**STAGE 2 BIOLOGY**

**ASSESSMENT TYPE 1: Investigations Folio**

**Practical Investigation: Factors affecting the movement of water across the membrane**

**Purpose**

This assessment task provides opportunities for you to demonstrate your ability to:

* work collaboratively to conduct a well planned biological investigation in which you manipulate apparatus, obtain, record and display data, and make appropriate observations
* display the findings appropriately and effectively
* systematically evaluate the data and observations from the investigation and form relevant conclusions.

**Description of assessment**

This is a ‘design’ type practical in which you formulate a hypothesis and design a procedure that allows you to collect data which you can analyse. You also consider safety hazards and how the results of your investigation may be used in a practical application.

**Aim**

You will design an experiment to test a variable that affects the movement of water across a membrane. You will be required to collect and interpret data to make conclusions. You will also need to back up your data with relevant literature to support your conclusions.

**Part A**

* Choose a factor to investigate.
* Write an appropriate hypothesis.
* Identify the independent, dependent, and controlled variables.
* Prepare a list of materials and a detailed plan or method to test the hypothesis, including a rationale of the method used to determine viable results and how they will be recorded.
* Provide this to your teacher before implementing the plan.

**Part B**

**Safety Assessment**

Every activity we do in life has a level of risk, from walking on the street to flying in a plane. It is your responsibility to critically analyse an experiment*before commencing* and identify hazards associated with each experiment and suggest safe operating procedures.

**Examples of hazards may be:**

Use of chemicals, biological specimens, electricity, heat/fire, tripping hazards, glass breakage, falling objects, lasers etc.

**Examples of safe operating procedures may be:**

Use of safety glasses/lab coats/aprons/closed toe shoes, awareness of safety blankets/fire extinguishers/eye wash/safety showers, one group member is designated as a safety officer and is responsible for ensuring procedures are followed, a verbal countdown to ensure that everyone knows that the test is commencing, the establishment of a safety zone, etc.

You need to provide an overall hazard assessment and then identify potential hazards and provide advice on the safe operating procedure to avoid the hazard from causing an issue in the laboratory.

**Part C**

Conduct the investigation, making any adjustments recommended by your teacher. Record your results in a data table you have prepared. Show your teacher the completed data table and your materials before discarding them.

**Part D**

Prepare a report of the investigation which includes the following:

* + an abstract
  + the plan prepared for Part A
  + the safety assessment, Part B
  + data in an appropriate form
  + an analysis of the data
  + an evaluation of the procedures used
  + suggestions for possible improvements
  + a discussion of the reliability and possible sources of random and systematic errors in your data
  + a relevant conclusion based on your data with reference to reliable sources
  + an indication of what you, as a research scientist, might do as a follow-up to this investigation, based on your results.

**Assessment conditions**

This assessment is conducted under direct supervision. One lesson will be allowed for Parts A and B of this assessment, some further lesson time to allow you to implement the plan and to record data, and one lesson will be allowed to complete the report.

2015 Osmosis Practical Assessment Criteria

| - | Investigation | Analysis and Evaluation | Knowledge and Understanding |
| --- | --- | --- | --- |
| A | Designs logical, coherent, and detailed biological investigations.  Critically and logically selects and consistently and appropriately acknowledges information about biology and issues in biology from a range of sources.  Manipulates apparatus and technological tools carefully and highly effectively to implement well-organised, safe, and ethical investigation procedures.  Obtains, records, and displays findings of investigations, using appropriate conventions and formats accurately and highly effectively. | Critically and systematically analyses data and their connections with concepts, to formulate logical and perceptive conclusions and make relevant predictions.  Critically and logically evaluates procedures and suggests a range of appropriate improvements. | Uses a variety of formats to communicate knowledge and understanding of biology coherently and highly effectively. |
| B | Designs well-considered and clear biological investigations.  Logically selects and appropriately acknowledges information about biology and issues in biology from different sources.  Manipulates apparatus and technological tools carefully and mostly effectively to implement organised, safe, and ethical investigation procedures.  Obtains, records, and displays findings of investigations, using appropriate conventions and formats mostly accurately and effectively. | Clearly and logically analyses data and their connections with concepts, to formulate consistent conclusions and make mostly relevant predictions.  Logically evaluates procedures and suggests some appropriate improvements. | Uses a variety of formats to communicate knowledge and understanding of biology coherently and effectively. |
| C | Designs considered and generally clear biological investigations.  Selects with some focus, and mostly appropriately acknowledges, information about biology and issues in biology from different sources.  Manipulates apparatus and technological tools generally carefully and effectively to implement safe and ethical investigation procedures.  Obtains, records, and displays findings of investigations, using generally appropriate conventions and formats with some errors but generally accurately and effectively. | Analyses data and their connections with concepts, to formulate generally appropriate conclusions and make simple predictions, with some relevance.  Evaluates some procedures in biology and suggests some improvements that are generally appropriate. | Applies different formats to communicate knowledge and understanding of biology, with some general effectiveness. |
| D | Prepares the outline of one or more biological investigations.  Selects and may partly acknowledge one or more sources of information about biology or an issue in biology.  Uses apparatus and technological tools with inconsistent care and effectiveness and attempts to implement safe and ethical investigation procedures.  Obtains, records, and displays findings of investigations, using conventions and formats inconsistently, with occasional accuracy and effectiveness. | Describes basic connections between some data and concepts, and attempts to formulate a conclusion and make a simple prediction that may be relevant.  For some procedures, identifies improvements that may be made. | Communicates basic information to others, using one or more formats. |
| E | Identifies a simple procedure for a biological investigation.  Identifies a source of information about biology or an issue in biology.  Attempts to use apparatus and technological tools with limited effectiveness or attention to safe or ethical investigation procedures.  Attempts to record and display some descriptive information about an investigation, with limited accuracy or effectiveness. | Attempts to connect data with concepts, formulate a conclusion, and make a prediction.  Acknowledges the need for improvements in one or more procedures. | Attempts to communicate information about biology. |