
# GOLD COAST SCHOOLS SCIENCE COMPETITION

Open to all state, independent and catholic primary and secondary schools in South East Queensland and Northern New South Wales.

## 4 - 7 September 2023

Science on the GO!
Griffith University Science Outreach Program

Queensland Government

GRIFFITH UNIVERSITY

# GRIFFITH UNIVERSITY
# GOLD COAST SCIENCE COMPETITION

When: 4-7 September 2023
Where: Queensland Academies - Health Sciences campus (QAHS)
102 Edmund Rice Drive
Southport, QLD, 4125
Deliveries received: Monday 4 September - 7.30am to 3pm to QAHS
Judging: Monday 4 September - 4.00pm until finish (7pm)
Notification of Winners: Tue 5th and Wed 6th September
Open for viewing: Thursday 7th September 4.00pm - 6.00pm,
Awards Ceremony: Thursday 7th September at 6.00pm,
QAHS Lecture Theatre
Collection/Pickup & take home of Entries: After Awards Ceremony or Friday 8th September– 8:00am to 2.00pm

Categories

- Scientific Investigations
- Engineering and Technology Projects
- Classified Collections
- Communicating Science
- Environmental Action Project


2023 Divisions

- Prep
- Years 1-2
- Years 3-4
- Years 5-6
- Years 7-8
- Years 9-10
- Years 11-12

Students may work individually or in pairs

*Registration & Payment*

- Registrations open online approx. 1 month prior.
- Register online at www.griffith.edu.au/science-competition
- Only entries that are registered online will be judged
- Previously entered projects (from 2022 or earlier) will not be judged
- $5.00 per entry –
  An invoice will be sent to schools with registered entries once registrations have been finalised

During the registration process, each registered school must nominate at least 1 judge for the judging on 4 September (4pm until finish) at the QAHS

## Conditions of Entry:

Every registered entry must:

- include a signed statement by the teacher confirming 100% child's work (See Appendix 1)
- include a scientific notebook (reflective journal) (See Appendix 2)
- be identified with a label with the following details (see diagram below):
  - Student Name/s
  - School
  - Division
  - Category
  - Title
  - If multiple parts label each part eg Part 1 of 2

**Part _____ of _____**

**Name:**

**School:**

**Division:** **Prep | Yrs. 1-2 | Yrs. 3-4 | Yrs. 5-6 | Yrs. 7-8 | Yrs. 9-10 | Yrs. 11-12**

**Category:**

**Title:**

## FOR FURTHER INFORMATION

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# SCIENTIFIC INVESTIGATIONS

This category is eligible for the STAQ (Science Teachers Association of QLD) Science competition with pathways to the BHP Billiton Science and Engineering Awards.

## The Task:

Design and perform a scientific investigation and report on the results obtained and the conclusions reached.

## What to do:

- Choose a topic, there are no restrictions.
- Keep a day-by-day Scientific Notebook that explains what you do and why (see Appendix 2) Students may work individually or in pairs.
- Ask questions about your topic.
- Collect the necessary background information about your topic.
- Design and perform one or more experiments that will make up the investigation.
- Analyse the results and draw your conclusions.
- Present a report to tell others what you did and what you found out.
- Include any references and acknowledge the assistance you receive.
- Scientific Notebook (see Appendix 2).


