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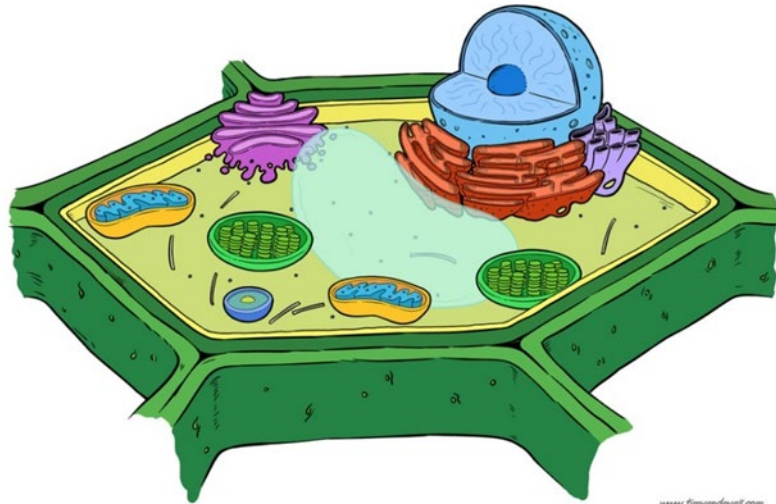
## Applied Science Summer Work

<b>Qualification</b>	Pearson Level 3 AAQ BTEC National in Applied Science (Extended Certificate)
<b>Unit number and title</b>	Unit 1-3: Principles and Applications of Biology / Chemistry and Physics
<b>Assignment title</b>	Applied Science Level 3 Summer Work
<b>Assessor</b>	R. Baker / R. Austin / J. Thompson
<b>Issue date</b>	June 2025
<b>Hand in deadline</b>	12 <sup>th</sup> September 2025

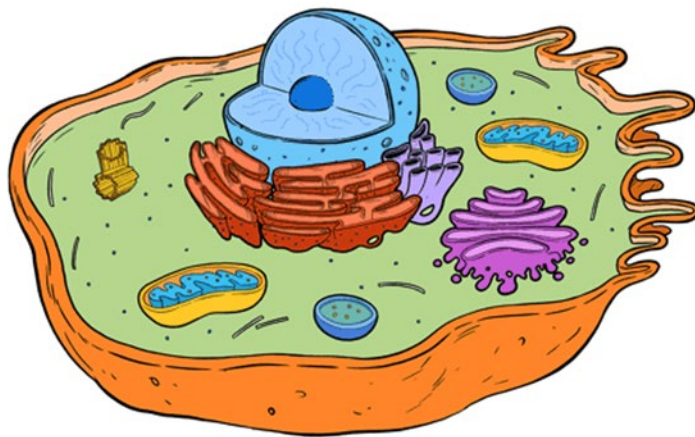
<b>Vocational Scenario or Context</b>	<p>You are a 1<sup>st</sup> Year Applied Science student and are about to begin the teaching for the externally assessed Unit 1 Principles and Applications of Science topic. This topic builds on your Key Stage 3 and GCSE teaching and learning of a few key core science topics, such as Cells in Biology, Chemical calculations in Chemistry and Properties of Waves in Physics. This summer work has been designed to make sure that key knowledge is learnt and secure to enable you to succeed in the exam. There are 12 Tasks so try to attempt them all. Tick them off when you have completed them. You are welcome to print this out and write by hand your answers (and add extra paper) or simply use this as an electronic document and write your answers directly in the spaces below.</p>
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Task 1 - Biology

Add organelle labels to the following plant and animal cell diagrams.

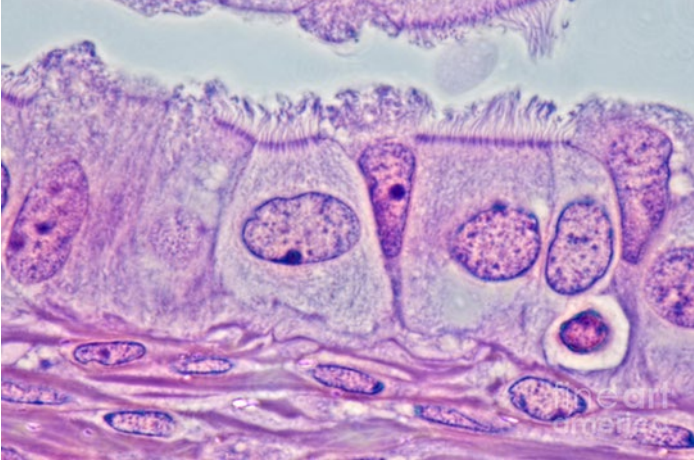


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 Plant Cell Diagram - Copyright © Dutch Renaissance Press LLC

