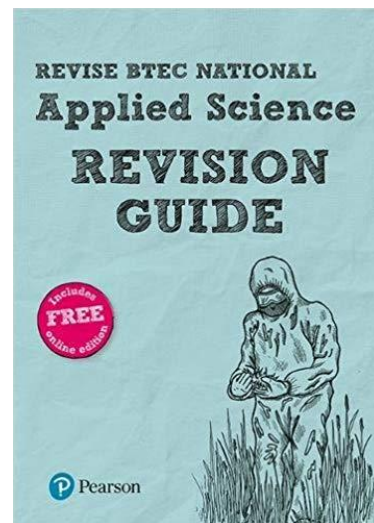
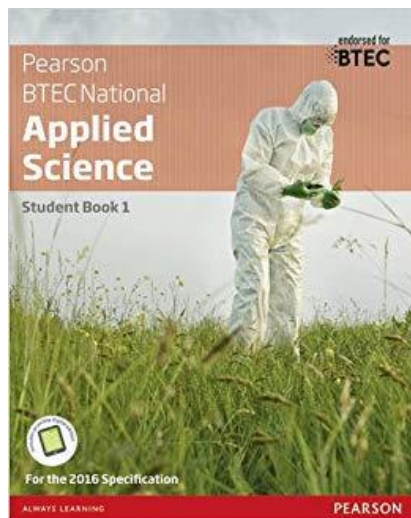




# Welcome to BTEC Level 3 Applied Science



Welcome to BTEC Applied Science. The purpose of this summer mailing is to prepare you to start your study of **BTEC Level 3 National Diploma in Applied Science** at Kingsbury High School in September 2019.

As you make the transition from GCSE to Level 3 studies you may find that you are expected to do much more independent reading, revision and research outside of lessons. This task will help you to make a start.

**There are THREE tasks for you to complete.**

# **TASK ONE: Report writing task**

## **Your Challenge**

The BTEC Level 3 Applied Science course includes units that are assignment-based. In preparing these assignments, you will need to write/produce a number of reports.

To do this, you will need to successfully research, find and extract **relevant** information from a number of sources both internet-sourced and non-internet sourced (e.g. books, journals or personal contacts for example).

You will need to **structure** and **summarise** this information and produce a **coherent** and **logical** report avoiding any **plagiarism** or **copy and paste!**

Please visit & go through the following websites for guidance on summarising and avoiding plagiarism:

<http://www.buowl.boun.edu.tr/students/avoidingplagiarism.htm>

<https://qualifications.pearson.com/content/dam/pdf/Support/Quality%20Assurance/Plagiarism-Factsheet.pdf>

Prepare a **250-word written report** based on **one** of the following questions. You will carry out your own research and then hand your work in during the first lesson back in September. Your work can be presented in any format of your choice. Remember, you are demonstrating your ability to work independently and produce work to the standard required at post 16. Choose from:

### **Biology:**

1. The history of the microscope
2. The differences between light and electron microscopes

### **Physics:**

1. The application of fibre optics in medicine (to include endoscopes).
2. The application of fibre optics in communication (to include analogue-to-digital conversion and broadband).

### **TIPS:**

A good strategy in summarising a text you have read is:

- Read the text several times but do not make any notes. During your first reading you may be tempted to take extensive notes, but later you may find out that you do not need them. Therefore, read without making notes but interacting with the author. That is, familiarise yourself with the text, the author, the main ideas and arguments, etc.
- List the key ideas and supporting arguments
- Rank them in order of importance before writing them up

Please include a word count at the end (to show how many words are in your report). The word count should be within 10% of the recommended 250 words.

**Remember to list the websites that you have used in preparing your report.**

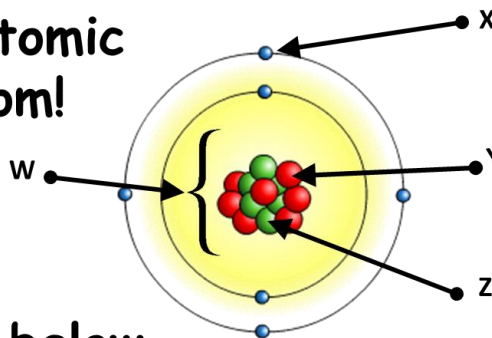
*Microsoft Word has a 'references' menu. In this is a drop down menu for 'citations and bibliography' – this is a good way to insert reference citations in the text and produces a bibliography that can be inserted at the end of the report – give it a go!*