## What makes a winning entry?

| | |
|---|---|
| RELEVANCE OF TOPIC | Reason why this topic was chosen is detailed<br>Topic chosen is original and relevant |
| | Focus question is testable<br>The investigation is an original and creative approach to solving the problem showing ingenuity/originality |
| SCIENTIFIC RESEARCH | Evidence of scientific research |
| | Background research is sufficient and relevant |
| EXPERIMENTAL DESIGN | Investigation contains elements of a fair test |
| | Variables are identified (independent, dependant, controlled and<br>monitored) and described |
| | Effective controlling and monitoring of variables |
| | Method allows for collection of sufficient relevant data |
| | Identification/Discussion of any errors/problems experienced during the investigation.<br>Eg: If I did this again…., I repeated the process because…, I observed that… |
| DATA | Sufficient relevant data is collected |
| | Data is displayed appropriately to present findings.<br>Eg. graphs, tables, photos, drawings, etc |
| CONCLUSION | Writes a conclusion that discusses the key findings of the investigation. |
| | Eg: Was my initial aim/ hypotheses achieved? |
| NOTEBOOK | Notebook contains evidence of scientific thought |
| | Accurate/ detailed notes of findings, decisions and thought processes are evident |
| SCIENTIFIC LITERACY | Appropriate use of scientific language |
| | Required elements of a Scientific Report are included |
| | Sources have been cited |

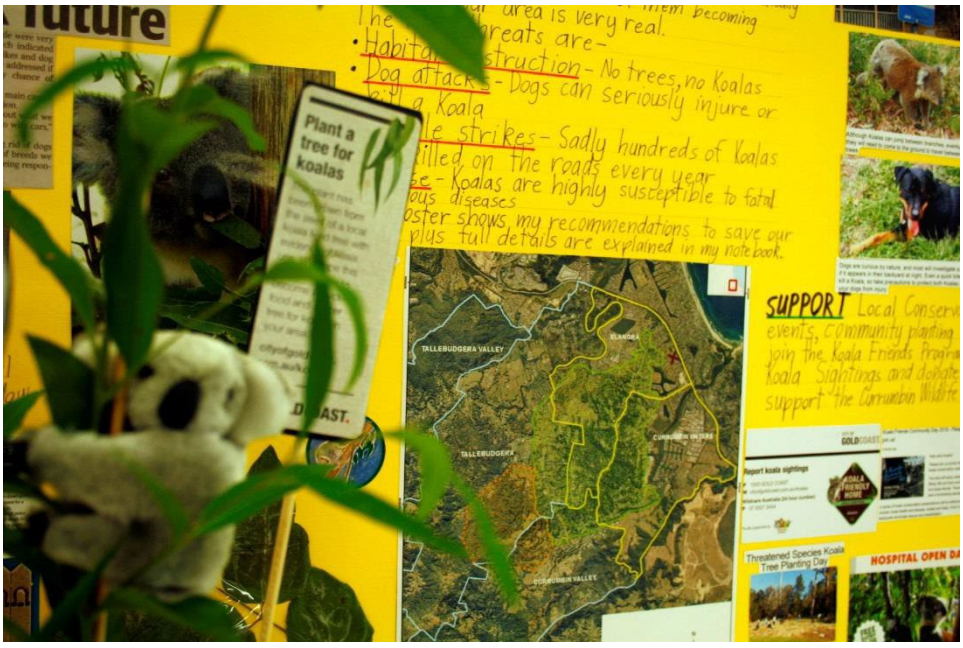
# ENVIRONMENTAL ACTION PROJECT

## The Task:

To identify, research, investigate and present recommendations about a local environmental issue.

Some examples of local action projects;

- Green Power
- Rainwater Harvesting
- Energy Conservation
- Recycling
- Pollution
- Soil quality
- Greenhouse effect
- Climate change
- Air Quality
- Recycling
- Renewable Energy
- Water Purification
- Waste Management
- Balanced Ecosystem
- Organic Garden




## What to do

- Identify and research a local environmental issue. Students may work individually or in pairs.
- With the help of people in the community, set about investigating and resolving the problem
- Choose the medium to present your project e.g. poster or report.
- Provide recommendations for future action
- Scientific Notebook (see Appendix 2)

