# Cawthron Scitec Expo



# Student/Teacher Guide

**CAWTHRON**
The power of science®

# Contents

# Entering

In the ONLINE ENTRY form, you will need to select what type of project you are entering:

Science project

Technology project

Research project -Science/Technology

Art project - Science/Technology

You can enter as an Individual, a Group (please enter all names), or a Class (enter class name/number).

## Topics

As best as possible tick what subject/s your projects is about (you can choose more than one). If your topic is not in the list, please select 'Other' and describe the topic briefly. This will help us decide what prizes you are eligible for. Please look at the Prizes and Awards section on the webpage to see what prizes are available.

If you are a keen science communicator and would like to be eligible for this prize you could be invited to present your project at an event open to the public. If you tick this box you will be contacted with further information.

# Project type

Choosing a project can be difficult, so choose a topic you are passionate about and that you think may be fun and interesting to investigate. There are four types of projects. You can also enter for the Science Communicator prize, no matter which type of project you choose.

**Science projects** will gather data in experiment/s, and will prove or disprove a hypothesis (what you think will happen). Science projects seek answers to questions. Students will need to gather data in experiments to try and answer their questions. You should follow the scientific method and write it up using set guidelines, see pages 6-7.

**Technology projects** are those that develop a product, device or process. The development of this product/device or process seeks to serve a purpose, a human need or problem that needs solving. Technology projects solve problems. These projects involve following a set technology process and write up, see pages 8-9.
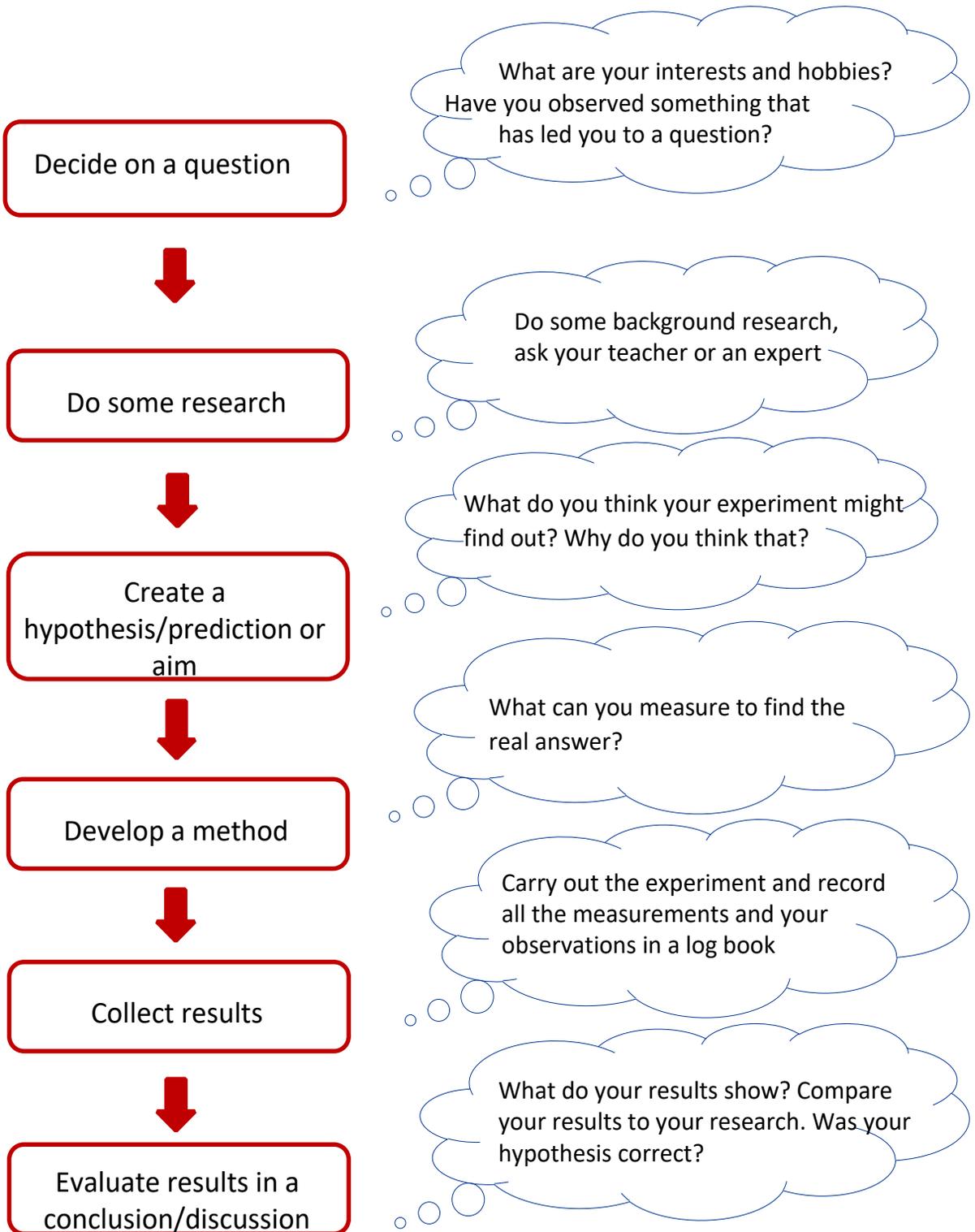
**Research projects** can be in both the field of science or technology, where an experiment or a product is not possible or feasible. The project is investigated in depth through research, observations and if applicable your own personal thoughts. These projects can be displayed in a variety of way or using the type of writing style you prefer. See page 10.

