Individual Research Project

KEY DATES:

- ☐ **Equipment Order and Risk Assessment** In class Week 4 Term 1, by Friday 23/02/2024
- ☐ **Self-Evaluation** Week 6 Term 1 during class time
- ☐ **Draft Submission for Feedback** Wednesday 13/03/24 Week 7 Term 1
- ☐ **Final Copy** By 3.20pm in hardcopy 21/03/2024 Week 8 Term 1

'Science is simply the word we use to describe a method of organizing our curiosity'

~ Tim Minchin

Student: _____

Teacher: ☐ Lawrence ☐ Nielsen

Topic of Investigation: Testing a Product Claim

Introduction: Your IRP

The Process:

Not all investigations can be defined as open-ended investigations. In conducting the IRP, you will need to develop your own investigation relating to the topic of Motion.

The 5 basic steps will involve:

- Developing problem that is to be solved
- Listing equipment/resources needed to undertake an investigation
- Planning a procedure for the investigation
- Gathering your results and presenting possible answers to the posed problem
- Concluding with the most common answer given to the posed problem.

Your IRP:

At the end of your IRP, you will need to present both your logbook and your typed scientific report, including:

- ☐ Planning and recording all your work in your logbook
- ☐ Developing a timeline for your research (see scaffold)
- ☐ Submitting your equipment order and risk assessment
- ☐ Completing a self-evaluation of your progress
- ☐ Conducting your experiment
- ☐ Processing your data into a typed report
- ☐ Submitting a draft for teacher feedback
- ☐ Finalising and presenting your IRP report with your logbook by the due date

Logbook: A rough record

Instructions to students

Part of the assessment of your IRP is for the final report and part for your planning and the work you complete along the way. To help your planning and work during the research project, you will need to keep a logbook. This is a record of what you do each time you work on your IRP.

Note: Your logbook is a diary of your research project only.

Here are some suggestions for your logbook:

- Begin your logbook with an outline of what your IRP is about – information provided by the teacher, what you want to investigate, what activities you think you will carry out and why you have chosen this topic. Discuss this outline with your teacher and make any changes suggested.
- Set out a week-by-week plan (a timeline) of what you plan to do. This plan may change as you go along, but it will help to set the work out at the beginning – it will surprise you how much there is to do. Your teacher will provide a scaffold for you to fill in.
- Treat your logbook as a diary – record every piece of work you do (eg library visits, interviews, telephone calls). This is your way of showing your teacher that you have taken the IRP seriously and worked consistently.
- Record the details of all books, magazines, websites etc, while using them so that it is easy to complete a bibliography for your final report. Include author, title, publisher, date of publication and the page numbers if relevant. This will save time later when you need to do your reference list.
- Record your failures as well as your successes – keep a record of strategies you considered to solve the problem and why you rejected some and kept others. Note phone call details, even if the person you called was no help; record details of library visits even if you could not find the information you needed; and record all letters/emails sent, even if you did not receive replies.
- Record all the details of the hands-on investigations you carried out including the planned procedure, equipment used, modifications to the procedure and why these were made, risk assessment and how hazards were minimised, and the results obtained.
  NOTE: Taking photographs over the period of the IRP is a good way to record your investigation procedure, observations and results.

Do not rewrite your logbook – it is meant to be your original work.

Getting Started: Some common Product Claims

Typing Your Report: A Checklist

☐ Title: *My Project*
A short name that describes what your project is about.

☐ Aim: *A statement on what you are trying to achieve*
Eg. To determine the effect of ------- on ---------.

☐ Background: *Research- related to your experiment (information will vary depending on your chosen topic)*

Answer the following questions:

1. States the products' claim, gives a detailed explanation of how the product is made, and its price point
2. What is the purpose of the claim that your product is making?
3. What physical or chemical aspect of the product helps it to make the claim? How is it different to TWO competitors?
4. Gives details of TWO experiments' methods and who/when they were conducted
5. Gives details of TWO experiments' results and how they are similar or different to own experiment prediction

☐ Hypothesis: *What I think may happen*
An educated guess based on your research, which predicts a solution to the aim of the experiment.

