

BTEC Applied Science



At HA we complete the Pearson Level 3 Alternative Academic Qualification BTEC National in Applied Science (Extended Certificate). This is studied over two years and is equivalent to one A-level.

Course Organisation

In Year 12 you will complete units 1 - 3, which are externally assessed (exam units) and in Y13 you will complete unit 4 and 5, which are internally assessed (course work)

Units 1, 2, and 3 are about the principles and applications of biology, chemistry, and physics, respectively. These units have external exams.

In Units 4 and 5 you will learn about practical scientific procedures and techniques, and carry out investigations on which you will be assessed by coursework.

On the following pages are a few review and research tasks to help you prepare for your start in Year 12 studying Applied Science

Biology

For biology we study cells, cell processes and a range of body systems. The emphasis is on application of knowledge, especially in relation to health, illness and treatments.

Review and revise your knowledge of cells by visiting these websites and watching these videos:

<https://www.dailymotion.com/video/x6z0pzg>

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

<https://www.youtube.com/watch?v=gFuEo2ccTPA>

<https://www.youtube.com/watch?v=gcTuQpuJyD8>

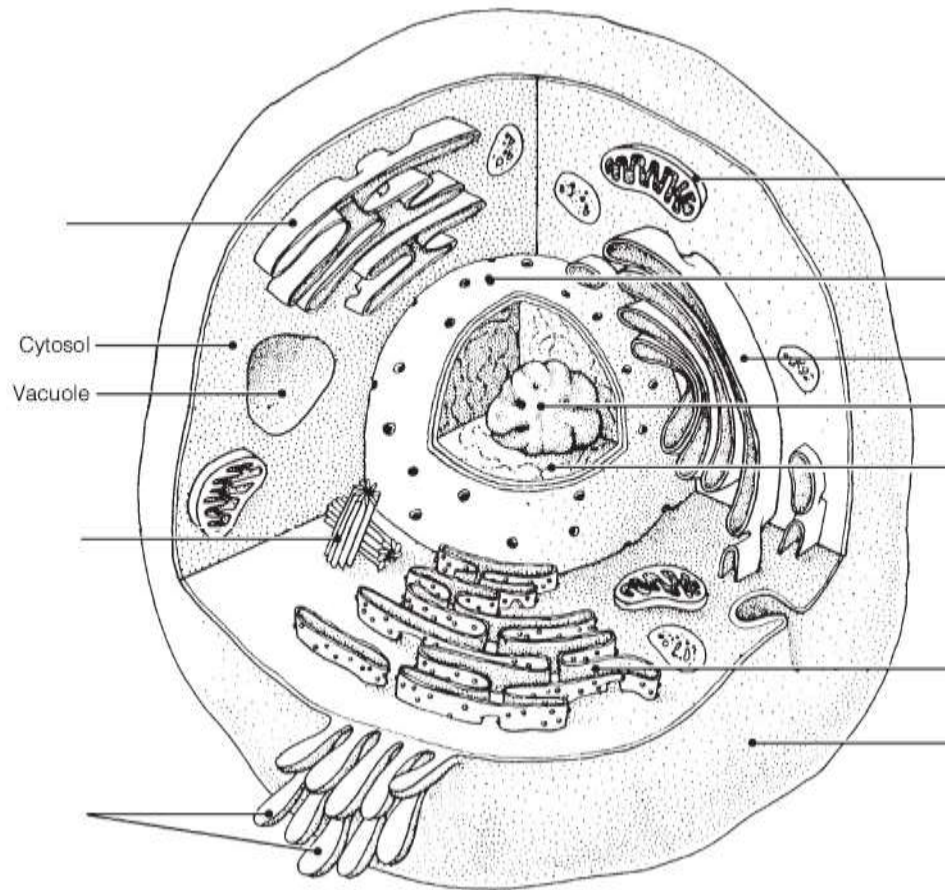
<https://www.youtube.com/watch?v=L0k-enzoeOM>

<https://www.youtube.com/watch?v=qCLmR9-YY7o>

<http://www.cellsalive.com/>

Activity B1: Cell Structure

Label the following cell structures then colour them, select different colours for each structure and use them to colour the coding circles and the corresponding structures in the illustration.



