

# Applied Science

## Recommended Text books



**The BTEC Applied science course consists of two units in year 12.**

- Unit 1 is examined. You will be taught Physics, Chemistry and Biology content and there is a 40 minute exam on each of these.
- Unit 2 is coursework. You will have to do 4 pieces of coursework. This is marked by your teacher and then sent off for checking by the exam board.

**The year 13 course has two further units, one examined and one of coursework.**

It is very important to do well in the exams, they are more heavily weighted and contribute more to your overall grade.



## 2 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. You will need to decide what type of bonding is within the atoms of these compounds before you start.

<b>Oxygen gas</b>	<b>Sodium chloride</b>
<b>Magnesium oxide</b>	<b>Water</b>
<b>Carbon dioxide</b>	<b>Calcium chloride</b>
<b>Ethane</b>	<b>Nitrogen gas</b>

### Task 3 - 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 solve speed.

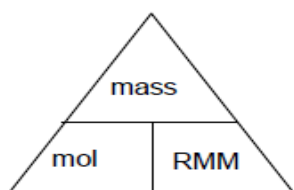
Speed (m/s) = distance (m) / time (s)

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

Distance (m) = speed (m/s) x time (s) Time (s) = distance (m) / speed (m/s)

Rearrange the following:

a)

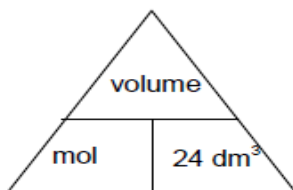


mass =

mol =

RMM =

b)



Volume =

mol =

c)

$$n = c v$$

$c =$

$v =$

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

d) There are  $1000\text{cm}^3$  in  $1\text{dm}^3$ . Convert the following:

1.	$250\text{ cm}^3$ is	$\text{dm}^3$	4.	$0.8\text{ dm}^3$ is	$\text{cm}^3$
2.	$30\text{ cm}^3$ is	$\text{dm}^3$	5.	$10\text{ dm}^3$ is	$\text{cm}^3$
3.	$500\text{ cm}^3$ is	$\text{dm}^3$	6.	$0.0065\text{ dm}^3$ is	$\text{cm}^3$

## Dealing with equations

Forces stretch things, squash things and twist things. When we consider things as whole objects (“bodies” in physics language) then Newton’s Second Law of Motion deals with the way that forces make bodies go faster, slower or change direction. The resultant force acting on a body makes it accelerate, and the size of the acceleration is directly proportional to the size of the force.

$$\text{resultant force (N)} = \text{mass of body (kg)} \times \text{acceleration (ms}^{-2}\text{)}$$

or, in symbols

$$F = m a$$

Example: A car of mass 1000 kg accelerates uniformly from rest at a rate of  $0.75 \text{ ms}^{-2}$ . What is the size of the resultant force accelerating it?

Solution:  $F = m a = 1000 \text{ kg} \times 0.75 \text{ ms}^{-2} = 750 \text{ N}$

Answer the following in the spaces provided:

- A bus of mass 10000 kg accelerates at  $0.25 \text{ ms}^{-2}$ . What is the resultant force acting on it?
- A car pulls a caravan of mass 800 kg. If it accelerates at  $0.4 \text{ ms}^{-2}$ , what force must the caravan experience?

Example: What would the acceleration of a 0.5 kg body be if a force of 10 N acted on it?

Solution:  $F = ma$ . Dividing both sides by  $m$  gives  $F/m = a$ , so  $a = F / m = 10 \text{ N} / 0.5 \text{ kg} = 20 \text{ ms}^{-2}$ .

Answer the following in the spaces provided:

- What would be the initial acceleration of an arrow of mass 0.3 kg shot from a bow if the force from the bow-string is 200 N?
- What would be the acceleration of a train of mass  $10^4 \text{ kg}$  if the force from the engine is 8kN?

## TASK 4

### Biology

#### Cells

The cell is a unifying concept in biology, you will come across it many times during your two years of study. Prokaryotic and eukaryotic cells can be distinguished on the basis of their structure and ultrastructure. In complex multicellular organisms cells are organised into tissues, tissues into organs and organs into systems. During the cell cycle genetic information is copied and passed to daughter cells. Daughter cells formed during mitosis have identical copies of genes while cells formed during meiosis are not genetically identical Read the information on these websites:

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

<http://www.bbc.co.uk/education/guides/zvjycdm/revision>

And take a look at these videos:

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

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

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

: Produce a one page revision guide to share with your class in September summarising one of the following topics: Cells and Cell Ultrastructure, Prokaryotes and Eukaryotes, or Mitosis and Meiosis. Whichever topic you choose, your revision guide should include:

Key words and definitions.

Clearly labelled diagrams

Short explanations of key ideas or processes.