**Art in Science/Technology projects** will not be eligible for the Cawthron Science and Technology prizes, but will be looked at as a category of their own. The category is open to art inspired by science or technology and can be displayed using any type of media. The project can also be a product made from any type of material. Let your creativity run wild! See page 10.

# Science Process

**Decide on a question**

> What are your interests and hobbies? Have you observed something that has led you to a question?

**Do some research**

> Do some background research, ask your teacher or an expert

**Create a hypothesis/prediction or aim**

> What do you think your experiment might find out? Why do you think that?

**Develop a method**

> What can you measure to find the real answer?

**Collect results**

> Carry out the experiment and record all the measurements and your observations in a log book

**Evaluate results in a conclusion/discussion**

> What do your results show? Compare your results to your research. Was your hypothesis correct?

# Writing Up – Science Project

Science is fun and exciting, but it would not progress if nobody bothered to publish their experiments, so we must write up all our hard work. The writing needs to have a logical flow so that it makes sense to anyone reading it. These are the main parts of a science experiment write-up;

**Background/observation**- Why are you doing this experiment? What did you observe or find out about your topic that made you think of your question?

**Hypothesis/prediction**- This is your best guess to what the result might be. Briefly describe the reason for your hypothesis, prediction or aim.

**Experimental method**- You may do either a fair test, a pattern seeking experiment or a combination of both.

> **Fair test-** Clearly identify what you are changing (only one thing). This is called the INDEPENDENT variable. What you are measuring (response) is called the DEPENDENT variable. Ask for help identifying these variables. All other conditions in your experiment must remain the same. You must repeat your experiment as many times as possible to get valid results to analyse. It is important for you to demonstrate that your experiment was a 'fair test'. A fair test only changes one variable at a time.

> **Pattern seeking-** Clearly identify at least two factors, or variables, that you are wanting to measure and compare. Ask for help identifying these variables. All other conditions in your experiment must remain the same. You may not be able to repeat your experiment so make sure that you take lots of accurate measurements.