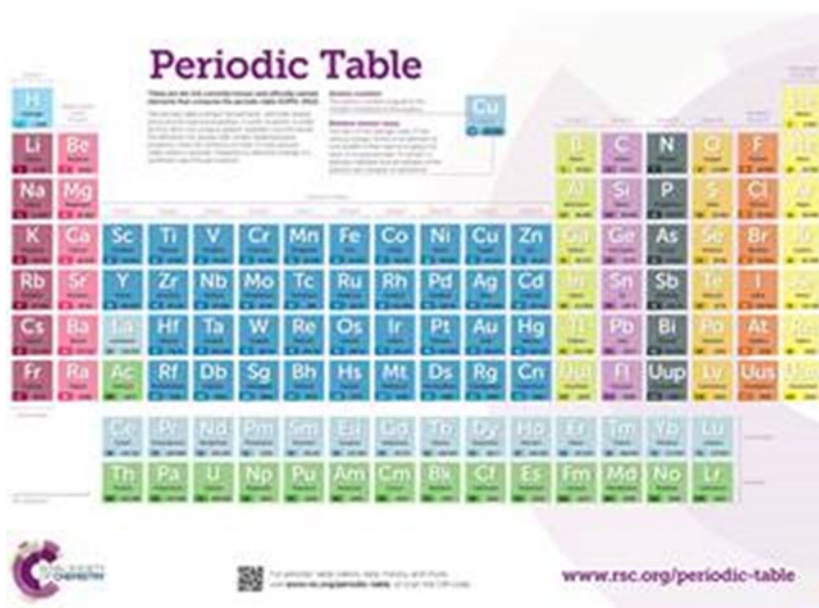


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 Animal Cell Diagram - Copyright © Dutch Renaissance Press LLC

Include notes on the function of the nucleus, cell membrane, mitochondria, ribosomes, cell wall, chloroplasts and vacuole. If you are saving this as an electronic document, you can copy these diagrams into MS Word and add lines and labels within that app.

<p><b>Task 2- Biology</b></p>	<p>An epithelial cell in the photograph measures 15 mm across. If the actual size of the cell is 0.015 mm, what is the magnification in the photograph?</p>  <p>If the epithelial cell nucleus in a photograph of a cell measures 3 mm across and the magnification in the photograph is <math>\times 500</math>, what is the actual size of the nucleus?</p>
<p><b>Task 3 - Biology</b></p>	<p>Research Task: Use the internet or books to explain the similarities and differences between the cause and treatment of Type 1 and 2 diabetes. This can be done using tables or a Venn diagram. Include your references in a bibliography.</p>
<p><b>Task 4- Chemistry</b></p>	<p>Potassium carbonate reacts with dilute hydrochloric acid to produce an aqueous salt (potassium chloride), water and carbon dioxide.</p> <ol style="list-style-type: none"> <li>1. Balance the chemical symbol equation</li> </ol> $\text{K}_2\text{CO}_3 (\text{s}) + \text{HCl} (\text{aq}) \rightarrow \text{KCl} (\text{aq}) + \text{H}_2\text{O} (\text{l}) + \text{CO}_2 (\text{g})$

