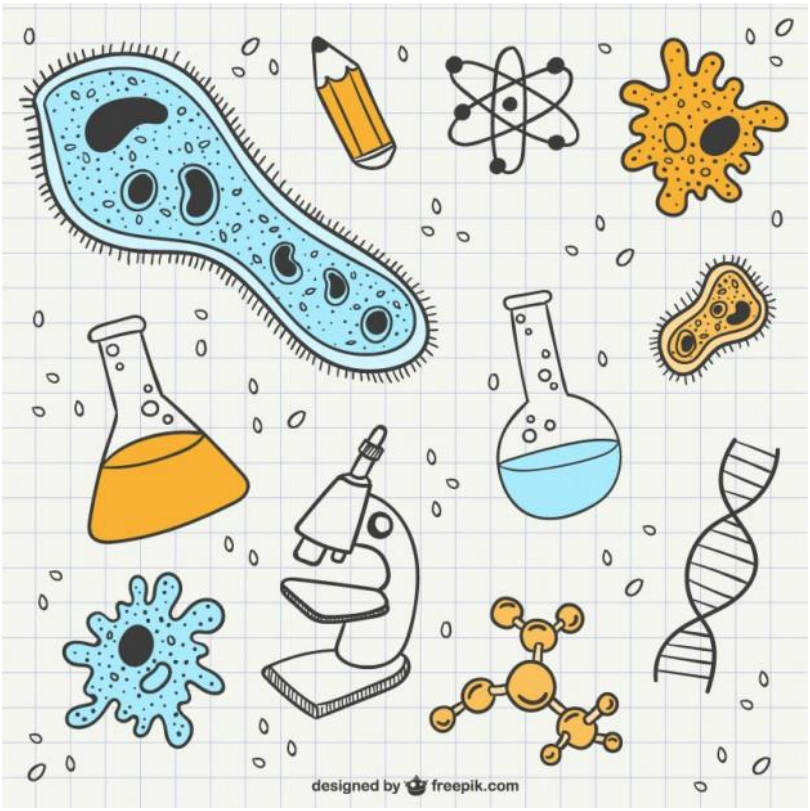
GCSE BIOLOGY



Core Practicals

Log Book

Name:

Class:

Teacher:

Target:

Students are required to carry out all core practicals and make a contemporaneous record of work undertaken.

The following codes are used in this document

- **AT** – use of apparatus and techniques
- **WS**- working scientifically skills
- **Ms** – mathematical skills.

You will be required to use certain techniques and apparatus and demonstrate working scientifically and mathematics skills as described in each of the core practicals below. Questions about these practicals, their procedures techniques and skills will be included in your final GCSE exams.

Papers will contain a number of different types of question which will assess students' practical skills and their understanding of practical techniques.

1. Questions that require a knowledge and understanding of a specific required practical activity procedure.

2. Questions that require a knowledge and understanding of apparatus and techniques from the list, but do not relate to a specific required practical activity.

3. Questions set in a practical context where students require an understanding of the science rather than direct experience of the practical activity**.**

Once a core practical has been completed, you need to add the date of completion to this log.

<u>Required practical activity - Microscopes</u>

Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record length and area. AT 7 – use a microscope to make observations of biological specimens and produce labelled scientific drawings.	
Key opportunities for skills development MS 1d, 3a – use estimations to judge the relative size or area of sub-cellular structures.	

Required practical activity - Microbiology

Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record length and area. AT 3 – use appropriate apparatus and techniques to observe and measure the process of bacterial growth. AT 4 – safe and ethical use of bacteria to measure physiological function and response to antibiotics and antiseptics in the environment. AT 8 – the use of appropriate techniques and qualitative reagents in problem-solving contexts to find the best antibiotic to use or the best concentration of antiseptic to use.	
Key opportunities for skills development WS 2.1 – develop hypotheses about the effectiveness of the antibiotics or antiseptics to be used. WS 2.2 – plan experiments to make observations, test hypotheses and explore phenomena. WS 2.4 – have due regard for accuracy of measurements, and health and safety when using bacterial cultures. MS 5c – calculate cross-sectional areas of bacterial cultures and clear agar jelly using $\pi r2$.	

Required practical activity - Osmosis

Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record mass and time. AT 3 – use appropriate apparatus and techniques to observe and measure the process of osmosis. AT 5 – measure the rate of osmosis by water uptake.	
Key opportunities for skills development WS 2.1 – use the theory of osmosis to create hypotheses on plant tissue. WS 2.2 – plan experiments to test hypotheses. WS 2.4 – have due regard for accuracy of measurements and health and safety. WS 2.6 – make and record observations and measurements of mass. WS 2.7 – evaluate the method and suggest possible improvements and further investigations WS 3.1 – present observations and other data in graphical form. WS 3.2 – translate mass data into graphical form. MS 1a, 1c – use simple compound measures of rate of water uptake.	

MS 1c – use percentages and calculate percentage gain and loss of mass of plant tissue. MS 2b – find mean mass of plant tissue. MS 4a, 4b, 4c, 4d – plot, draw and interpret appropriate graphs.	

Required practical activity – food tests

Use qualitative reagents to test for a range of carbohydrates, lipids and proteins.

To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein.

	Date completed
Apparatus and techniques AT 2 – safe use of a Bunsen burner and a boiling water bath. AT 8 – use of qualitative reagents to identify biological molecules	
Key opportunities for skills development WS 2.4 – carry out experiments appropriately having due regard for the correct manipulation of apparatus, and health and safety considerations.	

