Science Talent Search

We have registered Rossmoyne Senior High School into the STAWA "Science Talent Search" for 2018 and are inviting the year 9 Extension and Science Honours classes to submit entries as part of their extension programme. The three categories are:

- Science Investigation
- Engineering
- Scientific Communication (Science Photography / Science Video)

Attached are the following:

- Key dates
- Copies of the descriptions and examples of each of the categories
- Risk Assessment Forms

Entrants in Science Investigation and Engineering categories will be required to bring a copy of their written report, a summary of their report on a display board and working models (Engineering entries) to the state judging event. The judges will interview entrants as part of the judging process.

Further information can be found at:

https://www.stawa.net/index.cfm//student-activities/science-talent-search/

The final date for submissions at Rossmoyne is Wednesday 18 July since the registration of entries closes on Friday 20th July.

Category 1: Science Investigation (Years 7-12)

An investigation in secondary school can relate to conducting a fair test, testing materials, solving a problem, carrying out a survey or fieldwork, sourcing data to explain phenomenon or conducting chemical analyses (see Table 3). It is expected that students in Years 7-12 generate their own research questions.

A successful secondary science investigation entry will:

- follow the scientific method of investigation.
- communicate your ideas clearly using appropriate scientific language.
- be your own original idea, not just something copied from the internet.
- include evidence of your background reading on the idea you have chosen.
- present a clear and accurate recording and appropriate representation of your data and observations.

Table 3. Different types of secondary investigations

Type of investigation	Description	Examples of suitable question formats
Investigating a relationship between the independent and dependent variable where repeat trials* can be used.	A controlled experiment (fair test) with repeat trials. *Repeat trials are conducted because tests are non-destructive.	• How does backspin on a basketball affect goal shots? • What is the effect of tyre pressure on rolling resistance in bicycle tyres?
Investigating a relationship between the independent and dependent variable where replication** can be used.	A controlled experiment (**fair test**) with replication. **Replication is used because tests are destructive and cannot be repeated, or the population may not be uniform.	• Do moon phases affect the germination of radish seeds? • What effect does temperature have on germination?
Testing types of materials	A controlled experiment (**fair test**) with a discrete independent variable using repeat trials or replication.	• Which poo makes the best fertiliser? • Are childproof containers really childproof?
Investigating the effect of several independent variables on one dependent variable – often associated with a design problem	A number of independent variables are tested separately, or in combination, on one dependent variable to develop a design brief.	• Can the temperature above downlights start an insulation fire? • How do the number of coils, length and thickness of wire affect the efficiency of a heating element?
Survey research, where populations are sampled to investigate the relationships between variables	The population being tested is non-uniform and samples are selected based on the parameters being investigated (e.g. gender). Random sampling is used to control for interfering variables.	• How do height and weight vary with age in boys and girls? • Does streaming affect student academic performance? • Where do cockatoos prefer to nest
Comparative or descriptive studies (fieldwork)	Comparisons may be made between sets of data relating to different locations or time. A range of data is collected to develop a description of a phenomenon or location.	• What is the abundance and distribution of Surf Clams • Has the town jetty development affect surrounding cockle populations? • How does the shape of the moon change over a month?
Researching, analysing and explaining data collected and reported by other scientists	Secondary data is sourced to identify patterns then explain them.	• How accurate are BOM predictions for my local area? • How has land clearing affected stream quality over the last 10 years?
Chemical analysis	The use of quantitative analysis to identify chemicals present in substances	• What is the acetone content of different nail polish removers? • Does cooking food affect its vitamin C content?

Table adapted from Hackling M (1998) Working Scientifically: Implementing and Assessing Open Investigation Work in Science, Education Department of WA

Science Investigation (Years 9-12)

A Year 9-12 science investigation involves:

- choosing a topic that you are interested in.
- developing a clear testable question around your topic.
- forming a hypothesis.
- planning your investigation.
- conducting a risk assessment*.
- conducting your investigation.
- collecting your data.
- analysing your results.
- writing your report.