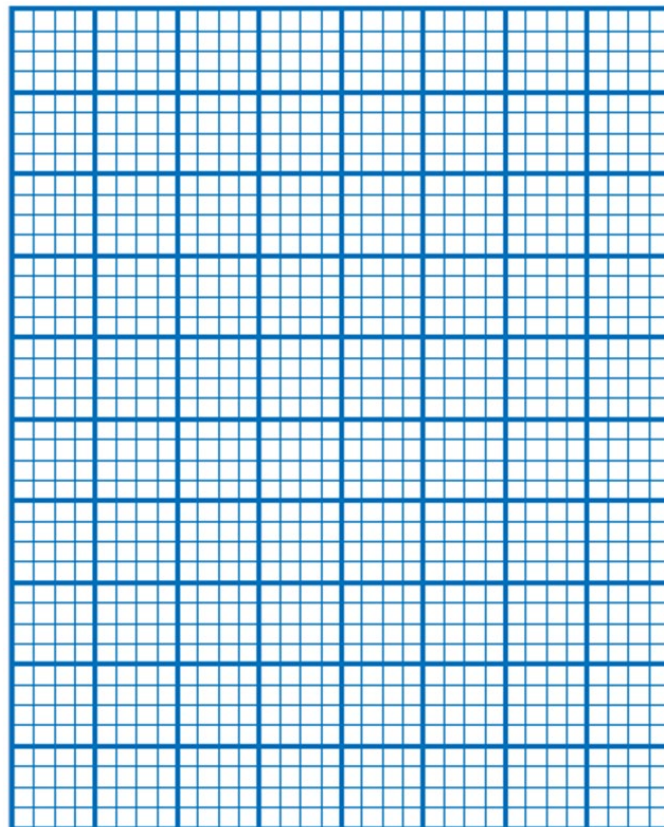
	<ol style="list-style-type: none"> <li>2. Work out the Relative Formula Mass (<math>M_r</math>) [Also known as Molar Mass] for all of the substances involved in the reaction.</li> <li>3. If 27.64g of <math>K_2CO_3</math> was used in the reaction, how many moles is this (Moles = Mass <math>\div</math> Molar Mass/<math>M_r</math>)</li> <li>4. How many moles of hydrochloric acid are needed to fully complete the reaction?</li> <li>5. What mass of potassium chloride will be formed?</li> <li>6. If the carbon dioxide is collected using a measuring syringe, what will be the volume of the gas collected?</li> </ol>
<p><b>Task 5- Chemistry</b></p>	<p>Draw the structure of an atom and include labels with the names, positions, relative charges and masses of the subatomic particles.</p>
<p><b>Task 6 - Chemistry</b></p>	<p>In your own words, describe the arrangement of elements in the periodic table.</p>

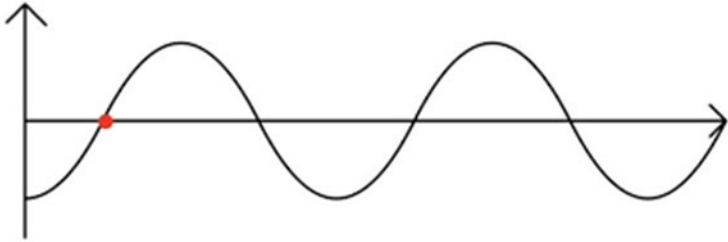
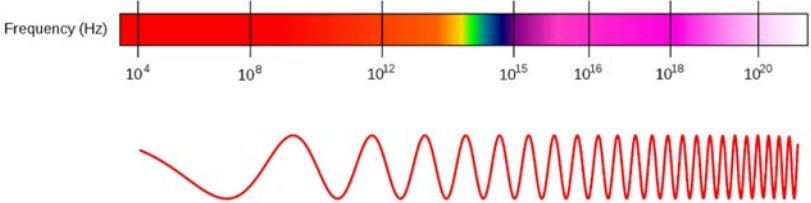

	
<p>Task 7 - Chemistry</p>	<p>Describe the arrangement, movement and relative energy of particles in the 3 states of matter. Draw box diagrams of the arrangement of particles in solid, liquids and gases. Add labels for the changes of state between each phase.</p>


Using the data in the table and the graph paper below (or your own graph paper), plot a heating curve for ice from a freezer to room temperature. Include axis labels and units. Calculate the heating rate between 2 and 4 mins by using a tangent.