**Materials & Methods-** Write a step by step method describing what you did to collect good data. List the equipment you used. Make sure somebody else could copy exactly what you did in your method.
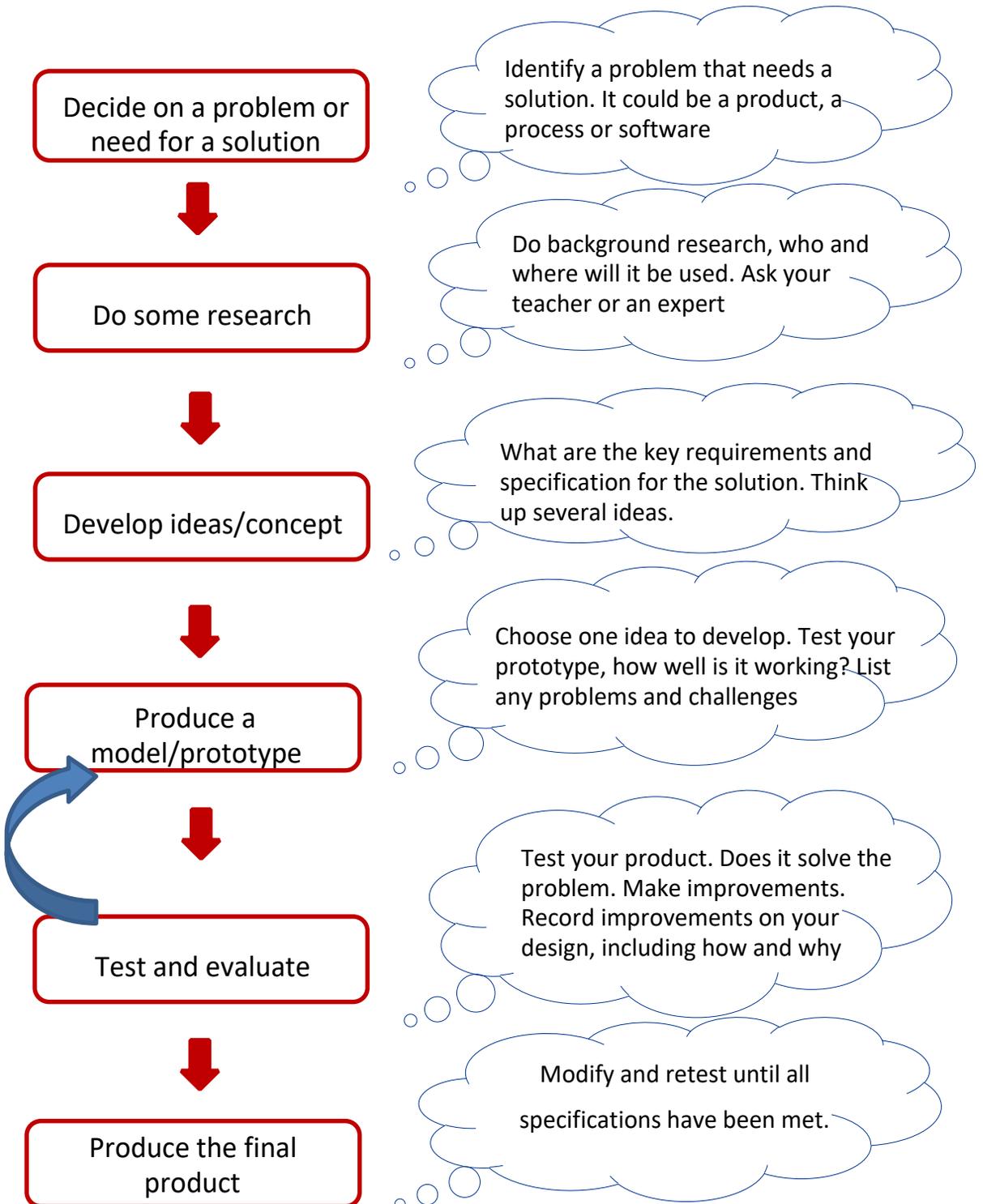
**Results/Observations-** Collect your data and record your observations. Organise the data into tables or graphs and describe what it tells us. Photos, diagrams and videos are all useful ways of showing results.

**Conclusion/Discussion-** Based on your RESULTS and OBSERVATIONS what did you find out? Was your hypothesis correct or your prediction or aim on track? Explain why your experiment was successful. How would you change it if you did it again? What further questions have you thought of?

**Bibliography/Acknowledgements-** What books and websites did you use to find out information? Who gave you valuable assistance?

**Log Book:** All projects must be accompanied by a log book.

# Technology Process

Decide on a problem or need for a solution

Identify a problem that needs a solution. It could be a product, a process or software

Do some research

Do background research, who and where will it be used. Ask your teacher or an expert

Develop ideas/concept

What are the key requirements and specification for the solution. Think up several ideas.

Produce a model/prototype

Choose one idea to develop. Test your prototype, how well is it working? List any problems and challenges

Test and evaluate

Test your product. Does it solve the problem. Make improvements. Record improvements on your design, including how and why

Produce the final product

Modify and retest until all specifications have been met.

# Writing Up - Technology

A technology write-up is slightly different to a science write up, but some elements are similar. Technology projects can vary in nature quite a bit, so please feel free to add to these recommendations to suit your project.

