BTEC Single, Double and Triple Award in Applied Science

Your BTEC Single, Double or Triple Award Applied Science involves studying a range of Biology, Chemistry and Physics topics. Your summer work will help prepare you for the first unit (Principles and Applications of Science I), and involves you completing three tasks. Each task must be handed to a different teacher, so complete them as three separate documents and bring to your first lessons in September.

Task 1: Biology

1. Draw and label a prokaryotic cell, including all the following organelles:

Nucleoid	*Plasmid*	*70S ribosomes*
Capsule	*Murein cell wall*	

2. Draw and label a eukaryotic animal cell, including all the following organelles:

Plasma membrane	*Cytoplasm*	*Nucleus*
Nucleolus	*Smooth endoplasmic reticulum*	*Rough endoplasmic reticulum*
Golgi apparatus	*Vesicles*	*Lysosomes*
80S ribosomes	*Mitochondria*	*Centrioles*

3. Draw and label a eukaryotic plant cell, including all the following organelles:

Cellulose cell wall	*Chloroplasts*	*Vacuole*
Tonoplast	*Amyloplast*	*Plasmodesmata*
Pits	*Plasma membrane*	*Cytoplasm*
Nucleus	*Nucleolus*	*Smooth endoplasmic reticulum*
Rough endoplasmic reticulum	*Golgi apparatus*	*Vesicles*
Lysosomes	*80S ribosomes*	*Mitochondria*

4. Create a glossary with definitions for all the organelles you have drawn and labelled (there should be 24 in total)

Task 2: Chemistry

1. Go to the **BBC GCSE Bitesize** website and work through the section on atomic structure (activity first, then revise, then test).

2. Use a GCSE science textbook, your own notes or the Bitesize website and write a definition of the following scientific terms.

    (a) Atom

    (b) Molecule

    (c) Ion

    (d) Atomic number (Z)

    (e) Mass number (A)

    (f) Isotope

    (g) Relative Atomic Mass (Ar)

3. Calculate the relative formula mass (M_r) by adding the relative atomic masses.

Example Mr of $MgCl_2$ = 24.3 + (35.5 x 2) = 95.3

(a) Iodine I_2

(b) Methane CH_4

(c) Sodium carbonate Na_2CO_3

(d) Copper sulfate-5-water $CuSO_4.5H_2O$

4. Complete the following table, to summarise the properties of the fundamental particles.

Particle	Relative Mass	Relative Charge	Location in atom
Proton			
Neutron			
Electron			

5. Electrons in atoms are arranged in energy levels or shells.

(a) How many electrons can occupy each of the first three energy levels?

(b) Choose a metal and a non-metal, which each contain at least ten electrons.

For each of these, write out the electron shell configuration.

6. Finally Complete this table on the atomic and electronic structure of atoms or ions.
You will need to be careful with the last two as they are ions, not atoms.

Species	Mass Number	Atomic Number	Number of electrons	Number of protons	Number of neutrons	Electronic Structure
Calcium (Ca)	40	20				
Sulphur (S)			16		16	
Chloride ion (Cl^-)	35	17				
Sodium Ion (Na^+)				11	12	

Task 3: Physics

1. Describe the key features of a transverse wave, including a labelled diagram.
2. Describe the key features of a longitudinal wave, including a labelled diagram.
3. Write a glossary for the following key terms (as applied to waves):

Periodic time   *Speed*   *Wavelength*
Frequency   *Amplitude*   *Oscillation*