## TASK TWO: Exam practice questions

### Chemistry questions:

#### Q1 – Atomic structure

**1:** Label the sub-atomic particles on the atom!




**2:** Copy and complete the table below.

Particle	Relative Mass	Relative Charge
Proton		
Neutron		
Electron		

Particle	Atom or ion	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons	Electronic structure
$^{23}\text{Na}^+$	ion	11	23	11	12	10	$[2,8]^+$
$^{23}\text{Na}$							
$^{40}\text{Ca}^{2+}$							
	atom	9	19				
				17	20	18	
				17	18	18	
		19	39			18	
				18	22	18	
		1	1			0	
					5		$[2]^{2+}$

Atoms are the basic building blocks of matter. They are not the smallest of particles, and within Chemistry, we are interested in the sub-atomic particles especially the **electron**.

Using a periodic table, draw the **electronic configuration**, as well as identifying **how many sub-atomic particles** there are for the following atoms and its corresponding ions:

<p><b>Hydrogen</b></p>  <p>Number of: p: e: n:</p>	<p><b>Nitrogen</b></p> <p>Number of: p: e: n:</p>	<p><b>Calcium</b></p> <p>Number of: p: e: n:</p>
<p><b>Hydrogen ion, H<sup>+</sup></b></p> <p>Charge:</p> <p>Number of: p: e: n:</p>	<p><b>Nitrogen ion</b></p> <p>Charge:</p> <p>Number of: p: e: n:</p>	<p><b>Calcium ion</b></p> <p>Charge:</p> <p>Number of: p: e: n:</p>

\*Don't forget brackets for ions

## Q2 – Bonding and Dot cross diagrams

You would have covered ionic and covalent bonding in your GCSE. Using your knowledge:

- **Draw** the dot cross diagrams for the following compounds, showing only **outer electrons**.
- State the **type** of **bonding** involved (ionic, covalent, metallic)

Oxygen gas	Sodium chloride
Magnesium oxide	Water
Carbon dioxide	Calcium chloride

### Q3 - Rearranging Formulae

When solving chemistry problems you will often be required to **rearrange** an equation to solve for an unknown. You would have seen this in Physics when trying to calculate speed.

$$\text{Speed (m/s)} = \text{distance (m)} / \text{time (s)}$$

We can re-write this to show distance and time as follows:

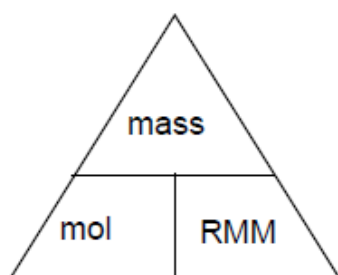
$$\text{Distance (m)} = \text{speed (m/s)} \times \text{time (s)}$$

$$\text{Time (s)} = \text{distance (m)} / \text{speed (m/s)}$$

You will encounter the following equations in the first topic.

**Rearrange** the following:

a)

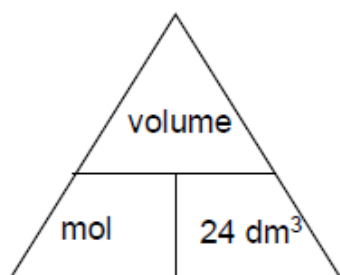


mass =

mol =

RMM =

b)



Volume =

mol =

c) **Rearrange:**

$$n = c v$$

c =

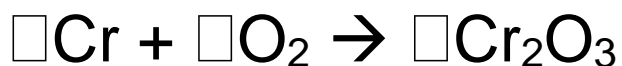
v =

The units of  $n$  is mol and the unit for  $v$  is  $\text{dm}^3$ . **Write** down the units for  $c$ :

## Q4 – Balancing equations

Fill in the boxes with the numbers you need to balance the equation.

Note: Some boxes can be left blank.



## Q5 - Relative formula mass

Use a Periodic Table to work out the relative formula mass of the following compounds:

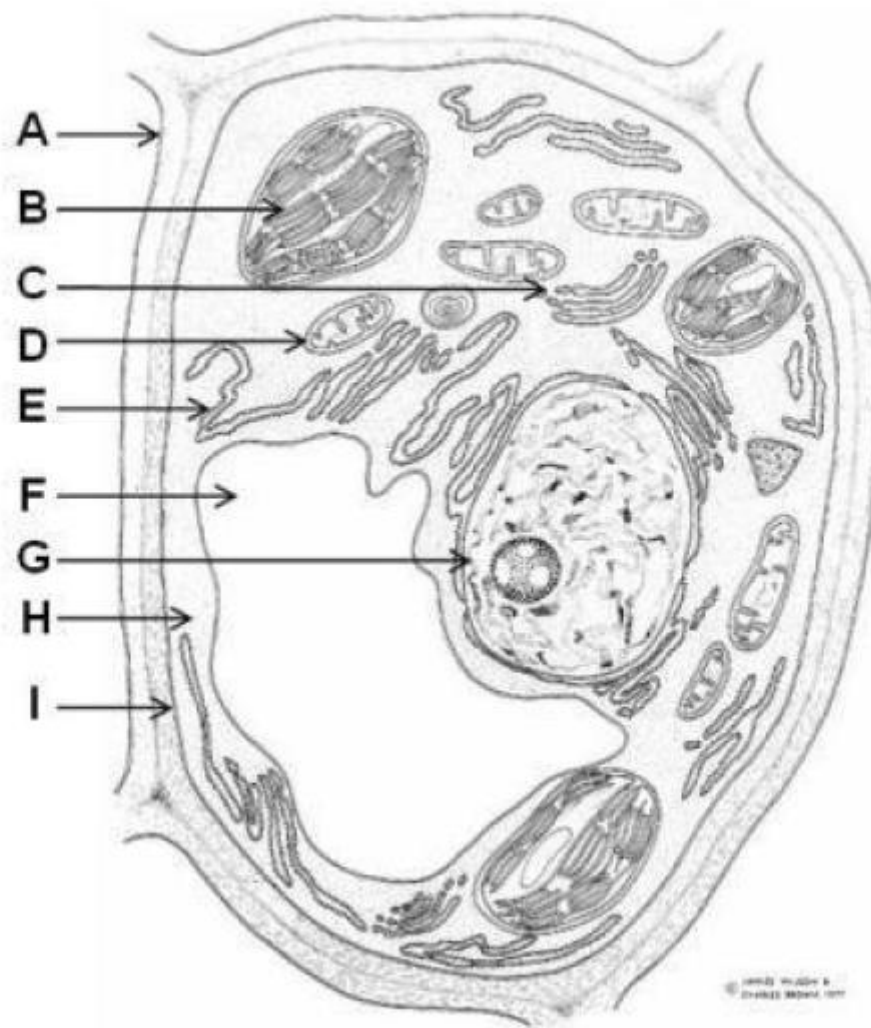
e.g. NaOH : Na + O + H = 23 + 16 + 1 = 40

- a) F<sub>2</sub> .....
- b) Fe .....
- c) H<sub>2</sub>SO<sub>4</sub> .....
- d) Al<sub>2</sub>O<sub>3</sub> .....
- e) Mg(OH)<sub>2</sub> .....
- f) Al(NO<sub>3</sub>)<sub>3</sub> .....





b) This is a diagrammatical representation of a **plant cell** showing its ultrastructure. Try to identify structures A-I



A)
B)
C)
D)
E)
F)
G)
H)
I)



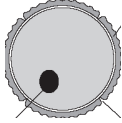

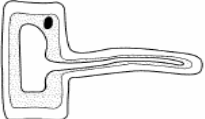

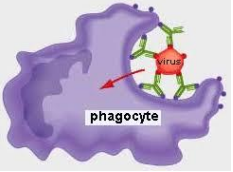
## Q2 – Organelle structure and function

Match the cell structure with its function in the table below. Record your answers in the table below.

Structure	Function
1. Plasma membrane	a. Releasing energy
2. Golgi body	b. Making proteins from amino acids
3. Lysosome	c. Controlling what enters and leaves the cell
4. Nucleus	d. <b>Modifying</b> , enclosing and dispatching proteins
5. Cytoplasm	e. Breaking down and recycling bacteria and worn out organelles
6. Centrioles	f. Making, storing and transporting proteins
7. Smooth endoplasmic reticulum (SER)	g. Surrounding the nucleus
8. Rough endoplasmic reticulum (RER)	h. Organising the spindle in cell division
9. Ribosomes	i. Controlling the activities in the cell
10. Mitochondrion	j. Making and transporting fats

Answers ( write the correct letter ( Function) next to the corresponding number( Structure ))				
1.	2.	3.	4.	5.
6.	7.	8.	9.	10.