☐ Variables: *How do I keep it fair?*
A list of all factors that could affect the investigation:-

- ☐ The one factor you will vary
- ☐ The one factor you will observe &/or measure
- ☐ The factors you will keep the same

☐ Equipment: *What will I use?*

- ☐ List all materials & equipment required, including amounts or sizes as appropriate.
- ☐ Complete your equipment order by _____

☐ Risk Assessment: *How do I stay safe during my investigation?*

- ☐ Tabulate risks and precautions
- ☐ Complete your Risk Assessment by _____

☐ Method: *How do I carry out the experiment?*

- ☐ Numbered, Step by step order of how you carry out the experiment.
- ☐ Starts with a verb
- ☐ Use impersonal language (no 'I' or 'We')
- ☐ Repeat your experiment a minimum of three times & average results.
- ☐ Include a labelled diagram and/or annotated photograph demonstrating your experimental method.

☐ Results: *What Happened?*

LOGBOOK

- ☐ Record observations &/or measurements as you go in the logbook.
- ☐ Include things that go wrong.
- ☐ The log book is your rough copy.

EXPERIMENTAL REPORT:

- ☐ A neat copy of your results is then presented as a table in your experimental report. You could use EXCEL to generate this.
- ☐ The RESULTS TABLE should show results for each trial, and an average result.
- ☐ For one of your average calculations, you need to show your working.
- ☐ GRAPH AVERAGES of your results either by hand or using Excel. You could generate multiple graphs with one per trial, or multiple data sets on one graph (this is often better to compare trends).
- ☐ Photographs of your observations should be included to show evidence of your experiment.

☐ Discussion: *Explains your results*

TRENDS:

- ☐ Describe the results you obtained
- ☐ identify evident trends and patterns in your results
- ☐ assess the accuracy of any measurements.

PROBLEMS:

- ☐ Discuss TWO problems you encountered and ways of improving your experiment.
- ☐ Suggest TWO ways of reducing errors.

RELIABILITY:

- ☐ Compare your results with the research you discovered, are they the same or different?
- ☐ Reflects on the accuracy of the product claim. Is it correct? Why or why not?
- ☐ Suggest further experiments that could be done to investigate your topic in more depth

☐ Conclusion: *Did I achieve what I set out to do in the aim?*

- ☐ Summarises the trend in the data and what you found out by doing this experiment.
- ☐ Did your experiment's results answer your aim?

☐ Bibliography: *Sources of information for Background research*

- ☐ You must include a Reference List which lists all the places you found information about the topic.
- ☐ Organise your Reference List according to Harvard referencing (see Stage 5 Assessment Handbook 2024)

Sample Questions:

Purpose of these questions:
The questions below may be a useful tool to lead you in starting your logbook. They are starting points for your research, and should be used to help you work your way through your investigation.

You are encouraged to utilize the marking criteria supplied as a checklist. Have a friend, parent or teacher look through your work, checking to ensure you have addressed each point.

Questions to start you thinking…

What am I going to investigate?

What do I think will happen? Why?

Which variables am I going to:

- change?
- measure?
- keep the same?

How will I make it a fair test?

What equipment will I need?

What happened?

Can my results be presented as a graph?

What do my results tell me? Are there any relationships, patterns or trends?

How can I explain the relationships, patterns or trends in my results?

What did I find out about the problem I investigated? How was the outcome different from my prediction?

What difficulties did I experience in doing this investigation?

How could I improve this investigation, eg fairness, accuracy?

