Year 10 Science 2017

Assessment Task 1
Student Research Project

Handbook

Timeline and checklist:

Step	Task	Page Reference	Due
1	❑ Acquire a **logbook**.	p2	Week 2 Tue 7th *OR* Wed 8th Feb
2	❑ Complete a **mindmap** of your interests in science.	p3	Week 2 Tue 7th *OR* Wed 8th Feb
3	❑ State the **research question** for your project. ❑ Research the topic. ❑ Write up the **research**. ❑ **Reference** sources of information correctly.	p4	Week 3 Wed 15th Feb
4	❑ State the **variables**. ❑ Formulate an **aim** and **hypothesis**.	p5	Week 4 Wed 22nd Feb *OR* Fri 24th Feb
5	❑ List **materials**. ❑ Write the **method**. ❑ Complete a **risk assessment**.	p6	Week 4 Wed 22nd Feb *OR* Fri 24th Feb
6	❑ Perform the **experiment**.	p6	Week 6 Fri 10th March
7	❑ Record **results**.	p7	Week 6 Fri 10th March
8	❑ Write the **discussion**. ❑ Write the **conclusion**.	p8	Week 7 Fri 17th March
9	❑ Submit completed SRP.	p8	Week 9 Mon 27th March

Year 10 Science 2017

Assessment Task 1

Student Research Project

Introduction:

The aim of the Student Research Project (SRP) is for you to scientifically investigate something you are interested in. All Year 10 SRPs will be presented in a Calrossy Science Fair later in the year. Some projects will also be selected for entry into competitions which may award cash and prizes. Your project will be displayed so put in your best effort.

Step 1: The Log book

Your log book is where you record everything that you do for your SRP. You will need to provide a separate book that will be a log book for your SRP.

✍ **To do:**

- ❑ Get a logbook (such as a 48 page binder book).
- ❑ Paste the marking criteria sheets into your logbook.

Step 2: Choosing a topic

What you investigate is your choice. **The best projects are about something you are interested in!!!!** There are plenty of resources on the internet to give you ideas, such as:

www.sciencebuddies.org

www.sciencemadesimple.com/

Advice for choosing a topic:-

- Choose a project that you will enjoy. Make sure you choose something that it is possible for you to complete.
- You have to be able to **measure** something in your experiment. Things you can easily measure include: distance, temperature, time, mass, pH.
- Keep it simple! It is very difficult to draw conclusions from an investigation with lots of different measurements. Focus on measuring the effect of one variable only.
- If you are doing a project with animals, remember you will need to assess how ethical your experiment is and possibly have it checked by the school's Ethics Committee.
- Any experiment that involves significant risks will have to be evaluated by your teacher.
- Some experiments such as those where you 'bounce balls of different temperatures' or 'measure reaction times of different groups of people' have been done many times. Original ideas are best. Do not simply repeat someone else's experiment you find in the internet (but if you like their ideas you can do a similar project).

✍ **To do:**

- ❑ Using a mind map, make notes **in your log book** about:
  - Areas of science and other subjects that you enjoy
  - Your hobbies and interests outside of school
  - Subjects that you are likely to study in Year 11 and 12
  - Ideas that you have for your SRP, including possible research question(s)

Step 3: Research

Once you have decided on your research question, in the next stage of your SRP you need to do some background research regarding your question. Remember to focus on collecting your information from reliable sources.

Good sources of information	Not so good sources of information
Come from a credible source	Come from a source with poor credibility
Not too old	Out of date
Not biased, acknowledges limitations of information	Not objective and fair, biased towards one point of view
Free of errors	Prone to errors
Properly cite the original source of all information	Do not cite where the information came from
Easy for other people to find or obtain	Difficult for others to obtain

✍ **To do:**

Complete the following in your log book:-

- ❑ State the **research question** you wish to investigate.
- ❑ Use at least 3 reliable sources to gather information about your topic.
- ❑ Complete 1 A4 page (500 words) of **handwritten** research on your topic (DO NOT PLAGIARISE - USE YOUR OWN WORDS).
  Use "GLOW" as a scaffold:
  Gather information
  List key points
  Organise ideas based on similarities
  Write a draft
- ❑ Write a **reference list** correctly (See Appendix 1)

Step 4: Variables, Aim and Hypothesis

Variables

A **variable** is any factor, trait, or condition that can exist in differing amounts or types. An experiment usually has three kinds of variables: *independent, dependent, and controlled*.
The **independent** variable is the one that is changed by the scientist. To ensure a fair test, a good experiment has only one independent variable.
The **dependent** variable is what you measure/collect as your *results* (data).
Controlled variables are factors that kept constant. Most experiments have more than one controlled variable.
In an experiment, data is collected. There are two types of data:

- **Qualitative-** data such as words (eg. from interviews), pictures (eg. video), or objects (eg. an artifact).
- **Quantitative-** numerical data.