### Q3 – Specialised cells – complete the table about the cells below:

Picture	Plant/Animal?	Function (it's job) & features
<p>Red blood cell</p> 		<p>Contains haemoglobin to carry oxygen to the cells.</p>
<p>Sperm cell</p> 		
<p>Egg cell</p> 		
<p>Nerve cell</p> 		
<p><b>Epithelial cell</b></p>		
<p>Root hair cell</p> 		
<p>Palisade cell</p> 		<p>These cells are packed with...</p>
<p>White blood cell</p> 		

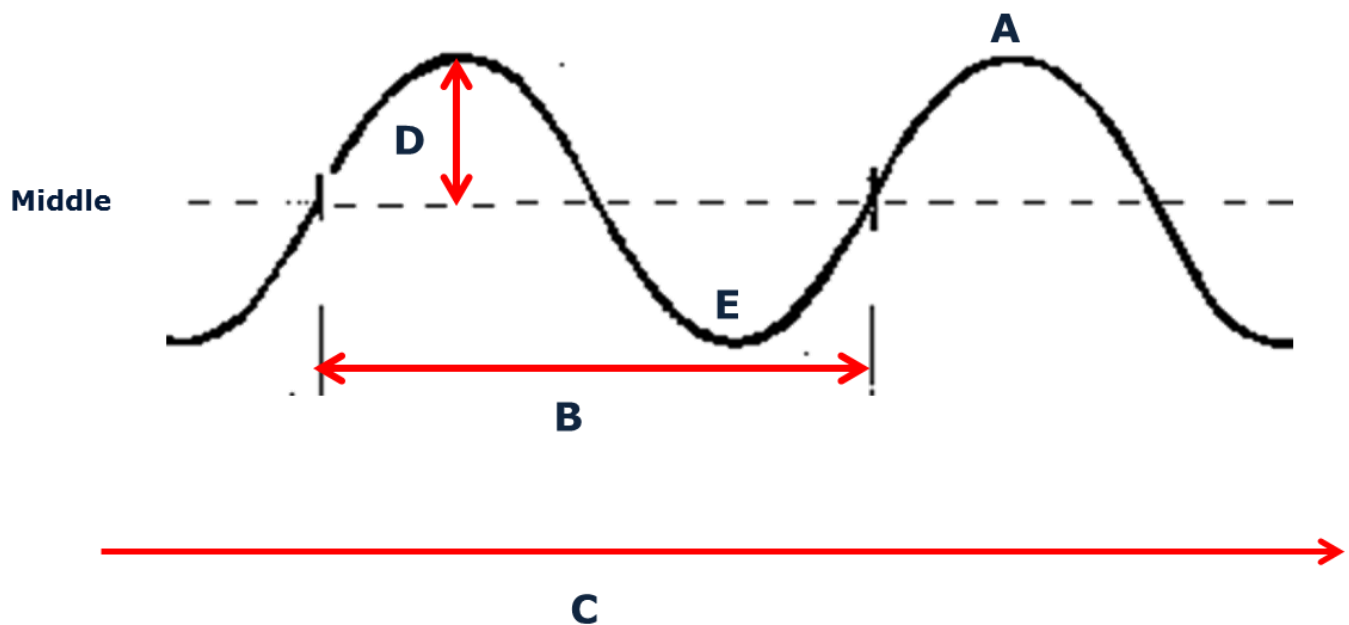
## Physics questions:

### Q1 – Wave features

A transverse wave has five key terms you need to know and be able to label on a diagram.

1. **Wavelength** – This is the distance of one complete wave.
2. **Wave direction** – This is the direction the wave is travelling.
3. **Peak** – The top of the wave.
4. **Trough** – The lowest part of the wave.
5. **Amplitude** – The height of the peak, or the depth of the trough from the middle.

Task: Label the main features of a wave below on the diagram.



## Q2 – Types of Waves

Waves may be longitudinal or transverse.

Describe the differences between longitudinal waves and transverse waves.

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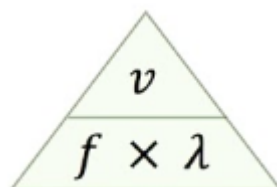
(3)

Name **one** type of wave that may be either transverse or longitudinal.

.....  
(1 mark)

## Q3 – The Wave equation

The wave equation is:



$v$  = velocity  
 $f$  = frequency  
 $\lambda$  = wavelength

**Rearrange** the following:

$v =$

$f =$

$\lambda =$

**What are the units for each symbol?**

## **TASK THREE:**

Learn these definitions and, write them out and learn them word for word!!

<https://olsc.org.uk/wp-content/uploads/2017/10/BTEC-Command-Verbs.docx>

**Please bring the work with you to your first lesson in  
Applied Science!**

AND remember to bring pen, pencil, ruler, eraser, calculator and paper too!

**See you there.....**

