

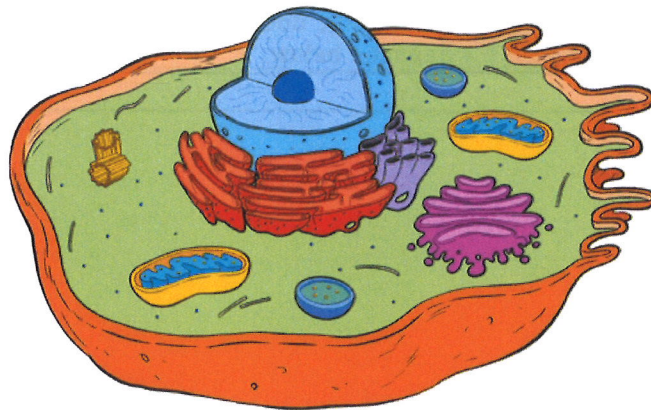
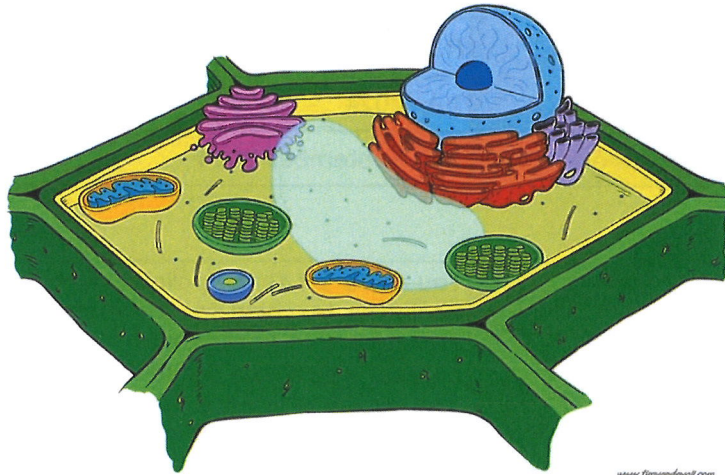
BTEC Applied Science Summer Work

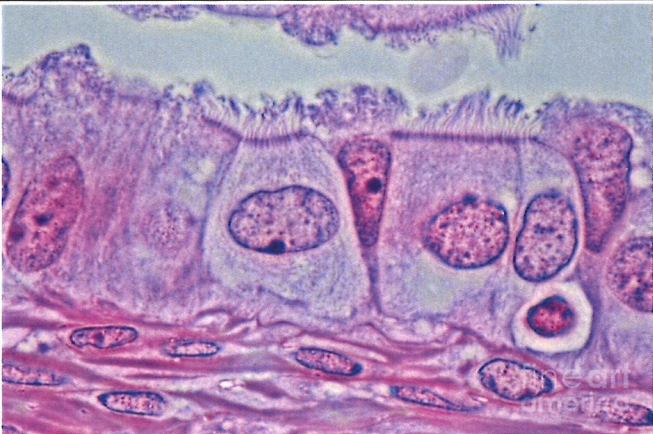
Qualification	Pearson BTEC Level 3 National Extended Certificate / Diploma in Applied Science
Unit number and title	Unit 1: Principles and Applications of Science
Assignment title	Applied Science Level 3 Summer Work
Assessor	R. Baker / R. Austin / J. Thompson
Issue date	July 2024
Hand in deadline	13 th September 2024

Vocational Scenario or Context	<p>You are a 1st 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. Include notes on the **function** of the nucleus, cell membrane, mitochondria, ribosomes, cell wall, chloroplasts and vacuole. *If you are saving this an electronic document, you can copy these diagrams into MS Word and add lines and labels within that app.*



<p>Task 2- Biology</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>× 1000</p> <p>If the epithelial cell nucleus in a photograph of a cell measures 3 mm across and the magnification in the photograph is × 500, what is the actual size of the nucleus?</p> <p>0.006 mm</p>
<p>Task 3 - Biology</p>	<p>Research Task: Use the internet or books to explain the <i>similarities</i> and <i>differences</i> 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>Task 4- Chemistry</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"> 1. Balance the chemical symbol equation $\text{K}_2\text{CO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow 2\text{KCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$ 2. Work out the Relative Formula Mass (M_r) [Also known as Molar Mass] for all of the substances involved in the reaction.