Hypothesis

A hypothesis is often constructed as an 'If…then' statement. For example, "If nitrogen fertiliser is applied to pea seedlings, then plants will produce more dry matter". Another way of saying this is: "Nitrogen fertiliser will increase pea seedling growth in terms of dry matter compared to pea plants not receiving nitrogen fertiliser."

✍ **To do:**

Answer the following in your log book:-

- ❑ What is the **Independent variable** for your experiment?
- ❑ What is the **Dependent variable** for your experiment?
- ❑ What are the **Controlled variables** for your experiment?
- ❑ What are you going to **measure**? How?
- ❑ Is your data **Qualitative or Quantitative**?
- ❑ State the **aim** of your investigation.
- ❑ Write a **hypothesis** for your investigation

Step 5: Design your experiment

✍ **To do:**

In your log book:-

- ❑ Write a detailed **materials** list.
- ❑ Write the **method**. It should have numbered steps and contain enough detail so that someone else could use your method to carry out your experiment.
  Things to consider:

  Reliability: Your experiment must be repeated at least three times to ensure that your results are reliable. A RELIABLE EXPERIMENT IS ONE WHICH PRODUCES CONSISTENT RESULTS ACROSS MULTIPLE REPEATS.

  Control: Some experiments involve comparison with a control group. Does yours?

- ❑ Write a **risk assessment** for your experiment in the following form:

Risk (and *level* of risk)	Precaution

Step 6: Perform and document your experiment

✍ **To do:**

- ❑ Carry out your experiment.

In your log book:-

Important: Have someone take photos of YOU carrying out your experiment. These are proof that you did the experiment and MUST be stuck into your logbook and your final report.

- ❑ **Each photo MUST be accompanied by a description of what is happening in each picture.**
- ❑ Record any difficulties you experienced.
- ❑ Record any changes to your method you needed to make.
- ❑ Record your raw data (include units) and observations.

Step 7: Record results

Now that you have collected your raw data, you need to decide on the best way to present your results. You will need to include table(s) *and* graph(s) in the results section of your final report. You may also need to perform calculations using your raw data.

Graphs

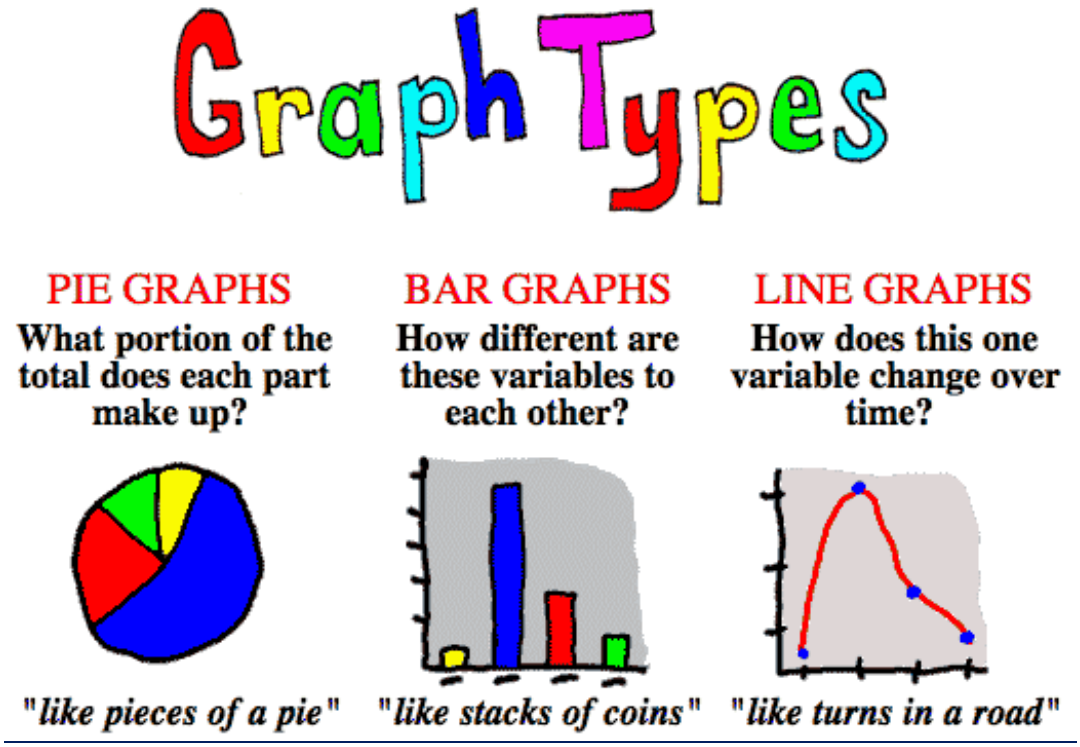
For any type of graph:

- Generally, you should place your independent variable on the x-axis of your graph and the dependent variable on the y-axis.
- Be sure to label the axes of your graph— don't forget to include the units of measurement (grams, centimeters, litres, etc.).
- If you have more than one set of data, show each series in a different color or symbol and include a legend with clear labels.

