Applied Science
Course Team Leader: Rob Baker
Email Address: rbaker@longroad.ac.uk

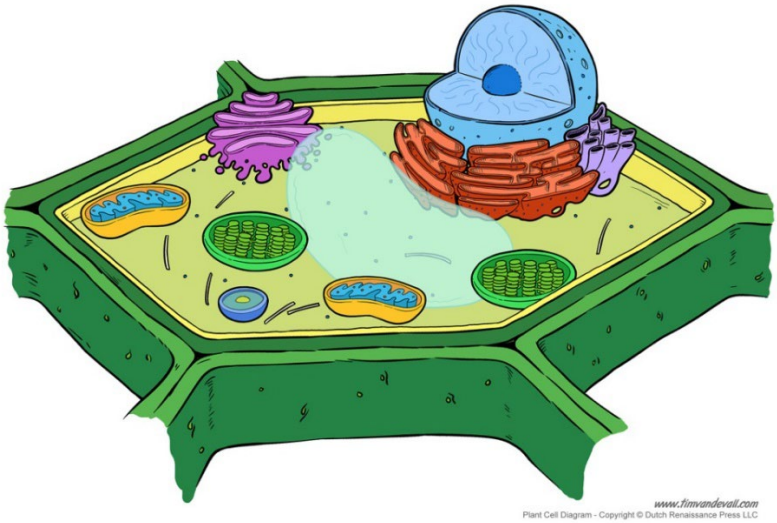
Pearson

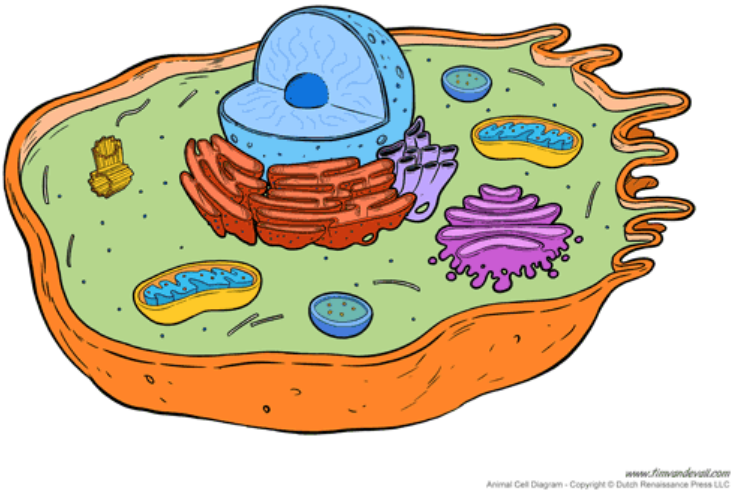
Pearson Level 3 Alternative Academic Qualification BTEC National in Applied Science (Extended Certificate)

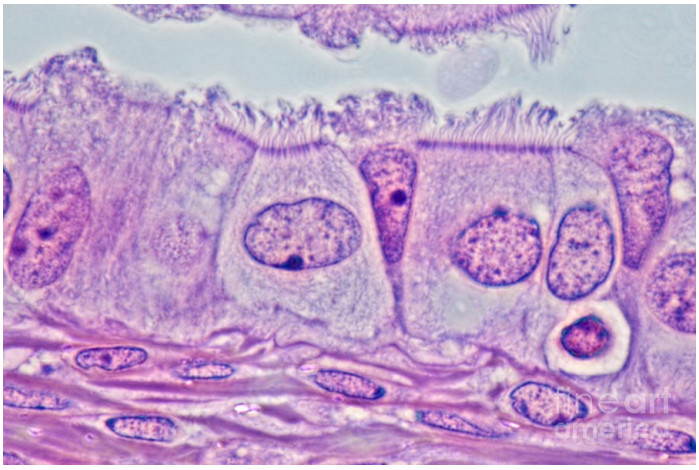
Paper reference

Applied Science Summer Work 2026

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.*







Task 2- Biology 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?

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?

Task 3 - Biology 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.

Task 4- Chemistry. Potassium carbonate reacts with dilute hydrochloric acid to produce an aqueous salt (potassium chloride), water and carbon dioxide.

1. Balance the chemical symbol equation

   K_2CO_3 (s) + 2HCl (aq) → 2KCl (aq) + H_2O (l) + CO_2 (g)

2. Work out the Relative Formula Mass (M_r) [Also known as Molar Mass] for **all** of the substances involved in the reaction.

