

Level 3 BTEC Applied Science – Year 11 Transition Work.

The BTEC Level 3 Extended Certificate in Applied Science course is equivalent to one A-level and teaches content from all 3 sciences with an emphasis of real-life contexts and scientific skills.

The first year consists of 2 modules;

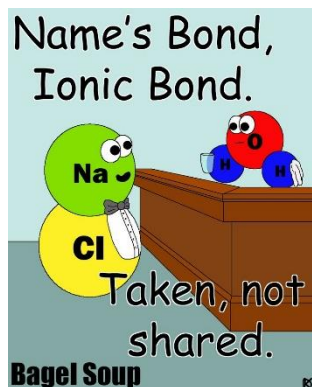
Unit 1: Principles and Applications of Science I. An externally assessed written examination consisting of 3 x 30 minute papers of Chemistry, Biology and Physics. This build on KS4 Science and extends into both 6.1 and 6.2 science concepts.

Unit 2: Practical Scientific Procedures and Techniques. An internally assessed portfolio module. This covers a range of quantitative laboratory techniques, calibration, chromatography, calorimetry and laboratory safety, which are relevant to the chemical and life science industries.

In order to prepare you for the Applied Science course you should attempt the tasks below to recap and extend on relevant GCSE content.

Task 1: Chemistry banter!

Why can you never find a good chemistry joke? Cause all the good ones Argon! To introduce you to the bonding part of the chemistry find a variety of 'bonding memes' or 'jokes' linked to the 3 bonding forms you covered at GCSE (ionic, covalent, metallic). You can do this by searching google images. Write a brief explanation of the science you understand from the picture. Add in extra pictures and features of the bonding e.g. properties of that substance, examples, what it occurs between, what happens to the electrons. An example is below.



"In an ionic bond the electrons are donated from metal atom(s) and received by non-metal atom(s) causing them both to form ions."

"The water molecule behind the bar is made from hydrogen and oxygen molecules which are non-metals, and so form covalent bonds"

"Ionic compounds have a high melting and boiling point as the ionic bonds are very strong"

Task 2: Wave goodbye to GCSE!

Watch the following short videos (use the links provided) as a great introduction to waves.

Video 1: <https://www.youtube.com/watch?v=RVyHkV3wlyk>

Video 2: <https://www.youtube.com/watch?v=CVsdXKO9xIk>

Make a set of flashcards including the following concepts:

- A labelled diagram of a wave (wavelength, amplitude, equilibrium (no displacement), crest and trough)
- Descriptions of transverse and longitudinal waves (how they vibrate) with an example of each.
- Definitions of wave features (use the second video for this it is much better) to include wavelength, amplitude, period and frequency – include the units if provided
- The wave equation in symbols with the word underneath. You are provided with the equation but only is symbol form, so you should know what these mean and the units!

As well as progressive waves, A-level introduces a standing or stationary wave. Here is a short video linked to this: <https://www.youtube.com/watch?v=wYoxOJDrZzw>

After watching the video:

- Make a sketch of a standing wave labelling the node and antinode
- Explain how a standing wave forms

Use this website to help if you get stuck: <https://www.khanacademy.org/science/ap-physics-1/ap-mechanical-waves-and-sound/standing-waves-ap/a/standing-waves-review-ap>

Task 3: Yummy Ribosomes!

Make models of a plant cell and an animal cell. You can use sweets or food items to make the two models. Cake based models are popular!

The animal cell should be labelled with the following features:

- Plasma membrane (or cell surface membrane)
- Cytoplasm
- Nucleus
- Nucleolus
- Rough endoplasmic reticulum
- Smooth endoplasmic reticulum
- Golgi apparatus
- Vesicles
- Lysosomes
- Ribosomes
- Mitochondria
- Centrioles

The plant cell must have the following organelles (cell parts) present:

- All of the above as for the animal cell except for centrioles.
- Cell wall
- Chloroplast
- Vacuole
- Tonoplast
- Amyloplast
- Plasmodesmata
- Pits

Once you have made your cell and labelled it, photograph it and place the photo in a document. For each organelle you have labelled write a glossary describing the structure and function of each cell part. This can be on the same document as the photograph. Below are some websites that will help you to find the information required to make and label your cells. The first one is for you to listen to about some of the organelles. When you have finished the glossary you may share your cells with your family!

<https://www.youtube.com/watch?v=dLJdRs5w4u4>

<https://alevelbiology.co.uk/notes/cell-structure/>

<https://www.s-cool.co.uk/a-level/biology/cells-and-organelles/revise-it/organelles>

Task 4: Science all around

There are a variety of interesting science / engineering / technology related programmes currently available. Watch one or two from the list below or find your own!

1. **How to make** (BBC Four) Take a look inside what makes up everyday objects such as trainers, headphones and toothbrushes. Zoe Laughlin, designer, maker and materials engineer, is fascinated by the science and technology hidden within the everyday objects we take for granted. In this series, she dismantles and dissects three classic items to understand the wonders of form, function and material that go into making them, before building her own truly bespoke versions, step by step. Available on iPlayer (3 episodes)
2. **Bang goes the Theory** (BBC One) Hundreds of episodes covering volcanic eruptions, nuclear reactors, melting rocks with sunshine, climate change...these are found on you tube (search full episodes). They also provide some cool science challenges that can be found on the link below: <https://www.bbc.co.uk/programmes/articles/2MfJ5Gydv3gP6W3Ff67vd0b/hands-on-science>
3. **From Ice to Fire: The incredible science of Temperature** (BBC Four) Everything around us - from the tiniest insect on Earth to the most distant stars of the cosmos - exists somewhere on a vast scale from cold to hot. In this series, physicist Dr Helen Czerski explores the extraordinary science of temperature. She unlocks the extremes of the temperature scale, from absolute zero to searing heat of stars - and reveals how temperature works, how deep its influence on our lives is, and why it's the hidden force that has shaped our planet and the entire universe. Available on iPlayer (3 episodes)
4. **Secret Universe: The Hidden life of the Cell** (BBC Two) This film reveals the exquisite machinery of the human cell system from within the inner world of the cell itself - from the frenetic membrane surface that acts as a security system for everything passing in and out of the cell, the dynamic highways that transport cargo across the cell and the remarkable turbines that power the whole cellular world to the amazing nucleus housing DNA and the construction of thousands of different proteins all with unique tasks. The virus intends to commandeer this system to one selfish end: to make more viruses. And they will stop at nothing to achieve their goal. Available on iPlayer
5. **Astronauts: Do you have what it takes?** (BBC Two) Astronaut Chris Hadfield, former Nasa medical researcher Dr Kevin Fong and psychologist Dr Iya Whiteley put 12 exceptional candidates through a series of gruelling physical and psychological tests to find out who has what it takes to be an astronaut. Using the demanding criteria of space agencies, they must hover a helicopter, take their own blood and be tested for claustrophobia, physical fitness and mental agility. Those who fail to make the grade can be asked to leave at any time. Available on iPlayer (2 episodes)
6. **The Limit** (BBC) Quite old (1995) but still interesting if you like engineering or London! Hugh Doherty has spent a lifetime building tunnels, from the Clyde River Tunnel to the Hong Kong Mass Transit System. But now he is facing his biggest challenge yet - to build a new tube line under the heart of London, in record time. To speed up the job he is using a spray-on, rapid setting concrete lining, but as another tunnel using the same method collapses, the work grinds to a halt. When his two trusted tunnelling machines then break down, it seems his quest may be doomed. Available on iPlayer.