* *It is important that a Risk Assessment is completed before starting your investigation. A Risk Assessment Form is required to be submitted with the entry or your entry will not be assessed. Make sure your teacher goes through your Risk Assessment form with you even if you are doing your project at home.*

Entry guidelines

You are required to:

☐ Produce a written report using the following headings:

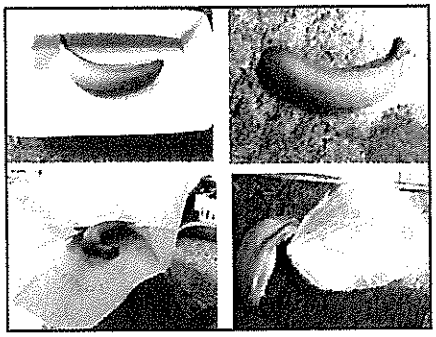
- **Title page and Table of contents**
- **Abstract** – A brief description of what you did and what you found out.
- **Introduction** – What gave you the idea? How did you get started? Include any background research you have done on the topic.
- **Aim** - What you were trying to find out? What you thought would happen.
- **Materials** – List or describe the materials used.
- **Method** – Describe the steps you took. Describe the safety requirements you followed in conducting this investigation. Photographs of your set up could be included.
- **Results** – Everything you discovered (or found out). To show this use tables, graphs, pie charts, photos etc.
- **Discussion** – Discuss your results describing the patterns and trends. Describe how you could improve your investigation.
- **Conclusion** – List the main things you have discovered or found out. Go back to your results - What do they tell you? Did your results support your hypothesis? Use your research/scientific knowledge to explain your results.
- **Acknowledgements and References** – Make sure you include a list of people who gave you help/advice and list any books or websites you used.

☐ Attach the required forms to the back of your report.

- *Risk Assessment Form* – required for all entries
- *Informed Consent Form* – if human subjects are used in your investigation.
- *Supervising Scientist Form* – if your investigation method falls outside the ethics or safety guidelines for schools.

☐ Ask your teacher or parent(s) to check your report to make sure it follows the guidelines.

☐ Your report should be typed and printed on single sided A4 paper and staple in the top left corner. **DO NOT** bind or place your report in a presentation folder.



Does packaging affect the ripening of bananas?
(2014)

Category 2: Engineering

Engineering is the application of Science, Mathematics and Technology to invent new products or modify existing products that benefit society. You could re-invent a product that solves a problem by reusing, repurposing or upcycling materials. The scope for entry is limited only by your imagination.

Have you considered entering the **Young Re-inventor of the Year awards**? The 2018 theme is *Water: Re-invent rubbish into something that helps keep our waterways clean or conserves water.* STS entries that meet the requirements of the *Young Re-inventor of the Year* awards can be entered into both competitions. For more information about this competition can be found at: https://www.switchyourthinking.com/our-projects/young-reinventor-of-the-year/

Finalists in this category may be eligible for selection into the **BHP Billiton Foundation Science and Engineering Awards.**

Designing an engineering project involves:

- choosing a problem to solve that you are interested in.
- researching ideas or gathering information to help you solve the problem.
- sketching and writing down several ideas that may solve your problem.
- selecting and developing one idea that you think will best solve the problem.
- conducting a risk assessment*
- making a model of your invention
- testing the model to see if it solves your problem
- evaluating your model to consider any improvements that could be made
- writing a report
- creating a video

* *It is important that a Risk Assessment is completed before starting your investigation. A Risk Assessment Form is required to be submitted with the entry or your entry will not be assessed. Make sure your teacher goes through your Risk Assessment form with you even if you are doing your project at home.*

A successful engineering entry:

- will show creativity and resourcefulness
- will show skill in construction and design
- will communicate ideas clearly