	<p>3. If 27.64g of K_2CO_3 was used in the reaction, how many moles is this (Moles = Mass \div Molar Mass/M_r)</p> <p>4. How many moles of hydrochloric acid are needed to fully complete the reaction?</p> <p>5. What mass of potassium chloride will be formed?</p> <p>6. If the carbon dioxide is collected using a measuring syringe, what will be the volume of the gas collected?</p>
Task 5- Chemistry	Draw the structure of an atom and include labels with the names, positions, relative charges and masses of the subatomic particles.

Task 6 - Chemistry

Periodic Table

www.rsc.org/periodic-table

In your own words, **describe** the arrangement of elements in the periodic table.

The elements of the periodic table are organised into groups and periods. Each group has the same number of electrons in the outer shell of its atoms. The groups also tend to share properties.

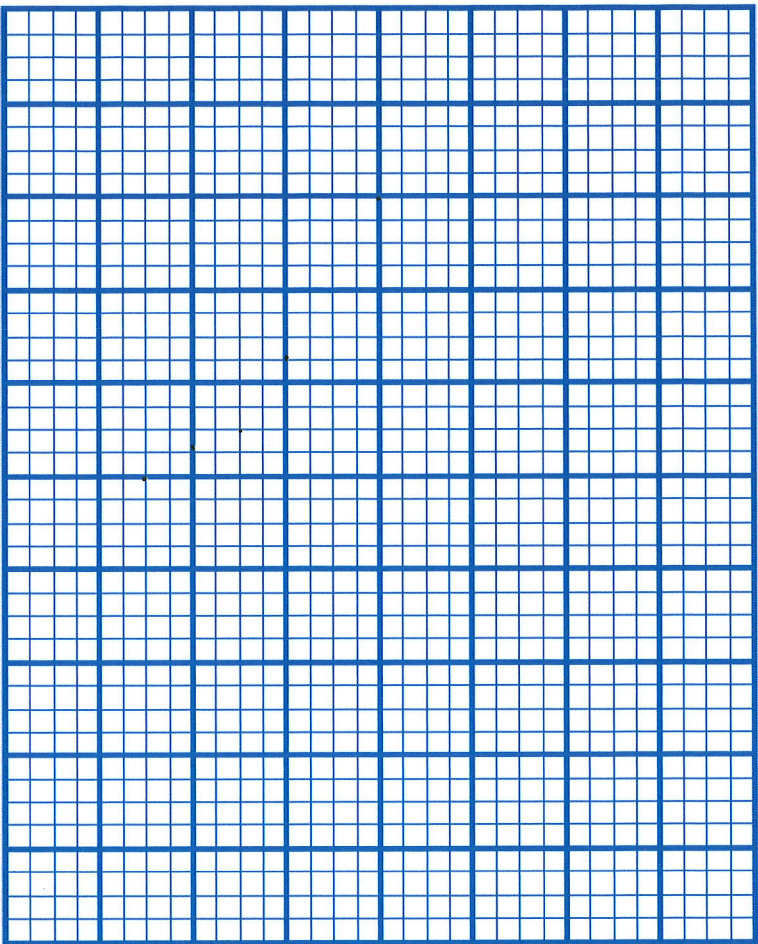
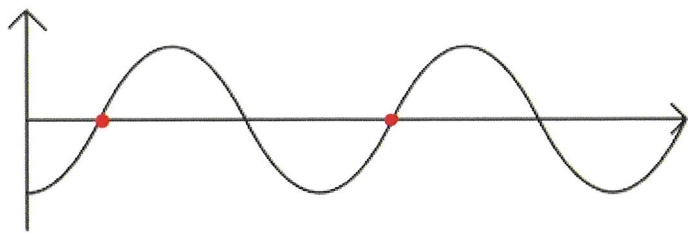
Task 7 - Chemistry

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*.