## What makes a winning entry?

| | |
|---|---|
| RELEVANCE OF TOPIC | Topic chosen is original and relevant<br>Demonstrates an original and creative approach to solving an environmental problem. |
| | Relevance to the broader community is clearly articulated |
| SCIENTIFIC RESEARCH | Evidence of scientific research such as:<br>Collection of data/information about the exiting problem is provided. (age appropriate)<br>Explains how the issue links to scientific knowledge and understanding. |
| DISCUSSION | Shows a clear understanding of a LOCAL environmental issue Eg. What is the problem?<br>What are the reasons that an action plan is required?<br>Evidence of consultation with the community about the issue is shared to set up the action plan. Eg: emails, letters, interviews, survey or questionnaire.<br>Presentation of the data collected. eg: tables or graphs.<br>Shows a clear understanding of the environmental issue with a concise action plan to help resolve the issue identified. |
| | Identifies a possible solution/s to the issue and provides a concise action plan to help resolve the issue identified. |
| CONCLUSION | Clear explanation of:<br>- how the action plan has addressed the problem<br>- ways in which the outcomes reflect the original aims for the action project |
| NOTEBOOK | Records the problem and actions of the project.<br>Accurate/ detailed notes of findings, decisions and thought processes are evident eg. brainstorming matrix, diagrams, lists |
| SCIENTIFIC LITERACY | Appropriate use of scientific language & sources are cited. |

# ENGINEERING AND TECHNOLOGY PROJECTS

This category is eligible for the STAQ (Science Teachers Association of QLD) Science competition with pathways to the BHP Billiton Science and Engineering Awards.

## The Task

Create a device or product to demonstrate a scientific principle, solve a problem or offer a different approach to a problem

## What to do:

The entry must be a physical device or product with dimensions not exceeding *76cm in depth, 122cm in width and 100cm in height.*
*Adhering to the following criteria will ensure that entries are eligible to progress to the BHP Billiton Awards if selected*:
The entry :

- must not be static except for new devices or products
- must satisfy one of the following:
  - Demonstrate a scientific principle;
  - Solve a problem; or
  - Offer a different approach to a problem
- must be accompanied by a Scientific Notebook (see Appendix 2) Students may work individually or in pairs.

Entries that make use of 240v power must be accompanied by a signed note of compliance as being supervised during the construction and testing by an appropriately qualified person.

Although some of the following may be used in the development phases they will not be accepted as part of the display:

1) Living organisms, including plants
2) Soil, sand, rock, and/or waste samples, even if permanently encased in a slab of acrylic
3) Taxidermy specimens or parts
4) Preserved vertebrate or invertebrate animals
5) Human or animal food
6) Human/animal parts or body fluids (for example, blood, urine)
7) Plant materials (living, dead, or preserved) that are in their raw, unprocessed, or non-manufactured state
8) All chemicals including water (Projects may not use water in any form in a demonstration)
9) All hazardous substances or devices (eg. poisons, drugs, firearms, weapons, ammunition, reloading devices, and lasers)
10) Dry ice or other sublimating solids
11) Sharp items (for example, syringes, needles, pipettes, knives)
12) Flames or highly flammable materials
13) Batteries with open-top cells
14) Glass or glass objects
15) Any apparatus deemed unsafe by the coordinator or judges (for example, large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks, etc.)

# What makes a winning entry?

| | | |
|---|---|---|
| The Design Thinking Process | Choice of Topic<br>DEFINE | Define/outline the problem to be solved.<br>ie: The problem should be real-world, significant, age appropriate and relevant. |
| | | Plausible aims for the Device/Product are provided.<br>ie: Explain how the device/product demonstrates a scientific principle, solves a problem or offers a different and new approach to a problem |
| | Plan the Project<br>IDEATE | Provides evidence of the initial design ideas for the device/product.<br>eg: Shown via note-taking, diagrams, research provided, surveys etc. (age appropriate) |
| | | Evidence of a plan to solve the initial problem is provided.<br>ie: Written processes, labelled diagrams, visual representations |
| | | Consideration of ways in which safety has been considered in the designing/creation of the prototype is provided.<br>ie: Via parental support, specific safety materials are used in its construction. |
| | The Design Phase<br>a) The prototype<br><br>b) The Testing and Implement Phase | Selection of materials is provided. |
| | | The construction process is clearly outlined and age appropriate.<br>Eg: Written steps, photographic evidence with captions of the construction phase. |
| | | Describes or provides visual evidence of the testing process for the prototype. |
| | | Includes outline of the successes and the failures. Suggests improvements as a result.<br>Considers and records changes to the prototype as a result of the testing. |
| | | Evidence of data collected during the testing phase. (age appropriate)<br>eg: surveys, tables, graphs, photo evidence/captions |
| | | Evidence of the final design is shared.<br>It should have dimensions not exceeding 76cm in depth, 122cm in width and 100cm in height) |
| Notebook | | Notebook contains evidence of scientific thought<br>Accurate/ detailed notes of findings, decisions and thought processes are evident<br>Accompanied with a 2-5 min presentation of the device/product in operation. Ie. PPT, Video, gif, online link |