Some Winning Science Talent Search Project Titles

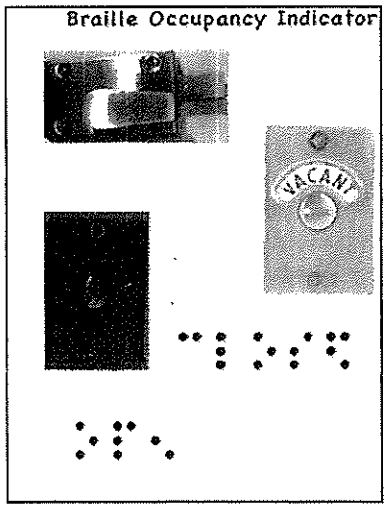
Primary	Secondary
• SHINE - car cleaning tool for the elderly	• Shopping Trolley Monorail
• Pencil case/tissue box	• Bananalam
• My Piano Pedal Aid	• Passive solar atmospheric water reclamation device
• Light my day	• Revolutionary Funnel
• Voice machine	• Arm Warmer
• Lego Clean-up	• The Hold It Hairbrush
• Bottle opener	• System to afford people with Achondroplasia easy access to a vehicle
• Cleaning footwear	• F.P.C.U "Flute Posture Correction Unit"
• Music pillow	• Water-table Simulator
• Book Turner	• Cover cone
• Pop-up hand	• iTrolley
• The Fog-away glasses	• Cereal machine
• The Teddy Bear Safe	• Juice Bottle Bioreactor
• Bag tag light	• Hydraulic powered robotic arm
• The umbrella water bottle	

Entry guidelines

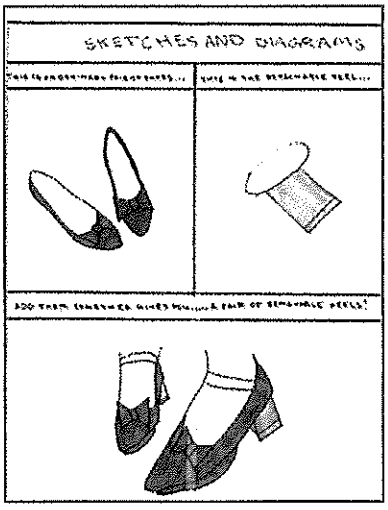
You are required to:

- ☐ Produce your product or working model
  - Your design must be original. It must be safe to operate in a crowded area and must have appropriate safety features. Dangerous chemicals must not be used and rocket type inventions will not be judged.
- ☐ Produce a video that states the problem you have chosen to solve, describes how well your product solves the problem and demonstrates how your product works.
  - ensure your video is no longer than **THREE** minutes in length
  - make sure you introduce your product at the start of the video.

  Any entries exceeding this limit will only have the first THREE minutes assessed.
  The quality of the video itself will play no part in the judging, however, it is important that the judges can see and hear the work to assess it fairly.
- ☐ Submit your video to your teacher in MP4 format for online submission. If the video is presented in any other format there is a risk that it may not be able to be reviewed.
- ☐ Produce a written report using the following headings:
  - **Title page**
  - **Table of contents**
  - **Introduction** – What problem were you are trying to solve? Why did you choose this problem? Is there anything else that has been made to solve this problem? What is original or new about your solution to this problem? (2-3 paragraphs)
  - **Features of your product** – Labelled sketches or drawings of your design.
  - **Pluses and minuses** – What worked and what did not work when you used your product? This can be presented as dot points.
  - **Evaluation** – Having used your product, what could you do to improve it if you could make it again? (1-2 paragraphs)
  - **Acknowledgements and references** - You should list all the books or websites you referred to for your invention, and any people who gave you practical help or advice.
- ☐ Attach the required forms to the back of your report.
  - *Risk Assessment Form* – required for all entries
  - *Informed Consent Form* – if human subjects are used in your project.
  - *Supervising Scientist Form* – if your project method falls outside the ethics or safety guidelines for schools.
- ☐ Ask your teacher or parent(s) to check your report to make sure it follows the guidelines.
- ☐ Type your report on single sided A4 paper and staple in the top left corner. **DO NOT** bind or place your report in a presentation folder.