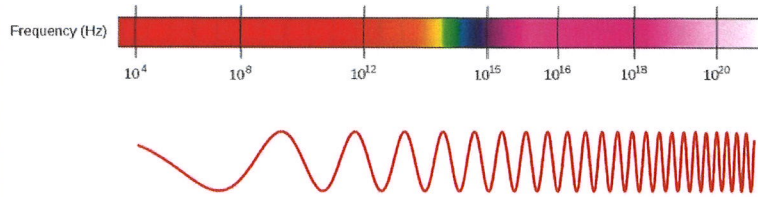
Task 8 - Physics

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.

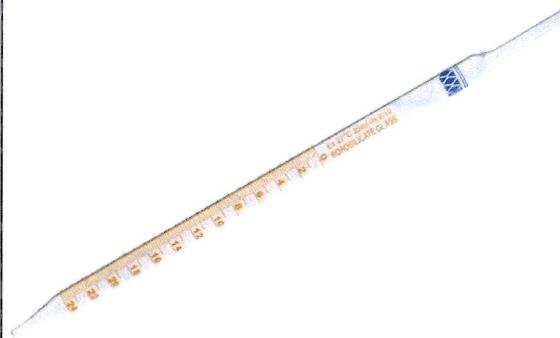
Time (mins)	Temperature (°C)
0	-20
2	-13
4	-7
6	-2
8	-0.5
10	0.5
12	4
14	9
16	12
18	15
20	19.5

	 <p><i>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.</i></p>
<p>Task 9 - Physics</p>	<p>Label the wave diagram with the wave's wavelength and amplitude.</p>  <p><i>If you are saving this an electronic document, you can copy this image to MS Word and add labels and arrows within that app.</i></p>
<p>Task 10 - Physics</p>	<p>Add the labels (Gamma rays, Infrared, Microwaves, Radio waves, Ultraviolet, Visible light & X-Rays) to the electromagnetic spectrum diagram in the correct</p>

frequency order. If you are saving this as an electronic document, you can copy this image to MS Word and add labels within that app.



Task 11 - General



Identify the equipment above.

Task 12 - General

50ml Burette	24.95 cm ³	24.90 cm ³	25.00 cm ³	
25ml Pipette	25.0 cm ³	24.9 cm ³	25.0 cm ³	25.1

Using the data above from a titration experiment, which of the volumetric glassware (the burette or the pipette) was the most:

a) Precise

	b) Reliable
Checklist of evidence required	Task 1 Task 2 Task 3 Task 4 Task 5 Task 6 Task 7 Task 8 Task 9 Task 10 Task 11 Task 12
Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
	<i>Explain how the sub-cellular structures of eukaryotic and prokaryotic cells are related to their functions, including: a animal cells – nucleus, cell membrane, mitochondria and ribosomes b plant cells – nucleus, cell membrane, cell wall, chloroplasts, mitochondria, vacuole and ribosomes c bacteria – chromosomal DNA, plasmid DNA, cell membrane, ribosomes and flagella</i>
	<i>Core Practical: Investigate biological specimens using microscopes, including magnification calculations, and labelled scientific drawings from observations.</i>
	<i>Explain the cause of type 1 and 2 diabetes and how it is controlled.</i>
	<i>Write balanced chemical equations, including the use of the state symbols (s), (l), (g) and (aq)</i>
	<i>Calculate relative formula mass given relative atomic masses.</i>
	<i>Calculate the number of moles of particles of a substance in a given mass of that substance.</i>
	<i>Calculate masses of reactants and products from balanced equations, given the mass of one substance.</i>
	<i>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.</i>

	<i>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</i>
	<i>Describe the arrangement, movement and the relative energy of particles in each of the three states of matter: solid, liquid and gas.</i>
	<i>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</i>
	<i>Drawing and interpreting appropriate graphs from data to determine rate of reaction.</i>
	<i>Determining gradients of graphs as a measure of rate of change to determine rate.</i>
	<i>Define and use the terms frequency and wavelength as applied to waves</i>
	<i>Use the terms amplitude, period, wave velocity and wavefront as applied to waves</i>
	<i>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</i>
	<i>Describe how to carry out an acid-alkali titration, using burette, pipette and a suitable indicator, to prepare a pure, dry salt.</i>
Sources of information to support you with this Assignment	<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>https://www.bbc.co.uk/bitesize/subjects/zrkw2hv</p>
Submission Instructions	<i>Hand in 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.</i>