# CLASSIFIED COLLECTIONS

## The Task:

To compile and present a scientific classified collection to show relationships between the items in the collection, or to assist in their recognition. Classified collection examples include a collection of specimens of plants, rocks, insects, shells etc.


## What to do:

- Plan, collect, classify and display/organise specimens of a collection to:
  - Help in the understanding of the material that is being collected or
  - Help in the solution of some other problem
- Explain how they have classified the collection using a specific legend or key and an explanation in their notebook about it.
  - Scientific Notebook (See Appendix 2) Students may work individually or in pairs.

A guide to collecting in different fields of natural science:

Botany

A classified plant collection might deal with a group of plants (e.g. ferns, conifers, palms, grasses, eucalypts, wattles), it might be the flowers of plants that are found in a particular area, or it might be a collection classified according to leaf shapes, flower or fruit characters, or chemical components (aromatic leaves), or it may be for a purpose such as identifying weeds in a locality. In these cases, it is important to explain why the collection was undertaken, and to show how the classification was developed.

- Use the new Griffith University "Grows at Griffith" App to assist you to identify your plant species - it provides plant family name, scientific name, location, distribution and other interesting details.
- A collection of seeds might investigate the relationships between seed composition (carbohydrate, protein, fat) and taxonomic group, or between seed size and plant habit (food plant, weed, and forest plant).
- A collection of weeds would ideally include some information that assisted in their identification (a key of some sort as discussed below), and comments on issues such as their importance, origin, manner of spread and difficulty of control.
- A collection of herbs might examine how they are distributed between families of plants, their regions of origin, and how they are used (directly or after processing).
- How to preserve plant specimens:
  - Choose specimens that contain stem, leaf, flowers, fruit/nut, seeds if possible.
  - Layout newspaper (greater than the size of specimen), add 2 layers of paper towel, place specimen on paper towel, add 2 more layers of paper towel, then a layer of newspaper; continue process with the next specimen; press specimens by placing in a flower press or by placing a heavy object on top eg. Books; change paper towel and paper daily; continue for 1-2 weeks.
- Display specimens with a label: with common name, scientific name, date of collection, location of collection.

Geology

A classified geological collection becomes more valuable when the relationships between rock types are examined, or when the collection is assembled to assist in the identification of rocks or minerals. Relationships between rock types may be examined on a local or a larger scale, but there should be a question asked concerning these relationships. An assemblage of rock types for identification should concentrate either on a class of rocks or on minerals that are important in a locality or region (e.g. important commercial minerals).

- Display specimens with a label: e.g. Identification, date of collection, location of collection

Entomology

A classified insect collection might concentrate on the insects occurring in a backyard over a period of time, or it might concentrate on a particular group of insects that can be collected from a region, or it might survey the orders of insects that can be collected in a region. The purpose for the collection should be to increase understanding of insects, and this purpose should be made clear in the Scientific Notebook.