Required practical activity-Enzymes

Investigate the effect of pH on the rate of reaction of amylase enzyme.

Students should use a continuous sampling technique to determine the time taken to completely digest a starch solution at a range of pH values. Iodine reagent is to be used to test for starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record the volumes of liquids, time and pH. AT 2 – safe use of a water bath or electric heater. AT 5 – measure the rate of reaction by the colour change of iodine indicator. AT 8 – use of qualitative iodine reagent to identify starch by continuous sampling.	
Key opportunities for skills development WS 2.1 – use scientific theories and explanations and hypothesis on how pH affects amylase activity. WS 2.4 – carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements, and health and safety. WS 2.5 – describe the appropriate sampling technique to ensure samples are representative. WS 2.6 – make and record observations and measurements of time. WS 3.1 – present a graph of amylase activity against pH. WS 3.2 – translate numeric data into graphical form. MS 1a, 1c – carry out rate calculations for chemical reactions.	

Required practical activity - Photosynthesis

Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record the rate of production of oxygen gas produced; and to measure and control the temperature of water in a large beaker that acts as a 'heat shield'. AT 2 – use a thermometer to measure and control temperature of water bath. AT 3 – use appropriate apparatus and techniques to observe and measure the process of oxygen gas production. AT 4 – safe and ethical use and disposal of living pondweed to measure physiological functions and responses to light. AT 5 – measuring rate of reaction by oxygen gas production.	
Key opportunities for skills development WS 2.1 – use scientific theories and explanations to develop hypotheses on how light intensity affects the rate of photosynthesis. WS 2.2 – plan experiments to test hypotheses. WS 2.5 – recognise that multiple samples will be needed at each light intensity. WS 2.6 – make and record observations of gas production. WS 3.1 – present a graph of light intensity against rate of photosynthesis. WS 3.2 – translate numeric data into graphical form. MS 1a, 1c – measure and understand the rate of photosynthesis reactions. MS 4a, 4c – plot and draw appropriate graphs of rate of photosynthesis against light intensity selecting appropriate scale for axes. MS 3a, 3d (HT) – understand and use inverse proportion: the inverse square law and light intensity in the context of photosynthesis.	

Required practical activity – Reaction time

Plan and carry out an investigation into the effect of a factor on human reaction time.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record time. AT 3 – selecting appropriate apparatus and techniques to measure the process of reaction time. AT 4 – safe and ethical use of humans to measure physiological function of reaction time and responses to a chosen factor.	
Key opportunities for skills development MS 4a – translate information between numerical and graphical forms.	

Required practical activity- Plant growth/ germination

Investigate the effect of light or gravity on the growth of newly germinated seedlings.

Record results both as length measurements and as accurate, labelled biological drawings to show the effects.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record length and time. AT 3 – selecting appropriate apparatus and techniques to measure the growth of shoots or roots. AT 4 – safe and ethical use of plants to measure physiological function of growth in response to light or gravity. AT 7 – observations of biological specimens to produce labelled scientific drawings.	
Key opportunities for skills development WS 2.2 – plan experiments to make observations to explore the phenomena of plant responses. WS 2.3 – apply knowledge of a range of techniques, apparatus and materials appropriate to the experiment. WS 2.6 – make and record observations and measurements using length and biological drawings. WS 2.7 – suggest improvements and further investigations. WS 3.1 – present observations as tables, graphs or drawings.	

<u>Required practical activity – field investigations</u>

Measure the population size of a common species in a habitat.

Use sampling techniques to investigate the effect of a factor on the distribution of this species.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record length and area. AT 3 – use transect lines and quadrats to measure distribution of a species. AT 4 – safe and ethical use of organisms and response to a factor in the environment. AT 6 – application of appropriate sampling techniques to investigate the distribution and abundance of organisms in an ecosystem via direct use in the field. AT 8 – use of appropriate techniques in more complex contexts including continuous sampling in an investigation.	
Key opportunities for skills development WS 2.1 – develop hypotheses regarding distribution of a species as a consequence of a factor. WS 2.2 – plan experiments to test hypotheses on distribution. WS 2.3 – apply a range of techniques, including the use of transects and quadrats, and the measurement of an abiotic factor. MS 1d, 3a – estimates of population size based on sampling. MS 2b – calculate arithmetic means. MS 2d – understand principles of sampling.	

MS 2f – understand the terms mean, mode and median as applied to ecological data. MS 4c – plot and draw appropriate graphs selecting appropriate scales for the axes.	

Required practical activity- decay

Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.

	Date completed
Apparatus and techniques AT 1 – use appropriate apparatus to record temperature and pH. AT 3 – the use of appropriate apparatus to measure anaerobic decay. AT 4 – safe use of microorganisms. AT 5 – measurement of rate of decay by pH change.	
Key opportunities for skills development WS 2.1 – use scientific theories to make a hypothesis about the effect of temperature on rate of decay. WS 2.4 – carry out experiments with due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. WS 2.6 – make and record observations and measurements. WS 2.7 – evaluate method and identify possible improvements. MS 1c – calculate rate changes in the decay of biological material. MS 4a – translate information between numerical and graphical form. MS 4c – plot and draw appropriate graphs selecting appropriate scales for the axes.	