2$ will be the same as $R_1$ .	Recognise that current splits in a parallel circuit and be able to add the different currents to find the total current drawn

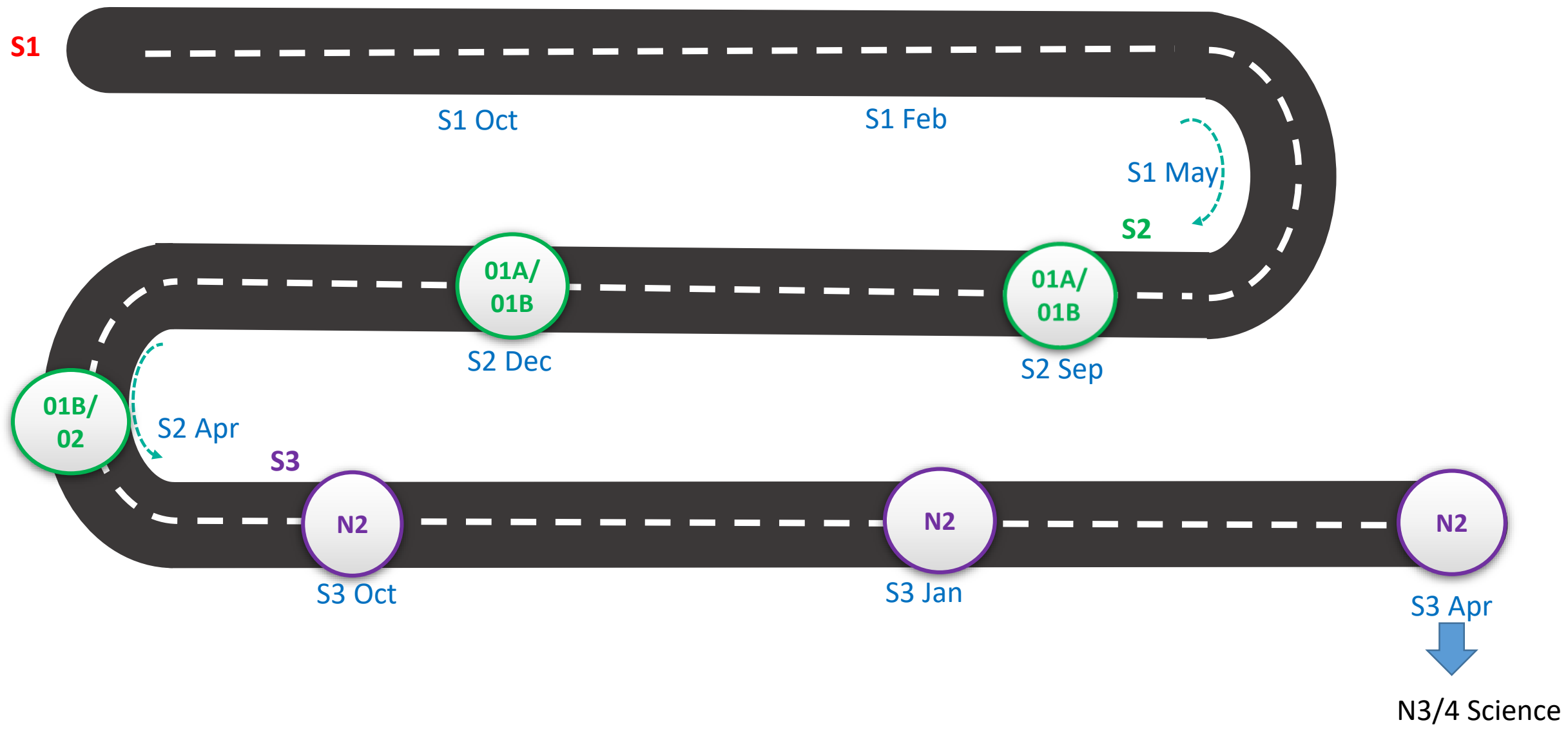
BGE Progression Framework to N3/4 Science

Subject: S3 Science in the Environment

- Biology
- Chemistry
- Physics

- S1/S2 Science
- N3/N4 Science

Next >



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Year	Period	Science in the Environment Course Overview
S3 Science in Environment	May - December	Living Things Everyday Materials
	January - May	Everyday Materials Forces <u>or</u> Keeping our Planet Healthy

Assessment of the two/three units takes place at a time appropriate for the student.

**Exemplification Link:**

[National 2 Science in the Environment - SQA](#)

[back](#)