☐ Plasma membrane

☐ Nuclear membrane

☐ Rough endoplasmic reticulum

☐ Smooth endoplasmic reticulum

☐ Golgi apparatus

☐ Chromatin thread(s)

☐ Mitochondrion

☐ Centriole(s)

☐ Nucleolus

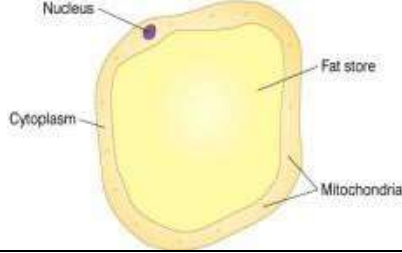
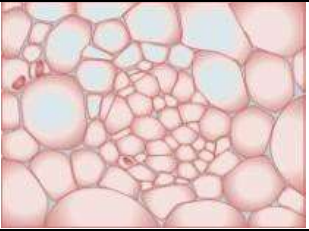
☐ Microvilli

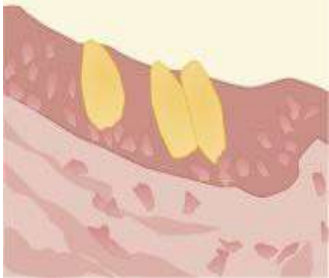
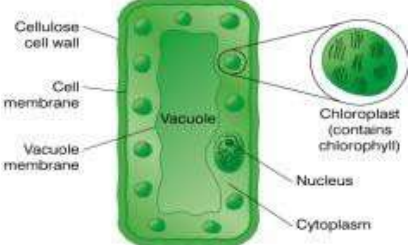
Activity B2: Specialised cells

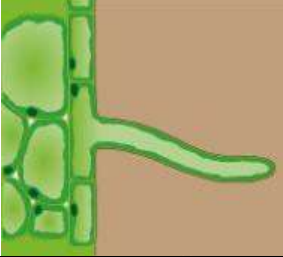
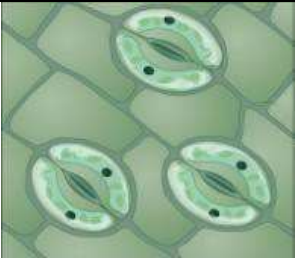
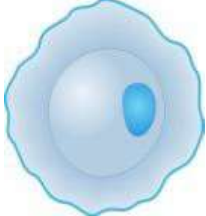
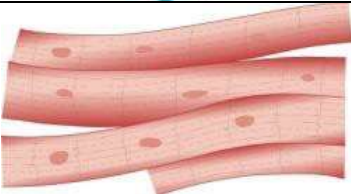
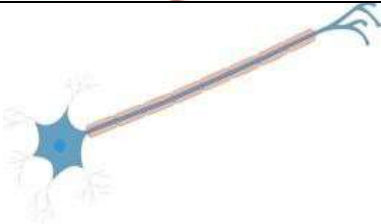
Watch these videos and use the information to complete this table:

<https://www.youtube.com/watch?v=cj8dDTHGJBY>

<https://www.youtube.com/watch?v=9UvlqAVCoqY>

Cell	Name of cell	Plant or animal?	Function	Adaptations
	Fat cell			1. 2. 3.
	Leaf epidermal cell			1. 2. 3.
	Xylem cell			1. 2. 3.

Cell	Name of cell	Plant or animal?	Function	Adaptations
	Gland cell			1. 2. 3.
	Sperm cell			1. 2. 3.
	Palisade cell			1. 2. 3.
	Red blood cell			1. 2. 3.

Cell	Name of cell	Plant or animal?	Function	Adaptations
	Root hair cell			1. 2. 3.
	Stomata (guard cell)			1. 2. 3.
	Ovum (egg cell)			1. 2. 3.
	Muscle cell			1. 2. 3.
	Nerve cell (neurone)			1. 2. 3.

Chemistry

Some of the topics we will study are:

- Atoms, elements, compounds
- Electronic structure
- Groups in the Periodic Table
- Structure and Bonding
- Moles
- Reactions of acids

Unit 2 gives you the opportunity to investigate these ideas in a more practical and independent way, in particular by carrying out experiments related to:

- Titrations
- Measuring pH
- Making and purifying chemicals
- Chromatography
- Colorimetry

To get you started on Chemistry, review and research the following topics.

<https://youtu.be/H0rFDakTI-0>

<https://www.webelements.com/>

<https://www.bbc.co.uk/bitesize/topics/zxnftv4>

Then complete the activities on the following pages.

Activity c1: Use the information from your research to draw a diagram of an atom.



Activity C2: Complete the table below to summarise the properties of the atom.

Particle	Relative mass	Charge
Proton		
Neutron		
Electron		

Activity C3: There are 92 naturally occurring elements.

