

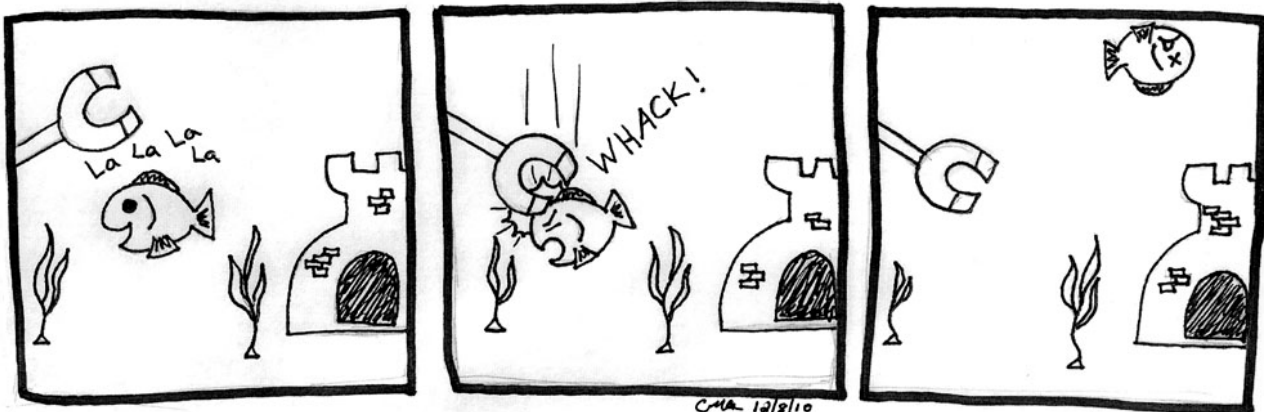
Haileybury College

HAILEYBURY Unit 1 BIOLOGY

EXTENDED PRACTICAL INVESTIGATION (EPI)

Student guidelines for designing, conducting and reporting an extended practical investigation relating to certain aspects of the Unit 1 Biology Course

The Importance of Experimental Design



Let's see if the subject responds to magnetic stimuli... ADMINISTER THE MAGNET!

Interesting...there seems to be a significant decrease in heart rate. The fish must sense the magnetic field.

EPI

INFORMATION BOOKLET

Name: _____

Extended Practical Investigation OVERVIEW

Introduction

The investigation that you will be carrying out is from the Unit 1 Biology course. Students will work in pairs (or on their own) to carry out the investigation. **You cannot work in a group of 3.** Each group will need to complete a planning process document, which will be written after teacher consultation. The area of investigation must be from the following topics:

<p><u>1. Microscope work</u> Investigating the relationship between heat and paramecium speed. Investigate the relationship between leaf size and stomata number. Investigate the relationship between cell size and cell type.</p>	<p><u>6. Physiological adaptations</u> Investigating relationships of exercise on pulse, weight, breathing rate or height.</p>
<p><u>2. Behavioural adaptations</u> Investigating the movement of meal worms when exposed to different light intensities/humidities.</p>	<p><u>7. Structural adaptations</u> Investigating the effect SA:V has on the rate of heat loss.</p>
<p><u>3. Seeds</u> Test the effect of salinity on seed germination (this would need to be set up early).</p>	<p><u>8. Cellulose tubing</u> Investigating the relationship between volume and glucose concentration.</p>
<p><u>4. Seedlings</u> Investigating the effect of light intensity/colour/heat on the growth of plants (this would need to be set up early).</p>	<p><u>9. Ecology</u> Investigate the relationship between the number of quadrats thrown and the accuracy of the population calculation.</p>
<p><u>5. Vit C</u> Investigating the Vit C content of different forms of a particular food item.</p>	<p><u>10. Osmosis</u> Investigate the osmotic point of a selected vegetable (could be compared to potato).</p>

The following points should be noted:

1. Students are encouraged to work in groups; however, there may be situations where you will work on your own.
2. ***Each group must design and conduct their own experimental investigation.***
3. In your planning, you will need to address any safety concerns – your experiment needs to be signed off by your teacher.
4. It is important that you perform an in-depth analysis of the experiment and provide scientific reasoning and explanations for your findings.
5. Furthermore, you should focus on the reliability of your findings and sources of experimental uncertainty, as well as identify the possible use of digital technologies to improve your data.
6. ***Each student must present their findings to the class as a poster – you can use the e-poster available on Go2 or construct your own .***

Four stages of the EPI task

The EPI task will be conducted in four stages.

EPI Stage	Time Allocation
Introduction	One Period
Planning	One Period
Implementation – Testing Equipment and Collecting Data	One week
Analysis & Evaluation	Two Periods/Home

Stage 1

Introduction

This is the class where your teacher will introduce the idea of the practical investigation. You need to come up with an idea that is testable (the hypothesis specified) and addresses the criteria outlined. This should be discussed with your teacher.

Stage 2

Planning Session

The topics will have been presented to you during the introduction session. ***At the end of the planning session, each group must complete and submit a Planning Sheet which includes the hypothesis, materials and method to be used.*** This will be assessed by your teacher; however, modifications to the experiment may need to be done. You cannot proceed to the implementation stage until your teacher is satisfied with your plan.

