

# QUEENSLAND SCIENCE CONTEST

## Science Teachers' Association of Queensland



# CONTEST HANDBOOK

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## Contact Information:

Science Teachers' Association of Queensland

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<mailto:staq@staq.qld.edu.au> Web: <http://www.staq.qld.edu.au>

## Background & Aims

When students engage inquiry they are building and acting on their curiosity about the world and how it works. It helps them form lasting connections with learning and develops skills in critical and creative thinking, literacy and numeracy. Their disposition to STEM blooms as they engage in the rapidly changing world, pose ethical questions and see the value of science. Seeing a project through from start to finish encourages student agency as they take responsibility for their learning.

The Queensland Science Contest is an annual event organised by the Science Teachers Association of Queensland (STAQ). The contest is open to all Queensland students from pre-school to year 12 and is judged across 7 age divisions. Students may enter their projects in one of 5 categories. They may also nominate to be considered for up to 2 bursary awards, provided their project topic is relevant to the particular bursary. Representatives from scientific and educational organisations will judge the projects.

There are three main aims of this contest.

1. To stimulate an ongoing interest in the study of science by:
  - encouraging students of all ages to participate in the process of self-motivated project work;
  - giving all students of Queensland the opportunity to communicate their passion and understanding of science to a wider audience; and
  - according recognition of effort and achievement to students who participate;
2. To promote the direct involvement of Queensland students in the processes and communication of science; and
3. To celebrate in the wider community, the exemplary science currently being carried out by Queensland students.

## Registration Fees

Individuals: \$5.00 per project

Groups (maximum 3 members): \$10.00 per project

## Registration & Payment Options

Register online

Pay by:

- Credit Card
- Cheque/Money Order (*made out to Science Teachers Association of Qld*)

## Conditions of Entry

- Failure to meet all entry deadlines may result in disqualification of the entry.
- Entries must meet the safety standards as described in the Contest Handbook. Projects involving illegal activities will not be accepted.
- **ALL entries must be submitted electronically.**
- Entries must be uploaded as outlined in the Contest Handbook. Submit online entries by the advertised submission date. Late arrivals will not be judged.
- Models and inventions may contain commercially available components such as switches, motors, meters etc, however entries must not have been solely assembled from, or based on, commercially produced kits.
- Entries must not breach Copyright regulations.
- Acknowledgement of all assistance received in preparing the entry is to be noted in the reflective journal or questionnaire.

## Certificate of Participation

A Certificate of Participation will be available to all students who enter the Queensland Science Contest. The certificates will be forwarded to your school for distribution to individual students. Where there is only one entry from a school, the certificate may be delivered to the individual's home address.

## Bursaries

Bursaries are awards for entries that address a specific area of science or a range of topics as nominated by the organisation or individual donating the award. Students should refer to the STAQ website for information about the types of projects that may be suitable for each bursary. Students may nominate for up to two bursaries in addition to one of the Science Contest categories.

Prizes will be awarded to the best entry or entries relevant to each bursary as judged by a representative of the organisation donating the prize. As new bursaries may become available between now and the contest closing date, students should refer to the latest list of bursaries available on the STAQ website (<http://www.staq.qld.edu.au>) for the latest information on the Queensland Science Contest.

## Other Awards

### **CSIRO Crest Awards**

Projects completed as part of the CSIRO CREST Awards may be entered in the Queensland Science Contest. Alternatively, projects entered in the Queensland Science Contest may be suitable to be entered in other science competitions. Students entering any science contest are advised to make copies of their report prior to submitting it for judging, in the event that the entry is lost or damaged.

### **The BHP Foundation Science and Engineering Awards**

Students who submit a project into the Scientific Investigations or Engineering and Technology categories need to complete the BHP Foundation Science and Engineering Awards entry form and submit it with their Consent form and payment to be entered into the National BHP Foundation Science and Engineering Awards.

The BHP Foundation Science and Engineering Awards provide significant cash prizes to primary and secondary students. Students who win secure a place in the Scientific Investigations and Engineering and Technology Projects sections of the Queensland Science Contest may be submitted as entrants in BHP Foundation Science and Engineering Awards.

The overall secondary winner of the National BHP Foundation Science and Engineering Awards will be given the opportunity to compete in the International Science and Engineering fair in the USA. There is no additional fee to have your entry considered for the BHP Foundation Science and Engineering Awards. For more information about the BHP Foundation Science and Engineering Awards go to their website ([http://www.scienceawards.org.au/student\\_awards/](http://www.scienceawards.org.au/student_awards/)).