- Displaying specimens:
  - See Queensland Museum website for preservation & pinning methods: http://www.qm.qld.gov.au/microsites/wild/pdf/Preserving-Pinning-Insects-Handout.pdf
  - Keep display enclosed with moth balls
  - Labelling: e.g. Identification, date of collection, location of collection

Zoology

A classified collection of animals (other than insects) will usually be of durable discarded parts (shells or feathers). Shells are used to identify some invertebrates, so the taxonomic relationships may be examined at a number of scales of organisation. Feathers are attractive, but the purpose of collecting and classifying should be more than to simply gather and arrange. There may be an opportunity to examine the relationship between feather size and bird size, or habitat (for example, is it possible to show that water birds have different feathers from land birds?), so there is a question behind the collection.

- Display specimens with a label: e.g. Identification, date of collection, location of collection

IMPORTANT!

Protected Species

Be aware that there are a number of protected species and protected areas in Queensland where collecting is prohibited. They are protected because they are valuable or vulnerable. Ensure that collected specimens are not listed by the Department of Environment and Heritage Protection or collected from a protected area. Go to: http://www.ehp.qld.gov.au/wildlife/threatened-species/

## What makes a winning entry?

| | |
|---|---|
| SPECIMEN COLLECTION | Demonstrates an original, clear and creative approach to the choice of specimens and their display |
| COLLECTION CLASSIFICATION | Appropriate classification system is evident and used which shows the relationships between items |
| | An appropriate table of characteristics or key is used for classification |
| | Includes a scientific description of the classification system used and why it was chosen |
| CLASSIFICATION DISPLAY | Specimens are preserved and displayed appropriately |
| | Specimens are labelled appropriately |
| CLASSIFICATION RESEARCH | Evidence of scientific research |
| | Background research is sufficient and relevant |
| SCIENTIFIC RELEVANCE | Collection is scientifically relevant with relationships clearly evident |
| NOTEBOOK | Notebook contains evidence of scientific thought |
| | Accurate/ detailed notes of findings, decisions and thought processes are evident |
| SCIENTIFIC LITERACY | Appropriate use of scientific language |
| | Sources have been cited |

# COMMUNICATING SCIENCE

## The Task:

To explain and communicate information about a scientific concept to a specified audience

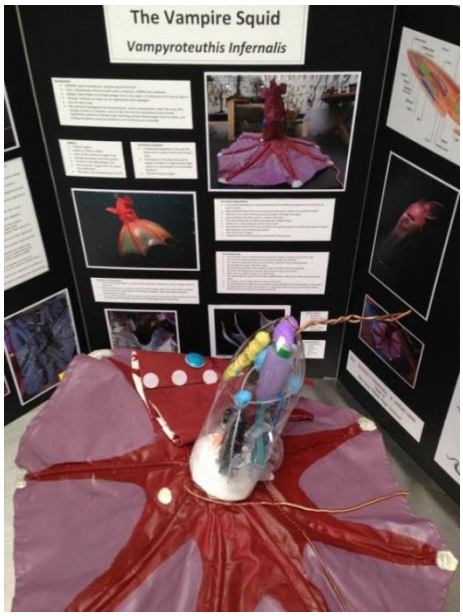
## What to do:

- Present a scientific concept using a communication medium (Model, Poster, PowerPoint Presentation, Game, Comic Strip). Students may work individually or in pairs.
- Scientific Notebook (see Appendix 2)
- Written report (see below)

Your written report should:

- clearly & briefly explain the scientific concept you have chosen.
  - ・include your background research information, references and permission to use copyrighted material (if applicable)
- identify and describe the target audience (examples could be: preschool students, aged pensioners without a scientific background, the general community)
- justify your choice of communication medium for your target audience

Choices of Communication Mode




Model

- 3D representation of a scientific concept including title, labels
- Not exceed 600mmH x 500mmD x 600mmW (HeightxDepthxWidth)
- Original construction

Cartoon/Comic Strip

- A single or series of cartoons which are hand drawn or computer generated which communicate a scientific concept
- The presentation must not exceed an A1 size (600mm x 840mm).
- The cartoons/images must not be subject to copyright or a letter stating that you have received permission to use the work
- The comic strip must be an original piece of work.

