Nayland College

#### Biology Investigation

Achievement Standard 91153 v1

**Carry out a practical investigation in a biology context, with supervision**

Credits: 4

Student Instructions Sheet

**Conditions:**

You may work individually or in pairs (of 2 or 3) on the trialling and data gathering but **each student** must do the data recording, processing and write-up **individually**.

You have approximately 5 weeks to complete the practical investigation. Within that 5 weeks you will be given 10 – 12 periods of class time and a further week of homework time.

#### Task 1 Selecting a topic:

You are to develop and carry out an investigation on a biological concept or process of your choice. This can be any concept or process but **you must check** with your teacher to **get supervision** to ensure your plan is workable for an investigation.

Some ideas of biological concepts and processes for investigations are given below:

#### *Enzyme expts: yeast / peroxidase, eggwhite / pepsin,*

* *Respiration in yeast (eg immobilised in alginate beads)*
* *Photosynthesis in aquatic plants*
* *Osmosis expts: potato / flatworm*
* *Model cells (agar) and diffusion*
* *Something that you are interested in*

You really do need to keep a log book to record your thoughts, plans, raw data, observations and so on. Also that will be helpful for your teacher when giving supervision and assessing your involvement in any group work

Also you need to check with the teacher that you have located, or have access to, reference material that will allow you to link your data and conclusion to the findings of other researchers.

#### Task 2 Developing the method

1. **Come up with an idea**… develop a **purpose** for your investigation (an explicit testable question / hypothesis) in relation to a **concept or process** you are investigating.

2. Use the information in the following table as a starting point for the development of a method for your investigation

|  |
| --- |
| For a **fair test** investigation the method should state: |
| the range over which the independent variable will be changedhow the dependent variable will be measuredhow other variables and factors that could have a significant impact on the investigation will be controlledthe equipment needed (discuss this with the teacher before you go any futher)how the results will be checked to see if they are accurate, valid and reliable |

***You will need to carry out a trial in the first week to make sure that your plan actually works and will give you data to work with !!!!***

Write up a ***step by step method*** that someone else could follow. Check that your method includes all the information listed in the bullet points in the table above and that it provides data or information relevant to your hypothesis.

#### Task 3 Carrying out the investigation

1. **Carry out** your investigation, recording any changes that you make to your initial method developed in task 2 above.
2. **Record** data such as observations or measurements (with units) relevant to your investigation in an appropriate way.
3. **Process** your data to produce results that can be compared directly with each other i.e. to enable a trend or pattern (or absence) to be determined

1. **Graph** the processed data in a way that allows you to **interpret the trend** in the data.

#### Task 4 Report *(this is what you will hand in)*

Write a well-organised report on your investigation that includes:

* An introduction coving the purpose of the investigation and the **hypothesis linked to the concept or process you investigated.**
* The **final step by step method** used in the investigation.
* **Recorded measurements** (including units) and observations.
* All **data processed** in a way that allows you to determine a trend or pattern (or absence) relevant to the purpose. This will include tables and graphs if appropriate.
* A **conclusion** analysing your processed data in terms of the purpose of your investigation. This will most likely be just ONE sentence
* **Relevant findings from another source** that you can compare with your data and your conclusion. This must be referenced.
* Discussion of the **reasons** for the presence or absence of a trend, based on their findings AND those from other sources by **explaining the conclusion** in terms of the **biology ideas** relevant to the investigation.
* An **evaluation** of your investigation. This involves a justification of your conclusion by considering the reliability of the data or the validity of the method (i.e. how sources of error, limitations, or bias were minimised or overcome).

Assessment schedule: Biology 91153 Practical Investigation

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| --- | --- | --- |
| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The student is able to carry out and present a report for a practical investigation on an aspect of biology  The report includes:  **Purpose** written as an hypothesis linked to the aspect of biology being investigated.  Final **method** includes a description of   * What data is collected, with units * A range of data/samples, * How **some** other factors (at least two) are considered.   Collecting, recording and processing of data **relevant to the hypothesis**   * Data processed as a table, or graph or calculation of averages * Minor processing errors ignored.   **Reporting on the findings**   * Conclusion reached based on the processed data in relation to the hypothesis of the investigation * Identifies and includes relevant findings from another source. | The student is able to carry out and present a report for an in-depth practical investigation on an aspect of biology  The report includes:  **Purpose** written as an hypothesis linked to the aspect of biology being investigated.  Final **method** includes a description of   * A valid collection of data, with units * How **most** factors such as sampling bias and sources of errors are considered.   Collecting, recording and processing of data **to enable a trend or pattern (or absence) to be determined**   * Data processed accurately as a table, or graph or calculation of averages.   **Reporting on the findings**   * Valid conclusion reached based on the processed data in relation to the hypothesis of the investigation * Discussion of the reasons for the presence or absence of a trend, based on their findings AND those from other sources by explaining the conclusion in terms of the biology ideas relevant to the investigation. | The student is able to carry out and present a report for a comprehensive practical investigation on an aspect of biology  The report includes:   * As for M   AND   * Justifies the choices made during the in-depth investigation by evaluating the validity of the method or reliability of the data * Discussion of the reasons for the presence or absence of a trend, based on their findings AND those from other sources by explaining the conclusion in terms of the biology ideas relevant to the investigation. |
| Teacher verification that the student was taking an active part in the practical work and recorded their own data | | |