Each element has physical and chemical properties that are similar and different to the others. The periodic table is the chemist's way to organise the elements based on their atomic structure. Using any of the links, colour in the periodic table as follows:

- Label the following groups:
- The alkali metals
- The alkaline earths
- The transition metals
- The halogens
- The noble gases

																1.0 H hydrogen 1	4.0 He helium 2				
6.9 Li lithium 3	9.0 Be beryllium 4															10.8 B boron 5	12.0 C carbon 6	14.0 N nitrogen 7	16.0 O oxygen 8	19.0 F fluorine 9	20.2 Ne neon 10
23.0 Na sodium 11	24.3 Mg magnesium 12															27.0 Al aluminium 13	28.1 Si silicon 14	31.0 P phosphorus 15	32.1 S sulfur 16	35.5 Cl chlorine 17	39.9 Ar argon 18
39.1 K potassium 19	40.1 Ca calcium 20	45.0 Sc scandium 21	47.9 Ti titanium 22	50.9 V vanadium 23	52.0 Cr chromium 24	54.9 Mn manganese 25	55.8 Fe iron 26	58.9 Co cobalt 27	58.7 Ni nickel 28	63.5 Cu copper 29	65.4 Zn zinc 30	69.7 Ga gallium 31	72.6 Ge germanium 32	74.9 As arsenic 33	79.0 Se selenium 34	79.9 Br bromine 35	83.8 Kr krypton 36				
85.5 Rb rubidium 37	87.6 Sr strontium 38	88.9 Y yttrium 39	91.2 Zr zirconium 40	92.9 Nb niobium 41	95.9 Mo molybdenum 42	[98] Tc technetium 43	101.1 Ru ruthenium 44	102.9 Rh rhodium 45	106.4 Pd palladium 46	107.9 Ag silver 47	112.4 Cd cadmium 48	114.8 In indium 49	118.7 Sn tin 50	121.8 Sb antimony 51	127.6 Te tellurium 52	126.9 I iodine 53	131.3 Xe xenon 54				
132.9 Cs caesium 55	137.3 Ba barium 56	138.9 La* lanthanum 57	178.5 Hf hafnium 72	180.9 Ta tantalum 73	183.8 W tungsten 74	186.2 Re rhenium 75	190.2 Os osmium 76	192.2 Ir iridium 77	195.1 Pt platinum 78	197.0 Au gold 79	200.6 Hg mercury 80	204.4 Tl thallium 81	207.2 Pb lead 82	209.0 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86				
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated										
* Lanthanide series		140 Ce cerium 58	141 Pr praseodymium 59	144 Nd neodymium 60	[147] Pm promethium 61	150 Sm samarium 62	152 Eu europium 63	157 Gd gadolinium 64	159 Tb terbium 65	163 Dy dysprosium 66	165 Ho holmium 67	167 Er erbium 68	169 Tm thulium 69	173 Yb ytterbium 70	175 Lu lutetium 71						
* Actinide series		232 Th thorium 90	[231] Pa protactinium 91	238 U uranium 92	[237] Np neptunium 93	[242] Pu plutonium 94	[243] Am americium 95	[247] Cm curium 96	[245] Bk berkelium 97	[251] Cf californium 98	[254] Es einsteinium 99	[253] Fm fermium 100	[256] Md mdellevium 101	[254] No nobelium 102	[257] Lr lawrencium 103						

Activity C4: Use the periodic table to identify the properties of following:

Element	Symbol	Mass No.	Atomic No.	No. of electrons	No. of Protons	No. of Neutrons
Lithium						
Sodium						
Oxygen						
Chlorine						
Carbon						
Hydrogen						

Activity C5: Outline the key features of the periodic table:

- What patterns of reactivity are seen in group 1?

- What patterns of reactivity are seen in group 7?

- What are the key features of group 1 metals?

- What are the key features of group 7?

Physics

We study some physics in Unit 1. The focus is on waves. For the physics task, watch these videos and read the information here:

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

<https://www.youtube.com/watch?v=HPcAWNIVI-8>

Now use the words in the word bank (below) to complete these statements:

1. _____ waves are shorter than radio waves
2. _____ is the distance between one point of a wave and the same point in the next wave.
3. _____ is the number of waves per unit of time.
4. _____ waves occur when the motion of the medium is in the same direction of the wave.
5. _____ waves have a colour spectrum known as ROYGBIV.
6. _____ waves disturb matter.
7. The _____ is the top of the wave.
8. The _____ is the bottom of the wave.
9. _____ is the maximum distance that matter is displaced from its resting position.
10. _____ waves are produced by stars and galaxies.
11. _____ waves occur when the motion of the medium is at right angles (perpendicular) to the direction of the wave.
12. _____ waves are used in heat lamps.
13. _____ waves are utilized by insects to locate nectar.
14. _____ waves are transverse waves that disturb electromagnetic fields.
15. _____ waves have the shortest wavelength and the highest frequency.

Crest	Frequency	Mechanical	Gamma
Trough	Transverse	Radio	Infrared
Wavelength	Longitudinal	Ultraviolet	Micro
Visible	light	Amplitude	Electromagnetic