### **SPECTRA Awards**

The SPECTRA Awards are an ongoing scheme designed to be used by students either at home on a self-timed basis or for class-based projects. For more information about SPECTRA, contact the Australian Science Teachers Association on (02) 6282 9377 or e-mail [asta@asta.edu.au](mailto:asta@asta.edu.au).

### **Maths Talent Quest**

The focus of the Maths Talent Quest is on the process of mathematical investigations. Open to all

primary and secondary students, the Maths Talent Quest aims to promote interest in mathematics and foster positive attitudes amongst students, teachers and parents.

Looking at real life situations and finding that mathematics is everywhere helps capture the imagination of both teachers and students alike. The Maths Talent Quest allows students to investigate mathematics on an individual, group or class basis with the opportunity to have fun exploring mathematics in real life situations. Assessment through a rubric helps to evaluate students' progression through the process strands.

## Types of Awards & Prizes

Individuals and groups of 2 or 3 students may submit an entry. Entries will be judged across 6 categories and 7 age divisions.

### Age Divisions:

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

### Categories:

Entries must be relevant to one of the categories listed below. For details about each category, refer to the specific category information downloadable from the STAQ Science Contest webpage. Prizes will be awarded for 1st, 2nd and 3rd in each age division for each of the categories (*providing entries are of a suitable quality*).

- Scientific Investigations
- Engineering and Technology Projects
- Classified Collections
- Communicating Science
- Environmental Action Projects
- Mathematical Investigations
- Poster Presentation

More information specific to each category are appended at the end of this handbook.

### Prizes:

All entries are recognised with a certificate.

Student projects may be awarded a prize of 1st, 2nd, 3rd or Highly Commended at the judges' discretion. Students who are awarded 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> or highly commended may receive cash prizes. Student projects may also be recognised as Commended with a certificate. These four prizes are awarded in each category and division at the judges' discretion. In some cases, not all prizes are awarded.

For more prizes refer to the Bursary Awards listed on the Science Contest website (<http://www.staq.qld.edu.au/queensland-science-contest>).

## Safety & Ethical Considerations

Students and their supervising teachers or parents should ensure that their science entries are conducted in a responsible and safe manner.

For example:

- Any study involving experiments on living animals must be carefully considered to ensure that the animal(s) are properly cared for. Projects involving living animals must follow national guidelines.
- Projects involving microorganisms will only be accepted if adequate safety precautions are evident and the microorganisms present no threat to the health of individuals or the environment.
- Agar plates will NOT be accepted as part of a physical entry.
- All cultured organisms should be treated as potentially pathogenic. Agar plates should not be exposed where pathogenic organisms may exist, e.g. toilets, near persons coughing or sneezing. Further guidelines are available at Education Queensland website.
- Projects involving blood or other body fluids will only be accepted if they have been carried out under strict medical supervision, for instance, in a hospital research centre while working with a scientist. No blood products will be accepted as part of a physical entry.
- Projects involving hazardous chemicals, explosives, rocket fuels, detrimental to the environment, or potentially harmful to individuals will not be accepted.
- All electrical experiments should not be in excess of 32 volts AC or 115 volts DC.
- Projects involving illegal activities will not be accepted.

Entrants who are unsure as to whether their project complies with the safety considerations should contact the STAQ office for clarification before submitting their entry for judging.

## Electronic Entry Requirements

Please note that many categories may require a combination of formats i.e. engineering video with PDF journal

### Formats accepted:

- **PDF/Word document (no word limit)(max file size 1G)**

Appropriate for:

- Science Investigations
- Mathematical Investigations
- Journals for most categories (you could include photos/scan of the journal if handwritten)

- **3-5min video (max file size 1G, format .mp4 .avi or .mov) –**

All video should be clearly audible and easy to watch. The film technique will not be judged, however judges need to gain an understanding of your project.

Don't forget your journal – you could include photos/scan of the journal if handwritten.

Appropriate for:

- Engineering and technology projects (note the video is a requirement of this category)
- Communicating Science
- Environmental Action Projects
- Mathematical Investigations

- **PPT**

Don't forget your journal – you could include photos/scan of the journal if handwritten.

Appropriate for:

- Communicating Science
- Environmental Action Projects

- **Photos**

Don't forget your journal – you could include photos/scan of the journal if handwritten.

Appropriate for:

- Classified collections
- Poster Presentations
- Communicating Science
- Environmental Action Projects
- Mathematical Investigations

If you have any questions please contact Gaynor on email [staq@staq.qld.edu.au](mailto:staq@staq.qld.edu.au) or the STAQ mobile number: 0490 950 249.