Game

- The game may be a board or a computer generated game which communicates a scientific concept
- The game must be an original piece of work.
- Clear Instructions must be included.

Poster

- A single or series of diagrams/paintings/drawings with text which communicates a scientific concept
- The poster must be "flat" or 2D two dimensional.
- The presentation must not exceed 850mm x 1200mm.
- The images must not be subject to copyright or a letter stating that you have received permission to use the work
- The presentation must be an original piece of work.

PowerPoint Presentation

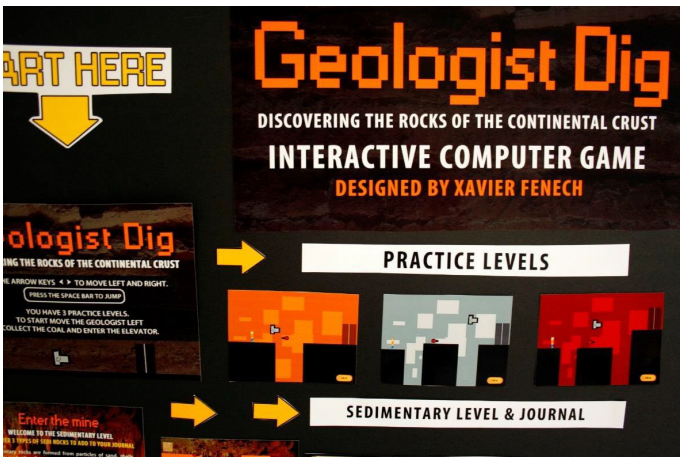
- A series of slides with/without sound which communicates a scientific concept – with paper printout of slides
- The presentation must be an original piece of work.
- The images must not be subject to copyright or a letter stating that you have received permission to use the work

Multi-media presentation

- A visual media presentation which communicates a scientific principle
- The presentation must be an original piece of work not longer than 2 minutes
- The images must not be subject to copyright otherwise a letter stating that you have received permission to use the work

## What makes a winning entry?

| | |
|---|---|
| RELEVANCE OF TOPIC | Topic chosen is original and relevant<br>Relevance to the broader community is clearly articulated<br>The topic/scientific concept choice is clearly explained and/or justified with reasoning for its selection. |
| SCIENTIFIC RESEARCH | Background research information is evident to support the topic/concept choice.<br>Evidence of the application of science knowledge to effectively communicate the scientific concept. It is age appropriate for the audience intended. |
| AUDIENCE | Clear explanation of intended audience<br>Explanation of how the communication medium is suited to the identified target audience is evident and justified. |
| COMMUNICATION | Communication is concise and effective for the identified audience.<br><br>Demonstrates and original and creative approach to solving the problem showing ingenuity/originality<br>Represents and communicate observations, ideas and findings using formal and informal representations<br>Visually appealing and effective use of design principles for the selected medium<br>Meets specifications for the category – cartoon/comic strip; Game; Poster; PowerPoint Presentation; website or model or video |
| OVERALL PRESENTATION | Presentation is informative<br>Presentation is entertaining/visually appealing<br>Presentation is effective and clearly articulated |
| NOTEBOOK | Notebook contains evidence of scientific thought<br>Accurate/ detailed notes of findings, decisions and thought processes are evident |
| SCIENTIFIC LITERACY | Appropriate use of scientific language & sources have been cited |



# APPENDIX 1
# GOLD COAST SCIENCE COMPETITION 2023
# STUDENT WORK AUTHENTICATION LETTER

The following letter must be submitted for each registered entry into the competition, signed & dated by student/parent and teacher.

Student Name:

School:

Division:

Category:

Project Title:

Dear Competition Judges,

By signing this document, I declare that the work submitted as an entry in the Gold Coast Science Competition is my own work. I have not previously submitted all or part of this work in previous Gold Coast Science Competitions.