Stage 2 Implementation Sessions – Testing Equipment and Collecting Data

One week will be allocated to testing your equipment and collecting your data. During these sessions you will need to:

- make insightful and detailed observations
- collect relevant data to test hypotheses and make predictions
- analyse data and interpret results
- estimate sources of uncertainty
- recognise the limitations of the experimental design

Stage 3 Analysis & Evaluation Sessions

Each group should analyse the findings of their experimental investigation. ***You will need to use the assessment criteria to guide your analyses.*** Each student will be responsible for the analysis and evaluation. Groups have been assessed up to this point; however, each student will be assessed individually for the results, discussion, conclusion and references section. There are several points you should cover when analysing and evaluating your experiment.

- All data tables should be included (make sure they are properly labelled and processed)
- Graphs should be included (computer graphs are reasonable as long as they are properly scaled + formatted + labelled + with title)
- Evaluation of the results (falls in the heading of discussion).
 1. Describe the main trends observed (use data to illustrate)
 2. Explain the biology behind the observed trends
 3. Discuss the accuracy of your data (repetition, outliers)
 4. Discuss the impact error had on the accuracy of the data collected
 5. Discuss how to reduce the impact of this error
- Write a short conclusion. Initially the conclusion should make reference to the hypothesis (was it supported, rejected or partially supported). Following this, there should be a summary of the experiment, using the data to illustrate your findings. A comment on how confident you are of the accuracy of your findings including any further experiments that could be conducted based on the findings.

Stage 4 Presentation of Investigation

Each student will present their investigation as a poster. You are encouraged to use the template available on Go2. The final copy needs to be submitted as a colour A3 poster and you need to submit this booklet with a signature in the area allocated after the assessment rubric on page 7.

Student Planning Sheet

(This sheet will need to be completed as part of your planning sheet and handed into your teacher)

Student Name: _____ Partner's Name: _____

Experiment Title: _____ (1)

1. The aim of the investigation (be general)

_____ (2)

2. The hypothesis of the investigation (be specific)

_____ (2)

3. What are the variables that are relevant to your investigation (both IV and DV)

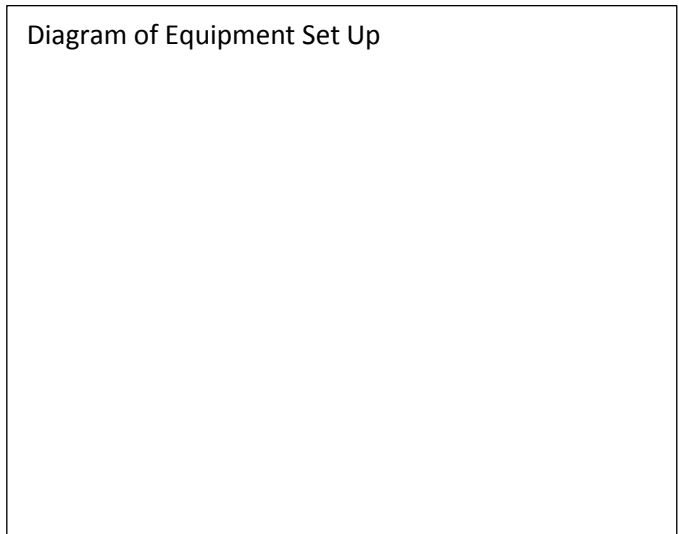
4. Which variables will you control?

_____ (2)

5. Equipment list (be specific)

_____ (2)

Diagram of Equipment Set Up



6. What method are you going to follow (be clear and justify each step)

(2)

7. Any special requirements (other than equipment)

8. What measurements/observations will you make and how will you record it?

9. How many measurements/observations will you make (remember the 5X5 rule)?

10. What information do you hope to gain from your measurements/observations?



HAILEYBURY

VCE BIOLOGY EPI COVER SHEET



Unit 1 Biology: Extended Practical Investigation

Name: _____ Date: _____ Teacher: _____

Assessment Criteria

	0	1	2	3
Poster set out as a scientific poster (Most sections completed / All sections present including / submitted as a hard copy colour poster)				
Title (Clear concise title given)				
Aim (Aim present / an accurate statement of the intentions)				
Hypothesis (hypothesis written but difficult to follow / clear concise hypothesis)				
Variables (Variables discussed but some inaccuracies / IV, DV and controlled variables discussed)				
Materials (List of materials given / Details of each of the materials given)				
Method (A method given / Easy to follow, could be used by someone else)				
Results				
Results Table (Data presented / Title, Labels, Units / data completely processed)				
Graph (Graph presented / Correct graph type, Title, Axis, Labels / correct type of graph properly scaled)				
Discussion				
1. Description of the trends illustrated by the graph (refer to data when doing this). (Basic description of trends / Description also refers to data)				
2. An Explanation of the trends. (Basic explanation / detailed explanation making reference to data)				
3. Relating finding to theory (basic reference /				
4. Accuracy discussion. (Basic explanation / detailed explanation using data to illustrate)				
5. One experimental error, impact on the data collection & how this error could be minimized to reduce its impact (Realistic error / impact of the error / reduce the impact)				
6. Conclusion (General conclusion / hypothesis discussion included /				
7. References (List of references / Correct scientific referencing)				

STUDENT DECLARATION

I am aware of the consequences of plagiarism.

I declare that the material in this assessment task is my own written creation and that I have acknowledged the writing/work sourced from other authors.

Signed: _____ Date: _____

Practical Report = _____