Time (mins)	Temperature (°C)
0	-20
2	-13
4	-7
6	-2
8	-0.5
10	0.5
12	4
14	9
16	12
18	15
20	19.5

R<sub>qi</sub> 6 + N<sub>wqq</sub>



	<p>If you are saving this an electronic document, you can copy this blank grid to MS Word and add lines and dots within that app.</p>
<p>R_qi 7 +Nfwagq</p>	<p>Label the wave diagram with the wave's wavelength and amplitude.</p>  <p>If you are saving this an electronic document, you can copy this image to MS Word and add labels and arrows within that app.</p>
<p>R_qi /. +Nfwagq</p>	<p>Add the labels (Gamma rays, Infrared, Microwaves, Radio waves, Ultraviolet, Visible light &amp; X-Rays) to the electromagnetic spectrum diagram in the correct frequency order. If you are saving this an electronic document, you can copy this image to MS Word and add labels within that app.</p> 
<p>R_qi // +Eclcp_j</p>	

	 <p>Identify the equipment above.</p>																	
<p>R<sub>q</sub> / 0 +Ecl cp<sub>j</sub></p>	<table border="1" data-bbox="571 913 1410 1086"> <tr> <td>50ml Burette</td> <td>24.95 cm<sup>3</sup></td> <td>24.90 cm<sup>3</sup></td> <td>25.00 cm<sup>3</sup></td> <td></td> <td></td> </tr> <tr> <td>25ml Pipette</td> <td>25.0 cm<sup>3</sup></td> <td>24.9 cm<sup>3</sup></td> <td>25.0 cm<sup>3</sup></td> <td>25.1</td> <td>24.9</td> </tr> </table> <p>Using the data above from a titration experiment, which of the volumetric glassware (the burette or the pipette) was the most:</p> <p>b) Precise          b) Reliable</p>						50ml Burette	24.95 cm <sup>3</sup>	24.90 cm <sup>3</sup>	25.00 cm <sup>3</sup>			25ml Pipette	25.0 cm <sup>3</sup>	24.9 cm <sup>3</sup>	25.0 cm <sup>3</sup>	25.1	24.9
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<p>Af cai jgr mdct gcl ac          pos gcb</p>	<p>Task 1            Task 2            Task 3            Task 4            Task 5            Task 6            Task 7            Task 8            Task 9            Task 10            Task 11            Task 12</p>																	

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
	<p>Explain how the sub-cellular structures of eukaryotic and prokaryotic cells are related to their functions, including:</p> <p>a animal cells – nucleus, cell membrane, mitochondria and ribosomes</p> <p>b plant cells – nucleus, cell membrane, cell wall, chloroplasts, mitochondria, vacuole and ribosomes</p> <p>c bacteria – chromosomal DNA, plasmid DNA, cell membrane, ribosomes and flagella</p>
	Core Practical: Investigate biological specimens using microscopes, including magnification calculations, and labelled scientific drawings from observations.
	Explain the cause of type 1 and 2 diabetes and how it is controlled.
	Write balanced chemical equations, including the use of the state symbols (s), (l), (g) and (aq)
	Calculate relative formula mass given relative atomic masses.
	Calculate the number of moles of particles of a substance in a given mass of that substance.
	Calculate masses of reactants and products from balanced equations, given the mass of one substance.
	Describe that in the periodic table elements are arranged in order of increasing atomic number, in rows called periods and elements with similar properties are placed in the same vertical columns called groups.
	Identify elements as metals or non-metals according to their position in the periodic table, explaining this division in terms of the atomic structures of the elements

	Describe the arrangement, movement and the relative energy of particles in each of the three states of matter: solid, liquid and gas.
	Recall the names used for the interconversions between the three states of matter, recognising that these are physical changes: contrasted with chemical reactions that result in chemical changes
	Drawing and interpreting appropriate graphs from data to determine rate of reaction.
	Determining gradients of graphs as a measure of rate of change to determine rate.
	Define and use the terms frequency and wavelength as applied to waves
	Use the terms amplitude, period, wave velocity and wavefront as applied to waves
	Recall the main groupings of the continuous electromagnetic spectrum including (in order) radio waves, microwaves, infrared, visible (including the colours of the visible spectrum), ultraviolet, x-rays and gamma rays
	Describe how to carry out an acid-alkali titration, using burette, pipette and a suitable indicator, to prepare a pure, dry salt.
<b>Sources of information to support you with this Assignment</b>	<p>The above were taken from the Edexcel GCSE Combined Science specification.</p> <p>The best website to help you will be BBC Bitesize</p> <p><a href="https://www.bbc.co.uk/bitesize/subjects/zrkw2hv">https://www.bbc.co.uk/bitesize/subjects/zrkw2hv</a></p>
<b>Submission Instructions</b>	Hand in a paper copy of your work or submit electronically via a pdf (you will be shown how to convert as word file to a pdf) to our VLE, Moodle.