Student/Parent Name:

Student/Parent Signature:

Date:

As a teacher of the above student, I support this authentication letter

Teacher Name:

Teacher Signature:

Date:

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# APPENDIX 2
# SCIENTIFIC NOTEBOOK

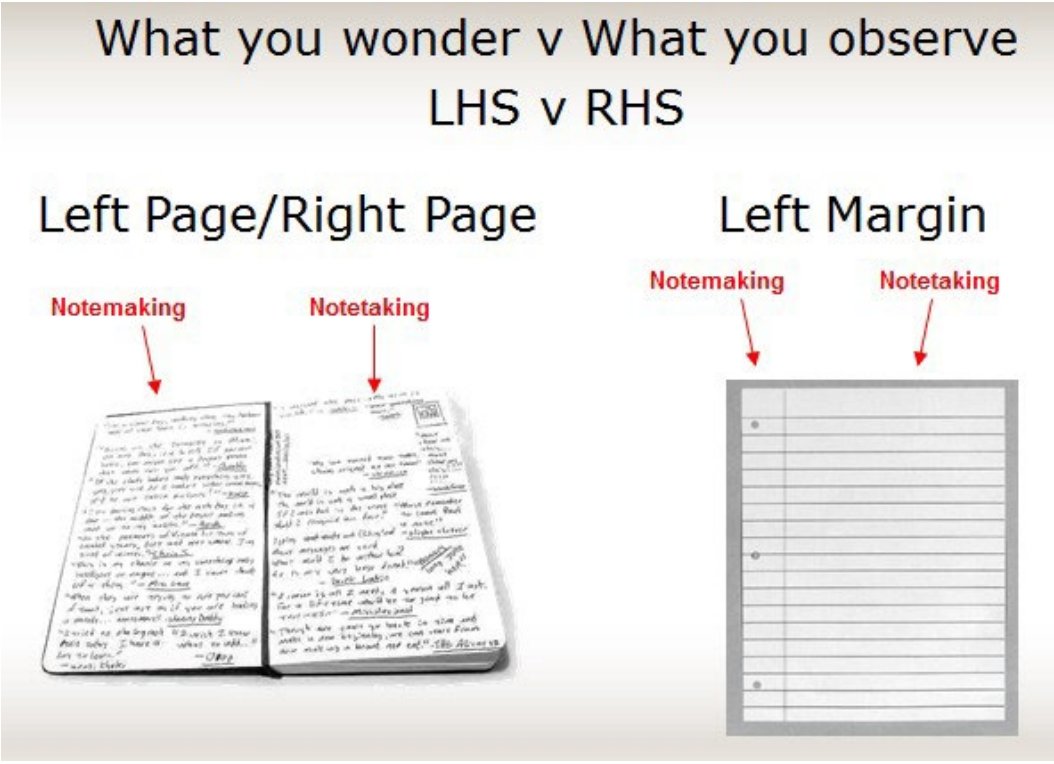
The Scientific Notebook is very important in showing the purpose behind the study, and the way in which the question evolved and was tackled, as well as a record of how the project progressed over time. A Scientific Notebook helps the student make sense of their science learning.

- A Scientific Notebook should be kept as a record of what was completed on different days – include dates
- A Scientific Notebook should contain evidence of scientific thought – include thoughts, questions, insights
- The Scientific Notebook should be a series of ideas, methods and findings
- Accurate and detailed notes of your findings, decisions and thought processes assist the project in becoming a winning entry.
- Good notes show consistency and thoroughness to the judges.
- Acknowledge any assistance received.
- Can be either typed or hand written.

Notetaking and Notemaking

You may like to use the Right hand side (or pages) of your notebook to record investigations including investigation question, prediction/hypothesis, method, materials, observations/measurements, labelled drawings, graphs, discussion, conclusions. This is Note-taking.

You may choose to use the Left hand side (or pages) of your notebook to record your thoughts and reflections on what is happening or questions or ponderings or rough diagrams/sketches etc. This is called Notemaking.




For more information, email: scienceonthego@griffith.edu.au or visit www.griffith.edu.au/science-on-the-go