

**Subject:** *BTEC National Extended  
Certificate in Applied Science*

**Exam Board:** *Pearson*

Welcome to the BTEC National Extended Certificate in Applied Science. We are delighted that you are considering this course as an option in Year 12. To demonstrate your commitment to the course and to prepare you for September, you must complete the following tasks to the best of your ability. These tasks are compulsory and must be completed prior to your first Applied Science lesson in Year 12.



We expect you spend at least 3 hours completing the tasks outlined in this pack. The activities have been designed to help you begin to develop some of the key skills you will need for BTEC Applied Science.

**Learning Objectives:**

- To demonstrate a basic understanding of the three key areas of science.
- To develop skills in planning a scientific investigation.
- To start to develop independent learning skills which will be vital in BTEC study.

**Contacts for Support:**

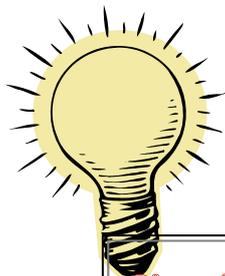
 Mrs North – Please email via Insight or visit room 81

**What is BTEC Applied Science?**



The BTEC Applied Science course is for learners who want to continue their education through applied learning. It provides a vocational context in which learners can develop the knowledge and transferable skills required for employment or higher education. These include; reading scientific and technical texts, effective writing, analytical skills and practical skills.

The course will cover fundamental elements of biology, chemistry and physics, practical laboratory skills as well as how to carry out a scientific investigation.



### *Task 1: Scientific content*

Please complete the questions below. Include references to the sources of information you used.



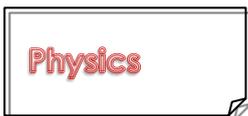
**Chemistry**

1. Using a named example, describe ionic bonding. Include information on the formation of ions due to gain or loss of electrons.
2. Using named examples, use dot and cross diagram to explain how simple covalent compounds are formed.



**Biology**

3. Describe the structure of the following cells and explain how they have been differentiated for their function:
  - palisade mesophyll cells in a leaf
  - sperm and egg cells in reproduction
  - root hair cells in plants
  - white blood cells
  - red blood cells.



**Physics**

4. Use a diagram to explain the following features that are common to all waves:
  - wavelength
  - frequency
  - amplitude
5. What is the difference between transverse and longitudinal waves?



## *Task 2: Planning a scientific investigation*

Planning and conducting scientific research plays an important part in Applied Science. You will need to produce a detailed plan for the following investigation that will enable you to carry it out during the first week of term in September.

### *Investigating the effect of Surface Area on the Rate of Diffusion*

#### **Introduction:**

You will be provided with a large block of agar which has been stained with cresol red dye. Cresol red is an indicator which is red in alkaline conditions and orange in acidic conditions. If you drop the agar into dilute hydrochloric acid it will change colour from red to orange.

#### **Writing your plan:**

Your plan must include the following:

- a hypothesis based on relevant scientific ideas about the rate of diffusion.
- a list of apparatus, including size of specific equipment you will need to carry out the practical safely. Include justifications stating why the equipment has been chosen.
- a risk assessment that should be followed during the investigation.
- the independent, dependent and any control variables for the investigation.
- a clear, logically ordered method to obtain results.
- relevant measurements and the range of measurements to be recorded, including any repeats.
- any precautions that should be taken to ensure the results obtained are precise, accurate and reliable.

#### **Analysing your data:**

- a table in which you have recorded your data.
- A graph that displays your data in the most appropriate form
- A brief analysis of what your data shows and any relevance that this might have to biological organisms

#### **Hints:**

1. A 5cm x 5cm x 5cm cube will have a smaller surface area to volume ratio than a 1cm x 1cm x 1cm cube.
2. The rate of diffusion could be measured by timing how long it takes the cube to change colour.
3. Temperature and concentration of acid will also affect the rate of diffusion