The entry shall be accompanied with

- Payment receipt – Credit Card, Money Order or cheque (made out to *Science Teachers' Association of Qld*)
- Consent form (*failure to submit a signed consent form will automatically disqualify the entry*)
- BHP Foundation Science and Engineering Awards Entry form (for Scientific Investigations and Engineering projects)

**NO RESPONSIBILITY WILL BE ACCEPTED FOR DAMAGED OR LOST ENTRIES**

## Entry Checklist

### ☐ Registration and payment

Register online by closing date.

### ☐ Consent form

Must be attached to the project on delivery or uploaded (preferably in PDF format) with the project.

All entries must be accompanied by appropriate documentation as outlined in the specific category information.

Students must keep a copy of their written work as projects not uplifted at judging venue or awards ceremony will be destroyed. STAQ is not responsible or liable for any projects lost.

## Notification of Winning Entries

Students' teachers with winning entries will be notified by email, and covid regulations permitting winning students and families will be invited to attend the presentation of awards.

## Awards Ceremony

Due to the evolving nature of COVID restrictions a date, venue and format of the awards ceremony has not been determined. If yours is a winning entry, please look out for an email regarding the awards ceremony.



## Specific Category Information

### **Category: Scientific Investigations**

Note: Selected projects in this category are eligible for entry into the BHP Foundation Science and Engineering Awards National Competition

#### **What to do:**

1. Choose a topic for your investigation.
2. Keep an electronic or written journal or notebook that explains what you do and why. (handwritten journals maybe scanned for electronic entry submission)
3. Collect the necessary background information and set some realistic aims.
4. Design and perform one or more experiments that will make up the investigation.
5. Analyse the results and draw your conclusions.
6. Present a report to tell others what you did and what you found out. Include any references and acknowledge the assistance you receive.

#### **What makes a winning entry?**

- **The topic** of the investigation should be relevant, original and creative It should address an issue of scientific significance that may be of a social, local or personal nature.
- **The approach** should be original, creative and resourceful.
- **The use of and/or design of equipment** should be original and creative.
- **The report** should include:
  - Realistic aims
  - Details of the materials used and the procedure
  - Risk assessment
  - Determination of variables to control
  - Evidence of replication of results, accuracy and thoroughness
  - Results, observations, measurements, graphics and text
  - Discussion of the results referring to the aims
  - Explanation of errors and anomalies
  - Reasonable conclusion from the data
  - Suggestions for further research
  - Appropriately acknowledge any assistance. Clarify which aspects of the project were devised and carried out alone and which aspects were not and what sort of assistance was provided.

#### **The Journal, logbook or notebook**

This shows the purpose behind the study, and the way in which the question evolved and was tackled, as well as a record of how the work progressed (including the disasters).

- Good notes show consistency and thoroughness to the judges.
- A reflective journal could be kept. It should contain evidence of scientific thought.

#### **Some ideas to get you started:**

- Does the temperature of a magnet affect its strength?
- How does the type of soil affect the growth of a bean plant?
- Which type of paper towel has the highest level of absorption/capillary <sup>[SEP]</sup>action?
- Which material is the best for insulating a can of drink?
- How does sugar affect the growth of yeast?
- What is the best metal conductor?
- How fast does light travel in different substances?
- Which tea contains the least amount of caffeine?

## Scientific Investigations

JUDGE/S: \_\_\_\_\_

Criteria	Excellent	Good	Satisfactory	Unsatisfactory	Comments
<b>Identifies project</b> Identifies the questions that can be investigated scientifically, and the making of plausible predictions.	2	2	2	2	2
<b>Designs investigation</b> Plans the investigation, identifies and describes why and how variables are controlled where necessary.	2	2	2	2	2
<b>Carries out investigation</b> Describes how to manage the work safely, collection of reliable data and other evidence.	2	2	2	2	2
<b>Interprets results</b> Summarises data using graphs, tables or other representations, appropriate use of mathematics, description of trends and relationships, identification of errors and reference to plausible causes of errors.	2	2	2	2	2
<b>Findings and conclusions</b> Drawing the relevant evidence and relationships to support conclusions, suggesting effective improvements to methods with reference to the quality of data.	2	2	2	2	2
<b>Communication</b> Coherent communication of ideas, methods and findings using appropriate scientific language and representations.	2	2	2	2	2
<b>Subtotal</b>					
<b>Evidence of Ownership</b> Provides evidence of ownership from notes, logbook or other form or journal, acknowledges assistance.	2	2	2	2	2
<b>Significance and ingenuity</b> Addressing an issue of scientific significance (personal, local or social), description of how the project fits in a wider scientific context, demonstrating original and creative approach to solving the problem, showing ingenuity/originality.	2	2	2	2	2
<b>Overall &amp; Total</b>					
2					
2					