Timeline: Scaffold for Logbook

Date due	*Student research project*	*Student comment*	*Teacher comment*
Week	Teacher: • introduces IRP • sets class timeline Students: • purchase logbook • brainstorm and record ideas for the IRP • review the process, establish expectations, requirements and assessment criteria for IRP	*It is important that the student is able to honestly self-monitor throughout the project if there is to be genuine development of organisational and analytical skills*	Comments could relate to: • degree of student's success in following their plan and timeline • suggestions for improving student's research, procedure, processes and quality of product
Week	Student: • identifies problem to be investigated and sources of information • records question/hypothesis • identifies strategies and solutions • outlines investigation plan • sets own goals and individual timeline • discusses proposed question and plan outline with teacher • submits logbook for checking		
Week	Student: • discusses proposed question, planned investigation and risk assessment with teacher • carries out initial testing using proposed equipment • evaluates procedure, makes and records modifications • performs investigation		
Week	Student: • prepares outline of report including procedure, results, preliminary discussion and conclusions • submits and discusses report outline with teacher		
Week	Student: • presents final report in an appropriate format • presents logbook • provides IRP timeline and self-evaluation		
Week	Teacher: • provides individuals and teams with feedback		*Comments and feedback to be based on the IRP marking criteria*

Equipment Order: Due _____

Item	Quantity

Prepared: _____ Date: _____

Risk Assessment: Due _____

Risk What could go wrong?	Precaution How can I prevent it?

Teacher Comments:

_____

_____

_____

Teacher Signoff: _____ Date: _____

Self-Evaluation: How am I going?

My IRP is due on _____.

I have now had my IRP for _____ days/weeks.

I have spent _____ hours on my IRP.

1. What is my IRP about? (Use point form.)

_____

_____

_____

2. Have I followed my plan? What changes have I had to make to my plan? Why were the changes needed?

_____

_____

_____

_____

3. What I have done so far in my IRP is:

_____

_____

_____

_____

4. How do I feel about the work I've done so far?

_____

_____

_____

5. What do I still have to do to complete my IRP? (Outline of my plan, which includes dates and what I will do each day/week.)

_____

_____

_____

_____

_____

_____

_____

_____

6. Action Plan:

3 actions for now…	What needs to be done?	When will I do it by?
Most Important		
Next important		
Next important		

I have _____ days/weeks until my IRP is due.

Teacher's comment:

_____

_____

_____

_____

Signature: _____ Date: _____

Marking Criteria:

Subheading	Description	Your Marks	Possible Marks	Section Total
Log Book	Hand written background research findings		5	/25
	Detailed notes around planning experiment		5	
	Several sequential dates that reflect the method of the experiment		5	
	Raw data, notes, measurements, sketches etc		5	
	Evidence of first-hand investigation eg: photos		5	
Equipment Order	All materials required are listed		2	/4
	Order form is submitted punctually		2	
Risk Assessment	Lists 4 risks (physical, chemical or biological)		2	/6
	Provides 4 precautions for minimizing identified risks		2	
	Risk Assessment is submitted punctually		2	
Aim	Appropriate aim for investigation linking independent and dependent variables		3	/3
Hypothesis	Provides a justified and educated prediction of the outcome of the experiment, supported by their background research		2	/2
Background Research	1. States the products' claim, gives a detailed explanation of how the product is made, and its price point		4	/21
	2. What is the purpose of the claim that your product is making?		3	
	3. What physical or chemical aspect of the product helps it to make the claim? How is it different to TWO competitors?		6	
	4. Gives details of TWO experiments' methods and who/when they were conducted		4	
	5. Gives details of TWO experiments' results and how they are similar or different to own experiment prediction		4	
Variables	Correctly identifies independent variable		1	/5
	Correctly identifies dependent variable		1	
	Correctly identifies multiple (3) controlled variables		3	
Materials	All equipment required for method is listed		2	/4
	Matches the equipment order in logbook		2	
Method	Steps to method are sequential (ordered) and numbered		2	/8
	Steps begin with a verb and are specific in quantities		2	
	Lists all steps in an impersonal, concise and logical manner		2	
	Includes a labelled diagram or photograph		2	