**Background**- Why are you doing this project and what did you find out about the topic before you started.

**Aim**- Describe the problem. What will you aim to do to solve it and what is your criteria for your design. Why were you inspired to find a solution?

**Design**- Labelled diagrams or photos are good here of prototypes. Explain why you did it, what is good about it. What materials did you use and why?

**Evaluation**- Discuss how your design performed against your criteria.

**Modification**- Show what you changed and why. You can use Design, Evaluation and Modification several times as Technology has a cyclic nature.

**Future recommendations/marketing-** Show what you would do next. Where do you see this going in the future? If you have done any marketing it can also be included here.

**Bibliography-** What books and websites did you use to find out information?

**Log Book:** All projects must be accompanied by a log book, which will show your thought process, every little modification and result/observation recorded.

# Research projects

Not all scientists carry out experiments and not all technologists create products or processes. Many fields of science (e.g. cosmology, astronomy, physics) are not always feasible to experiment on within a school/home environment. But if you are passionate about a topic and experimenting isn't for you or it isn't feasible we would still like you to enter.  Under the Research category a review of the information is made and condensed to the size of your display board.

- Carry out extensive research

- Make observations or a model if relevant and possible

- Remember to make it your own not just a summary of your research. Add your opinion and thoughts, future research you think could be done etc.

- Consider how you would like to communicate your research (as a news article, documentary, editorial etc.)

# Art in Science / Technology
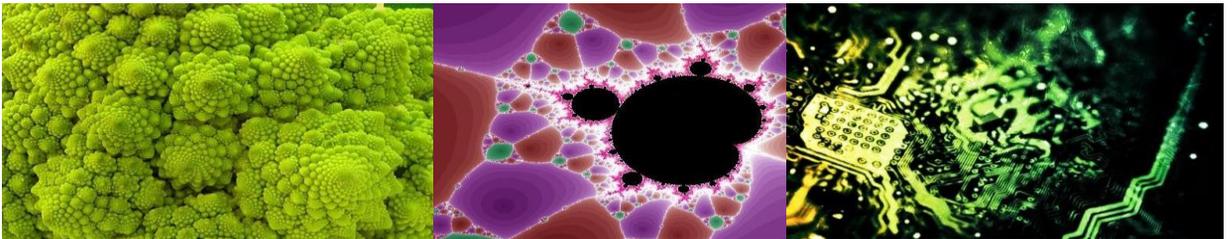


Science/Technology and Art seem like totally different type of subjects, but they are connected. Scientists and technologists regularly observe nature for inspiration to solve problems and art can also be inspired by nature, science or technology.

Get creative and create your own art work inspired by science or technology. Projects can use any type of media (painting, photography, sculpture, video etc.). If using paper, the maximum size is A3 for an individual or 2m width for a classroom project.

This section includes creative technology which allows students to produce a product that demonstrates their *craft skills* in wood, metal, engineering or textiles.

Art Projects must be accompanied by a sentence/paragraph explaining the inspiration. The Art section will be judged by artists and skilled craftspeople.

# Making an Expo Exhibit

In the past exhibits have had quite strict guidelines, but we now accept different ways of displaying your project. The classical way is shown below and it is still an effective way to display your project. However, you may choose to have a flat poster or use digital technology, so get creative! Every project is allocated an equal amount of space (1.2m wide, 150cm tall and 75cm deep). Please do not exceed these dimensions or it may be difficult to display your project at the venue. Please also ensure your exhibit is returned safely to your school after the Expo. If it wins a major prize we may need to display it again. Remember: All parts of the write up process still need to be visible and log books are still required.
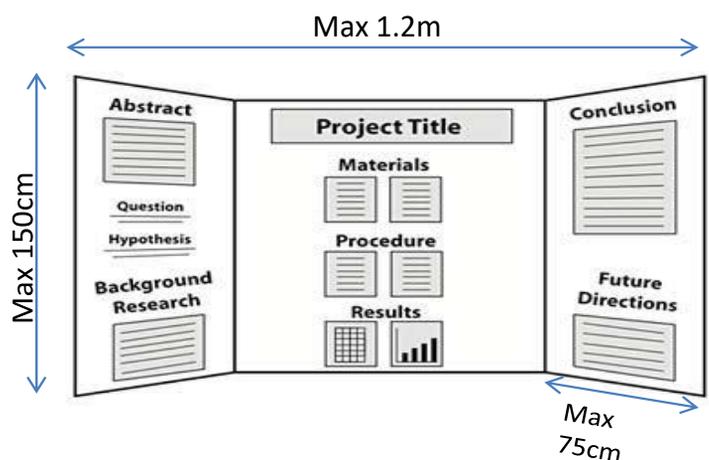
## Recommendations:

Free standing and robust

Use colour and photos, make it attractive

Writing no smaller than 1 cm and legible

Clear and with a logical flow

Space in front of board can be used for equipment, product or logbook

# Judging Criteria

It is important to know what you will be judged on, that way you can make sure you score highly. There are separate judging criteria for each different type of project, except for Art in Science/Technology projects which do not have any formal criteria except that they must be original.

## Science Investigation

|  | Outstanding | Good | Average | Poor | Minimal | Absent |
|---|---|---|---|---|---|---|
| **Understanding of background research** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Scientifically rigorous** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Ability to explain concept clearly** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Understands results** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Logical conclusions drawn from results** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Can discuss problems/limitations** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Effective communicator, conveys passion** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Exhibit is well designed and attractive** | 5 | 4 | 3 | 2 | 1 | 0 |
| **COLUMN SCORE** |  |  |  |  |  |  |
| **TOTAL SCORE** |  |  |  |  |  |  |

## Technology Project

|  | Outstanding | Good | Average | Poor | Minimal | Absent |
|---|---|---|---|---|---|---|
| **Understanding of background research** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Evidence of technology process** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Ability to explain concepts clearly** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Solution is clear reflection of the problem** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Can discuss problems/limitations** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Effective communicator, conveys passion** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Ingenuity/complexity** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Exhibit is well designed and attractive** | 5 | 4 | 3 | 2 | 1 | 0 |
| **COLUMN SCORE** |  |  |  |  |  |  |
| **TOTAL SCORE** |  |  |  |  |  |  |

## Research Project

| | Outstanding | Good | Average | Poor | Minimal | Absent |
|---|---|---|---|---|---|---|
| **Understanding of topic** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Ability to explain concept clearly** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Uses a variety of sources** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Insightful/inventive/future focused** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Can discuss personal opinion** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Effective communicator, conveys passion** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Originality of concept and or approach** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Exhibit is well designed and attractive** | 5 | 4 | 3 | 2 | 1 | 0 |
| **COLUMN SCORE** | | | | | | |
| **TOTAL SCORE** | | | | | | |

## Science Communicator

| | Outstanding | Good | Average | Poor | Minimal | Absent |
|---|---|---|---|---|---|---|
| **Effectively explained what their investigation was about and why they chose it** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Discussed the investigative methods (in the widest sense) that they used** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Showed excellent understanding of the underlying science** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Exhibited the ability to evaluate their investigation** | 5 | 4 | 3 | 2 | 1 | 0 |
| **Method of communication chosen had impact (e.g. talk, powerpoint, video, etc)** | 5 | 4 | 3 | 2 | 1 | 0 |
| **COLUMN SCORE** | | | | | | |
| **TOTAL SCORE** | | | | | | |

# Preparing for an Interview

Every student will be asked questions by the reviewers. Interviews are easy for some natural communicators, but can be a daunting thought for others.

The best thing to do is be prepared, you may have finished your project a while ago so read back on everything.

## Things you may get asked:

- Why did you do this project?
- Did you enjoy it?
- Do you understand the ideas and concepts of the project?
- What was the process you took to complete the project?
- What were the challenges you overcame?
- What would you do differently in retrospect?

**Remember** that you know the full details of your project because YOU did it, you are the expert!

# Checklist

1. Complete an entry form online ☐

2. Read and agree to the conditions of entry and the fair rules ☐

3. Check if you need Ethics approval for your project ☐

4. Do background research and get help from an expert ☐

5. Carry out your amazing project (remember to keep a logbook) ☐

6. Design and create your exhibit ☐

7. Take your exhibit to the Cawthron Scitec Expo on the correct day, check the website for date/time/location ☐

8. Be present for judging interviews between 10am and 2.00pm ☐

9. Tell your family and friends to come along and see all the projects ☐