## Category: Engineering and Technology Projects

Note: Selected projects in this category are eligible for entry into the BHP Foundation Science and Engineering Awards National Competition

### What to do:

1. Choose a problem
2. Design a device or product to
  - a. Solve the problem; or
  - b. Offer a different approach to a problem.
3. Create the device or product. (ICT-based projects in an Engineering or Science context that have a positive impact are also eligible.)
4. Develop a 3-5 minute film of the device/product in operation.
5. Write a report of up to 1000 words. Marks will be deducted for reports that exceed this amount.

### What makes a winning entry?

- **The problem** should be significant, complex and relevant.
- **The approach** should be original, creative and resourceful.
- **The product** should be well made, elegant and easy to use. It should have dimensions not exceeding 76cm in depth, 122cm in width and 100cm in height)
- **The report** should:
  - Explain how/why you chose the problem
  - Set out some realistic aims
  - Explain how the problem is significant and relevant. (Refer to relevant references, resources and literature to place the project in a wider scientific context.)
  - Explain how you went about solving the problem in an original, creative and resourceful way, including any problems you overcame and how you undertook testing. (This may be presented in the format of a journal. The journal may be typed or handwritten and scanned for online entry submission.)
  - Explain the limitations of the product or device and suggest further improvements.
  - Include a risk assessment evidencing safety considerations in the planning stages and use of the final product
  - Appropriately acknowledge any assistance. Clarify which aspects of the project were devised and carried out alone and which aspects were not and what sort of assistance was provided.
- **The video** should:
  - Demonstrate the device/product in use
  - Clearly show how the product is easy-to-use, elegant and well made.
  - How well the device/product addresses the problem.
  - Be clearly audible and easy to watch. The film techniques will not be judged. This is an engineering entry not a film competition.

### Some ideas to get you started:

- simple materials used creatively
- solves/reduces a problem of the aged
- solves/reduces a problem of the disabled
- a non-harmful pest control device e.g. non-harmful live capture then release mouse trap
- reduces/solves an environmental concern. If appropriate, you may wish to explain how your project reduced materials or energy used, the amount of material thrown away, or air or water pollution. Keep careful records and use "**before and after**" data to demonstrate the difference that your project made for waste reduction, resource conservation or pollution prevention.

### **Some questions to ask yourself in preparing the device/product and report:**

- To what degree is the innovation new and/or different?
- Where could it be used?
- What are the costs and benefits of the idea?
- What are the consequences, immediate and long-term of employing this idea?
- How does it help with a preferred future for society?
- How were the items utilized in appropriate and/or new ways?
- What are the energy implications – requirement, wastage- of the idea?
- How well is the project constructed and organised?
- How clear/well prepared is the presentation?
- Is the idea clearly demonstrated and explained?
- Is there a compelling reason for uptake of the innovation?

### **Some Restrictions:**

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. Examples of appropriately qualified person are an electrician or an electrical engineer. Entries using 240v power that do not have an accompanying note of compliance will not be judged.

Although some of the following may be used in the development of the Engineering entry 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 (Exception: manufactured construction materials used in building the project or display)
- 8) All chemicals including water (Projects may not use water in any form in a demonstration.)
- 9) All hazardous substances or devices (for example, 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 unless deemed by the BHPFSEA Coordinator or judges to be an integral and necessary part of the project (for example, glass that is an integral part of a commercial product such as a computer screen)
- 15) Any apparatus deemed unsafe by the BHPFSEA 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.)