Results	Includes photos of performing experiment		2	
	Tabulated record of appropriate measurements taken during the experiment showing evidence of repetition		4	
	Calculates averages from multiple trials, including working		4	
	Experimental results displayed in an appropriate graph/chart		4	/14
Discussion	Describes results in words		2	
	Identifies any trends/patterns in the results		2	
	Assesses the accuracy of any measurements taken		2	
	Identifies TWO problems with the experiment and explains their impact on the results		4	
	Discusses TWO ways these problems were addressed		2	
	Suggests TWO ways (2) of reducing identified (2) sources of error		4	
	Reflects on the background research findings and identifies similarities or differences in their own data		4	
	Reflects on the accuracy of the product claim. Is it correct? Why or why not?		4	
	Suggests further research/experiments that could be done to investigate the topic in more depth		2	/26
Conclusion	Summarises overall findings of the experiment		1	
	Reflects the variables of the experiment		1	
	Evaluates the success of the experiment in meeting the aim		2	/4
Drafting process	Submitted draft to teacher by due date		2	
	Applied teacher feedback to make multiple (5) corrections to final report		5	/7
Report Presentation	Provides a coversheet with title, student name and teacher		3	
	Provides a Reference List with several sources (5)		5	
	Utilised Harvard Referencing for acknowledging sources		5	
	Places Student Name and Teacher Name in header		2	
	Places Page Number in footer		1	/16
Feedback: **Signature:** _____ **Date:** _____		**TASK TOTAL:** /145	**TASK RANK:**	**Cumulative RANK:**

Standardised NESA Grade

Grade	*A student at this grade typically:*
A	▪ applies extensive knowledge and understanding of scientific models, theories and laws, and about the nature, use and influence of science ▪ identifies and proposes valid scientific hypotheses, asks questions and makes evidence based predictions ▪ creates, plans and organises appropriate, risk-assessed, safe, and ethical first-hand scientific investigations both individually and collaboratively ▪ uses critical thinking skills to evaluate trends, patterns and relationships to draw evidence-based scientific conclusions ▪ effectively gathers, selects, organises and processes first-hand and secondary sourced data and information to evaluate issues and inform creative solutions using appropriate digital technologies ▪ communicates comprehensive understanding of scientific ideas, and related evidence for a particular purpose and audience using scientific units, language conventions and text types.
B	▪ applies thorough knowledge and understanding of scientific models, theories and laws, and about the nature, use and influence of science ▪ identifies and proposes coherent hypotheses, asks questions and makes logical predictions ▪ plans and organises appropriate, risk-assessed, safe, and ethical first-hand scientific investigations ▪ uses critical thinking skills to explain trends, patterns and relationships to draw scientific conclusions ▪ systematically gathers, selects, organises and processes first-hand and secondary sourced data and information to explain issues and inform problem-solving using appropriate digital technologies ▪ communicates well-developed understanding of scientific ideas to an audience using scientific units and language conventions.
C	▪ demonstrates sound knowledge and understanding of scientific models, theories and laws, and about the nature, use and influence of science ▪ identifies and proposes related hypotheses, asks questions and make predictions ▪ plans and performs safe, ethical first-hand scientific investigations ▪ explains trends, patterns and relationships to draw scientific conclusions ▪ gathers and selects first-hand and secondary sourced data and information to identify issues and participate in problem-solving using appropriate digital technologies ▪ communicates sound understanding of scientific ideas to an audience.
D	▪ demonstrates basic knowledge and understanding of scientific models, theories and laws, and about the use and influence of science ▪ asks questions and makes some predictions ▪ performs safe, ethical first-hand scientific investigations ▪ describes trends, patterns and draws some conclusions ▪ uses first-hand and secondary sourced data and information, and appropriate digital technologies, to assist in the problem-solving process ▪ communicates basic scientific understanding to an audience.
E	▪ demonstrates elementary knowledge and understanding of some scientific principles, and about some uses of science ▪ asks questions and attempts prediction ▪ performs safe, ethical first-hand scientific investigations with guidance ▪ recounts conclusions ▪ uses information provided and, with assistance, participates in problem-solving activities ▪ with guidance, communicates elementary scientific information to an audience.

Teacher Signature: _____ Date: _____