3. If 27.64g of K_2CO_3 was used in the reaction, how many **moles** is this (Moles = Mass ÷ Molar Mass/M_r)

4. How many **moles** of hydrochloric acid are needed to fully complete the reaction?

5. What **mass** of potassium chloride will be formed?

6. If the carbon dioxide is collected using a measuring syringe, what will be the **volume** of the gas collected?

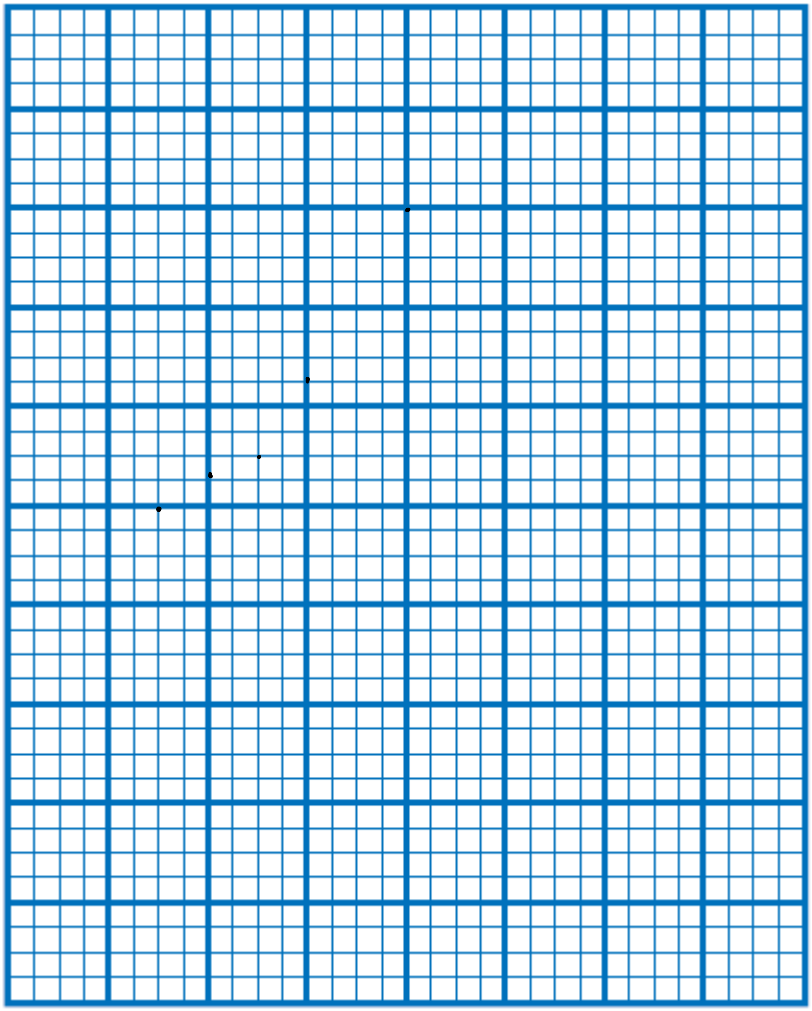
Task 5- Chemistry. Draw the structure of an atom and include **labels** with the names, positions, relative charges and masses of the subatomic particles.

Task 6 – Chemistry. In your own words, **describe** the arrangement of elements in the periodic table.

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



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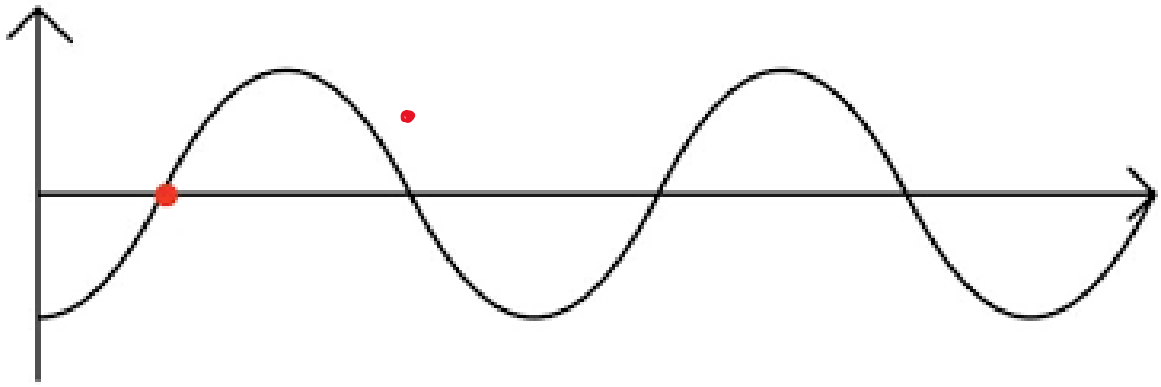
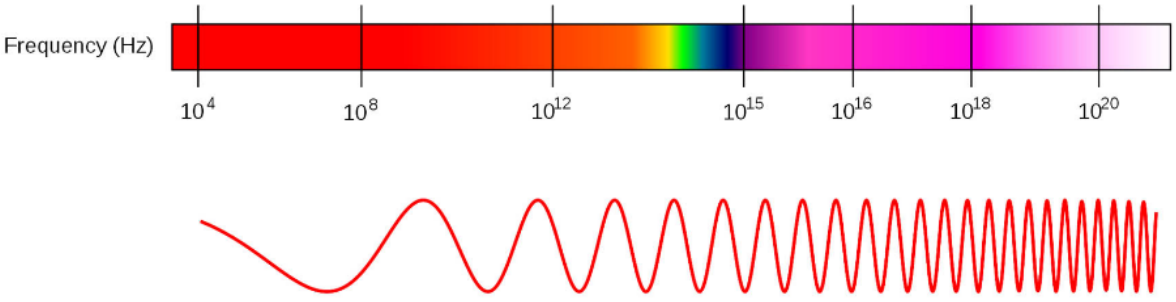
Task 9 - Physics. Label the wave diagram with the wave's wavelength and amplitude.



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

Task 10 – Physics. Add the labels (Gamma rays, Infrared, Microwaves, Radio waves, Ultraviolet, Visible light & 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.*



Task 11 – General. Identify the equipment above.

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	24.9

Task 12 – General. 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

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
	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*
	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.
Sources of information to support you with this Assignment	The above were taken from the Edexcel GCSE Combined Science specification. The best website to help you will be BBC Bitesize https://www.bbc.co.uk/bitesize/subjects/zrkw2hv
Submission Instructions	*Hand in Paper copy of your work or hand in via Teams (date tbc)*