Criteria	Excellent	Good	Satisfactory	Unsatisfactory	Comments
<b>Identification</b> of the problem that can be investigated scientifically, and the making of plausible aims for the project	2	2	2	2	2
<b>Informed explanation</b> of the problem and its significance linking to background research, including appropriate references to external sources (books, websites etc.) and permission to use copyrighted material (where applicable)	2	2	2	2	2
<b>Thorough planning</b> of device/product to solve problem, describes testing process for device/product and identifies and describes why and how variables are controlled where necessary.	2	2	2	2	2
Description of <b>how to manage</b> the work safely.	2	2	2	2	2
<b>Identification</b> of the limitations of the device/product for addressing the problem and aims. And the making of <b>plausible</b> suggestions for further improvements.	2	2	2	2	2
<b>Coherent</b> explanation of the product or device in use and how it addresses the problem and aims for the project	2	2	2	2	2
Visually appealing product or device and <b>effective</b> use of design principles	2	2	2	2	2
<b>Subtotal</b>					
<b>Evidence of Ownership</b> Acknowledges assistance to clarify which aspects of the project were supported by other people and note the type and degree of assistance.	2	2	2	2	2
<b>Significance and ingenuity</b> Addressing an issue of significance (personal, local or social), <b>description of how</b> the project fits in wider scientific context, demonstrating <b>original</b> and creative approach to solving the problem, showing ingenuity/originality.	2	2	2	2	2
<b>Overall &amp; Total</b>					

## **Category: Classified Collections**

### **What to do:**

1. Choose a topic for your collection
2. Collect relevant items. Keep a journal/record of where the items were collected, how they were preserved or cared for and your safety considerations in how you safely collected them. Submit the journal/record with your collection.
3. Organise your collection into groups to show relationships between the items in the collection, or to assist in their recognition.
4. Develop a classification scheme. This may be a table, key, field guide or interactive computer program.
5. Present your collection as a poster or report. You may use a series of photographs in place of submitting the actual items that were collected. Include the classification system you have developed in the poster or report.

### **What makes a winning entry?**

- The classified **collection** should seek to help in the understanding of the material that is being collected. There should be:
  - a high standard of preservation and presentation of the specimen,
  - complete and accurate information about the specimens, commensurate with the age of the collector.
- The **classification scheme** can be used to group and identify the specimens. This may take the form of:
  - a table of characteristics that can be matched to the specimens to identify them
  - a taxonomic grouping of specimens,
  - a dichotomous key may be appropriate; or
  - an interactive key, using relatively simple computer programming, could provide the basis for an interesting Information Technology project.
- The **journal/record** of where and how you collected your items and how they were preserved or cared for must be submitted to the contest with the report/poster of your collection. The journal may be typed or handwritten and scanned for online entry submission.

### **Some ideas to get you started:**

#### *Geology*

The collection may be 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.

#### *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.

#### *Zoology*

A classified collection of animals (other than insects) will usually be of durable discarded parts (shells or feathers). 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.

### *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). A collection of seeds might investigate the relationships between seed composition (carbohydrate, protein, fat) and taxonomic group, or between seed size and plant habitat (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).

### **Protected Species**

Be aware that there are a number of protected species and protected areas in Queensland where collecting is prohibited - even dead things. They are protected because they are valuable. Ensure that collected specimens are not listed by Environment and Resource Management as protected species or collected from a protected area. The website address is:

[http://www.derm.qld.gov.au/wildlife-ecosystems/wildlife/threatened\\_plants\\_and\\_animals/index.html](http://www.derm.qld.gov.au/wildlife-ecosystems/wildlife/threatened_plants_and_animals/index.html)



### Classified Collections

JUDGE/S: \_\_\_\_\_

Criteria	Excellent	Good	Satisfactory	Unsatisfactory	Comments
Identification of specimens that can be classified scientifically in a plausible group	2	2	2	2	2
Considered selection of good quality specimens and evidence of specimen preservation, careful handling and clear presentation	2	2	2	2	2
Description of the implications of safety considerations	2	2	2	2	2
Making of plausible groupings to show similarities and differences	2	2	2	2	2
Application of science knowledge to generate plausible and informed classification schemes to show relationships between the items in the collection, or to assist in their recognition	2	2	2	2	2
Coherent communication of ideas, methods and the classification scheme using appropriate scientific language and appropriate representations	2	2	2	2	2
Acknowledges assistance to clarify which aspects of the project were supported by other people and note the type and degree of assistance	2	2	2	2	2
<b>Overall &amp; Total</b>					



## **Category: Communicating Science**

The aim of these projects is to communicate a scientific concept to a chosen audience.

### **What to do:**

1. Choose a scientific concept
2. Research the concept
3. Choose a target audience e.g. preschool students, aged pensioners, English teachers
4. Choose a communication medium e.g. poster, film, webpage, comic strip, model
5. Develop the chosen medium within the constraints listed below.
6. Write a report about your research, audience and medium.

### **What makes a winning entry?**

- The **approach** should be original, creative and resourceful.
- The **report** should:
  - clearly explain and justify 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;
  - explain how you designed your entry (eg worked out what to do); and
  - discuss what was the most challenging part and what you would do differently next time.
- The **chosen medium** should be well made, elegant and easy to follow.