✍ **To do:**

In your log book:-

- ❑ Record your results in an appropriate **table**.
- ❑ Draw appropriate **graph(s)** to show your results.



Step 8: Write a Discussion and Conclusion

The analysis and explanation of your experimental findings are detailed in the discussion section of your report. In this section, you have the opportunity to show your analytical and critical thinking skills.

✍ **To do:**

In your log book:-

- ❑ Write a **discussion** for your experiment. In the discussion you need to:
  - Interpret and explain your results.
  - Show how your results relate to your research and your hypothesis.
  - Discuss the **reliability** of your experiment. Did you repeat it enough times or have a large enough sample size and were your results consistent?
  - Discuss the **validity** of your experiment. How well did you test your aim? Were there any defects in your experimental design or procedure? What are the sources of error? Did you control necessary variables?
  - How could your experiment be improved? Make plausible suggestions.
  - What implications do your results have for the real world? Why is your research valuable?
  - Outline any new research questions or areas for future research that your results have suggested.

- ❑ Write a **conclusion** for your experiment.

Step 9: Submit the final SRP report

As you have completed each step in the SRP, your teacher has provided feedback and suggestions. Type up a scientific report for your SRP, making sure that you have made any changes suggested by your teacher. Also make sure that you edit your work. The final report will **not** be in submitted in your logbook.

✍ **To do:**

Submit your final typed report, ensuring that it includes the following sections:

Title, Aim, Hypothesis, Materials, Risk Assessment, Method, Results, Discussion, Conclusion.

APPENDIX 1

Referencing

There are standard ways to reference your sources. If you use any other type of source not mentioned here, or need more information go to
http://www.une.edu.au/__data/assets/pdf_file/0007/12958/REF_APA-Referencing.pdf

Web document:

Author/editor or compiler Year of the most recent version, *Title*, version number (if applicable), description of document (if applicable), name and place of the sponsor of the source, viewed Day Month Year, <URL either full location details or just the main site details>.
Eg:
Anderson, J (Minister for Transport and Regional Services) 2000, *CASA approves avgas contamination test*, media release, 23 January, Department of Transport and Regional Services,Canberra, viewed 7 February 2000, <http://www.dotrs.gov.au/media/anders/archive/2000/jan_00/al6_2000.htm>.

Web document (no author):

Title Year, version number (if applicable), description of document (if applicable), name and place of the sponsor of the source, viewed Day Month Year, <URL either full location details or just the main site details>.
Eg:
Educating America for the 21st century: developing a strategic plan for educational leadership by Columbia University 1993-2000 (initial workshop draft) 1994, draft workshop report, Institute for Learning technologies,Columbia University, viewed 16 May 1995, <http://ariel.adgrp.com/~ghb/trips/940717_ICT/policy/ILT/EdPlan.html>.

Web document (no publication date):

Author n.d., *Title*, version number (if applicable), description of document (if applicable), name and place of the sponsor of the source, viewed Day Month Year, <URL either full location or just main site details>.
Eg:
Sherman, C n.d., *The invisible web*, Free Pint Limited, UK, viewed 27 November 2000, <http://www.freepint.co.uk/issues/080600.htm#feature>.

Web site:

Author (the person or organisation responsible for the site) Year (that the site was created or last revised), name and place of the sponsor of the source, viewed Day Month Year,<URL>.
Eg:
The Body Shop Australia 2003, The Body Shop Australia, Mulgrave, Victoria, viewed 31 January 2003, <http://www.thebodyshop.com.au/>.

Online images:

Author (the person or organisation responsible, if available) Year, *Title of image (or a description*), description of document (if applicable), name and place of the sponsor of the source, viewed Day Month Year, <URL either full location details or just the main site details>.
If there is no named author, put the image title first followed by the date.
Title of image (or a description) Year, description of document (if applicable), name and place of the sponsor of the source, viewed Day Month Year, <URL either full location details or just the main site details>.
Eg:
The lunar interior 1999, PlanetScapes, US, viewed 31 January 2003, <http://www.planetscapes.com/solar/browse/moon/moonint.jpg>.