### **Some ideas to get you started:**

- A PowerPoint presentation about buoyancy,
- A comic strip about why things dissolve,
- A game about how diseases are transmitted,
- A model of how the human heart pumps blood

### **Constraints for the Communication Mediums:**

#### *Cartoon/Comic Strip*

- Detail a single or series of cartoons which are hand drawn or computer generated.
- Photos or PDF/PPT/SWAY of the cartoon/comic strip must be submitted for judging.

#### *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.
- A video of you playing the game and clear Instructions for running the program must be included.

#### *Poster*

- Present a single or series of diagrams/paintings/drawings with or without text.
- Diagrams must be hand drawn or computer generated.
- Text must be your own words.
- Photos or PDF/PPT/SWAY of the poster must be submitted for judging.

#### *PowerPoint Presentation*

- Prepare a series of slides with/without sound

#### *Video/DVD/Animation/Simulation*

- Create a visual media presentation
- The presentation must be an original piece of work no longer than 5 minutes.

#### *Website*

- Clear Instructions for using the website must be included.

#### *Model*

- should be well made, elegant and easy to use. It should have dimensions not exceeding 76cm in depth, 122cm in width and 100cm in height)
- Video or photos explaining the use/function of the model must be submitted for judging.

#### **A note on originality, authenticity and Copyright**

All work must be original. Any images used must either

- not be subject to copyright or
- a letter stating that you have received permission to use the work accompanies the entry.

## Communicating Science

JUDGE/S: \_\_\_\_\_

Criteria	Excellent	Good	Satisfactory	Unsatisfactory	Comments
<b>Identification</b> of the scientific concept and selection of <b>appropriate</b> communication medium to <b>meaningfully</b> communicate the concept	2	2	2	2	2
<b>Informed explanation</b> of the scientific concept thinking of background research, including <b>appropriate</b> references to external sources (books, websites etc.) and permission to use copyrighted material (where applicable)	2	2	2	2	2
<b>Justified</b> explanation of how the communication medium is <b>suited</b> to the identified target audience. Communication medium is <b>engaging</b> for the target audience	2	2	2	2	2
Planning the design of the communication medium and suggesting <b>effective</b> improvements	2	2	2	2	2
<b>Application</b> of science knowledge to <b>effectively</b> communicate the scientific concept through the chosen medium	2	2	2	2	2
Visually <b>appealing</b> and <b>effective</b> use of design principles for the selected medium	2	2	2	2	2
Communication medium <b>meets the specifications</b> outlined in the Communicating Science category description, and works <b>effectively</b> as intended	2	2	2	2	2
<b>Coherent</b> communication of scientific concept using <b>appropriate</b> scientific language and imagery where appropriate	2	2	2	2	2
Acknowledges assistance to clarify which aspects of the project were supported by other people and note the type and degree of assistance.	2	2	2	2	2
<b>Overall &amp; Total</b>					

75

## **Category: Environmental Action Projects**

### **What to do:**

1. Research a local environmental issue.
2. Consult with members of the community about the issue. This may involve a survey or questionnaire.
3. Present the data. It may be helpful to use tables or graphs.
4. Develop an action plan to help resolve the issue.
5. Explain how the action plan will help to resolve the issue.
6. Put your plan into action
7. Present your investigation and resulting action plan as a poster, report or video.
8. Keep a journal throughout the project and submit with the entry.

### **What makes a winning entry?**

An effective project will:

- show a clear understanding of the environmental issue;
- explain how the issue was investigated scientifically and how community members were consulted;
- graphically represent data e.g. tables or graphs
- set out the action plan in a clear and concise manner
- explain clearly how the action plan will resolve the issue
- demonstrate active, practical involvement in the issue at a local level; and
- be creative and original.

### **The Reflective Journal**

The reflective journal 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 work progressed

A reflective journal should

- keep a record of what was completed throughout the project. It should contain evidence of scientific thought to help the student make sense of their science learning.
- The journal may be typed or handwritten and scanned for electronic entry submission.
- Contain accurate and detailed notes of any findings, decisions and thought processes assist the project in becoming a winning entry.
- acknowledge any assistance received.

### **Some ideas to get you started:**

- Develop a plan for your school to reduce litter.
- Develop a plan for managing weeds at the local creek.
- Develop a plan for less students to use cars to get to school.
- Develop a plan for your school/community group to use less electricity/water.

## Environmental Action Project

JUDGE/S: \_\_\_\_\_

Criteria	Excellent	Good	Satisfactory	Unsatisfactory	Comments
<b>Identification</b> of the problem that can be investigated scientifically, and the making of plausible aims for the project.	2	2	2	2	2
<b>Informed explanation</b> of the problem and its significance linking to background research, including appropriate references to external sources (books, websites etc.) and permission to use copyrighted material (where applicable).	2	2	2	2	2
<b>Thorough planning</b> of investigation, describes a fair process for consulting community members and identifies and describes how the consultation will be done to minimise bias.	2	2	2	2	2
<b>Summarising</b> data using graphs, tables or other representations. Appropriate use of mathematics	2	2	2	2	2
<b>Clear and concise</b> action plan, drawing on relevant evidence to support the action plan.	2	2	2	2	2
<b>Coherent</b> explanation of how the action plan addresses the problem and aims for the project. <b>Identification</b> of the limitations of the action plan, and the making of plausible suggestions for further improvements.	2	2	2	2	2
Acknowledges assistance to clarify which aspects of the project were supported by other people and note the type and degree of assistance.	2	2	2	2	2
<b>Overall &amp; Total</b>					
2					
2					

## **Category: Mathematical Investigations**

### **What to do:**

1. Choose a topic for your investigation
2. Collect the necessary background information and clearly state a realistic problem to investigate
3. Use mathematical approaches to solve the problem
4. Present a report to tell others what you did and what you found out. <sup>[1]</sup><sub>SEP</sub> Include any references and acknowledge the assistance you receive.

Projects can be on any mathematical topic and may be presented in a variety of forms such as:

- Written report
- Written as a booklet, brochure or poster
- Video

### **What makes a winning entry?**

- **The topic** of the investigation should be relevant, original and creative It should address an issue of significance that may be of a social, local or personal nature.
- **The approach** should be original, creative and resourceful and integrate a range of mathematical concepts and processes.
- **The report** should include:
  - Clear questions/aims for investigation
  - Details of the materials used and the procedure
  - Evidence of replication of results (if appropriate), accuracy and thoroughness
  - Results, observations, measurements, graphics and text
  - Discussion of the results referring to the aims
  - Explanation of errors and anomalies
  - Reasonable conclusion
  - Suggestions for further research
  - Appropriately acknowledge any assistance. Clarify which aspects of the project were devised and carried out alone and which aspects were not and what sort of assistance was provided.

### **Some ideas to get you started:**

Students are encouraged to investigate a particular theme following normal class lessons in a particular area. An excursion to the Zoo, museum, or historical village could provide a useful source of ideas and motivation for projects. Current events or special celebrations such as the International Year of the Volunteer or Centenary of Federation may also prove a starting point. Students could choose to investigate the mathematical content of a specific interest e.g. maths in basketball, budgeting for a holiday.

## Mathematical Investigations

JUDGE/S: \_\_\_\_\_

Criteria - Mathematical Processes	3 Excellent	2 Good	1 Satisfactory	0 Unsatisfactory	Comments
<b>Mathematical Concept</b>					
Is the mathematical concept of the project investigation clearly identified?					
<b>Quality of Research Regarding Concept</b>					
Does the research and data support understanding of the concept?					
<b>Student Understanding of Concept</b>					
Has the student provided their own information and linked or adapted research to their investigation?					
Does the student show a deep understanding of the concept rather than merely mentioning it in passing?					
<b>Conclusions</b>					
Does the conclusion link to the aim of the project?					
<b>Ingenuity of Purpose</b>					
Does the project present a novel or ingenious way of illustrating the mathematical concept?					
<b>Source and Originality of Idea</b>					
Does the journal/notebook show evidence that the student/group completed the project?					
Does it acknowledge where and how assistance was given?					
<b>Coherence, Presentation and Acknowledgements</b>					
Does the project have visual appeal?					
Is it logical in presentation?					
Are diagrams, tables, graphs and other displays clearly labelled?					
Are all sources appropriately acknowledged?					
<b>OVERALL</b>					

## **Category: Poster Presentation**

### **What is a science poster?**

A science poster is an attractive and visual way to present a message about a science topic. The message is presented clearly, quickly and relies on impact. The poster should be eye-catching in order to get the message across.

### **What to do:**

- select an idea around a theme
- decide on a message you want the poster to tell
- find out about your topic
- plan your poster
- locate resources
- make your poster

### **What makes a winning entry?**

A winning entry:

- has accurate science content.
- will communicate the single idea clearly.
- will show good quality drawing, artistic skills and imagination, giving the poster visual appeal.
- will use minimal words that can be easily read from a distance and that are appropriate to your year level.

### **Entry guidelines**

You are required to:

- Give a clear explanation of the scientific and technical principles involved (refer to the diagrams you have used that help illustrate these principles)
- Explain the significance and impact that the topic has in the real world (refer to the diagrams you have used that help illustrate these principles)
- Include at least 3 relevant diagrams which summarise the two guidelines above
- List acknowledgements and references used. Put these in a small box at the bottom right hand corner of the poster.
- Posters must not have any built-up or three-dimensional sections.
- All diagrams and text must be original: Text must be in your own words. It may be hand written or produced via computer. The text needs to be concise (use just enough words to explain the topic ideas when a person looks at the poster/chart for a couple of minutes.) Diagrams may be either hand drawn or produced using tools on a computer. Diagrams copied from other software or downloaded are not acceptable.
- Maximum word limit is 400 words, including headings, explanations and captions; excluding bibliography
- Written information must be legible (visible from 1 metre) and contain a major heading for the topic and sub-headings (visible from 2 metres) for ideas/concepts within the topic.
- Diagrams must have clear headings/labels and be distinguishable from a distance of 2 metres.
- Judges will look for evidence of accurate and relevant scientific content, understanding of the material presented, and depth of investigations, innovative and creative thought in the visual presentation and in the selection of ideas investigated.
- Electronic submission must include high resolution photos (to ensure that judges can zoom in to see the written detail).



**Some ideas to get you started:**

- Exploring the moon
- A new colony on the moon
- Use of drones in industry
- Edible vaccines
- Architectural acoustics
- Seismology
- Sustainable chemistry
- Alternative energy
- Environmental conservation strategies

## Scientific Posters

JUDGE/S: \_\_\_\_\_

Criteria	Excellent	Good	Satisfactory	Unsatisfactory	Comments
<b>Scientific Idea</b> Identification of idea Give clear explanation of scientific & Technical Principles involved Demonstrated awareness/knowledge/comparison of change over time in scientific ideas - knowledge of the function/relationship of the components of systems					
<b>Significance and Impact of Topic</b> Explain the significance & impact that the topic has in the real world. Refer to diagrams. -Demonstrates - understanding of factors which may affect attitudes to a scientific idea of issue of interest - understanding of different perspectives & attitudes involved in a scientific idea or issue - analysis of impact of factors which cause change in living & non-living systems - balanced argument in addressing a scientific idea or issue of interest to an audience					
<b>Interprets results – diagrams</b> Include at least 3 relevant, labelled diagrams Summarising data using graphs, tables or other representations, appropriate use of mathematics, <b>description of trends</b> and relationships, identification of errors and reference to <b>plausible</b> causes of errors. Demonstrates understanding of different perspectives & attitudes..., presented through diagrams					
<b>Findings and conclusions</b> Drawing on <b>relevant</b> evidence and relationships to <b>support</b> conclusions, suggesting <b>effective</b> improvements to methods with reference to the quality of data					
<b>Communication</b> <b>Coherent</b> communication of ideas, methods and findings using <b>appropriate scientific</b> language and representations					
<b>Subtotal</b>					
<b>Evidence of Ownership</b> Provides evidence of ownership from notes, logbook or other form of journal, acknowledges assistance.					
<b>Significance and ingenuity</b> Addressing an issue of scientific significance (personal, local or social), <b>description of how</b> the project fits in a wider scientific context, demonstrating an <b>original</b> and creative approach to solving the problem, showing ingenuity/originality.					
<b>Overall &amp; Total</b>					

## Consent Form

# QUEENSLAND SCIENCE CONTEST

## Science Teachers' Association of Queensland

This form is to be completed and attached to your entry to the Queensland Science Contest. Only one form needs to be completed per student, regardless of how many entries they register.

### Student:

I give permission for the Science Teachers' Association of Queensland to use photos of myself, my artwork and my project for promotional, education and/or research purposes. I ask for no remuneration or acknowledgement.

Name:

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Signature:

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Contact email or phone:

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Date:

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### Parent / Guardian:

For students under 18 years of age, parental / guardian consent is required.

I give permission for the Science Teachers' Association of Queensland to use photos of my child, his or her artwork and project for promotional, education and/or research purposes. I ask for no remuneration or acknowledgement.

Name of child:

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Parent / guardian name:

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Signature:

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Contact email or phone:

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Date:

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