Finalist (2016)



My piano pedal aid (2016)

CATEGORY 3 : SCIENTIFIC COMMUNICATION

Science Video (Years K-12)

What is a science video?

Science videos are videos or animations of 60 seconds duration that clearly explain a Science idea. The videos/animations should be original work filmed in 2018.

Entries could also be entered into the **Sleek Geeks Science Eureka Prize** *competition if they meet the entry requirements. Information about this competition can be found at australianmuseum.net.au/sleek-geeks-science. The website also contains hints, ideas and video galleries that could be useful when planning Science Talent Search entries.*

Producing a science video involves:

- selecting a science idea or concept that you are interested in.
- finding out about the topic and locating equipment and props you may use.
- planning the script to fit the 60 second time frame.
- conducting a Risk Assessment*.
- practising your script.
- making your video.
- editing your video.
- producing your final copy of your video.

* *It is important that a Risk Assessment is completed before starting your investigation. A Risk Assessment Form is required to be submitted with the entry or your entry will not be assessed. Make sure your teacher goes through your Risk Assessment form with you even if you are doing your project at home.*

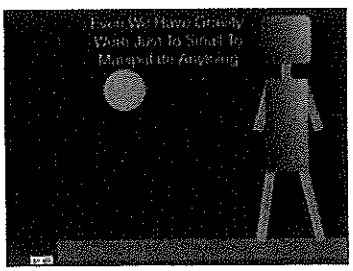
Some Winning Science Talent Search Project Titles

Primary	Secondary
• Volcano Eruption	• The Process of Smelting Aluminium
• Broccoli Sustainability	• Black holes
• Boy vs Bot	• Can humans live on Mars?
• The POP, CRACKLE, FIZZ Show	• Levers
• Red Tailed Black Cockatoo Feathers	• Eclipses
• Light my day	• The Heart Valve

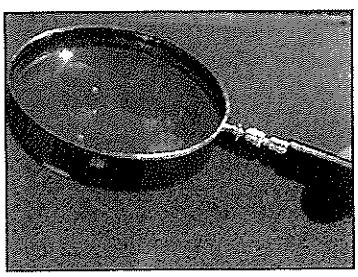
Entry guidelines

You are required to:

- ☐ ensure your video communicates the Science behind your idea or concept and does not simply display a skill used in Science.
- ☐ conduct a Risk Assessment **before** you film your video.
- ☐ ensure the video has opening and closing credits.
- ☐ include entry title in the opening credits.
- ☐ ensure videos are 60 seconds or less in duration, including credits. Any entries exceeding this limit will not be assessed.
- ☐ ensure no corporate logos are visible during the video; this includes wearing and/or displaying corporate logos. Remove or obscure labels/brand names from any commercial products used in the video. (School logos on uniforms are OK)
- ☐ ensure you are the driving force behind your video, but you can use extra help. This help can include others videoing to allow you to be in the presentation, others holding equipment or giving any other help that is appropriate to your skill level.
- ☐ Submit your video to your teacher in MP4 format for online submission. If the video is presented in any other format there is a risk that it may not be able to be reviewed.
- ☐ Submit your *Risk Assessment* form to your teacher.



Gravity (2016) – Animation



A focus on light (2015) – Video

Science Photography (Years K-12)

In the scientific photography section you choose a scientific theme or event and submit between three and six photographs to illustrate this theme or event.

Developing scientific photographs involves:

- selecting a theme or event you are interested in.
- deciding what you want to photograph.
- deciding what type of camera you have access to (e.g. optical, digital, mobile phone camera, iPad or tablet camera).
- conducting a Risk Assessment*.
- taking your photographs.
- adding any special effects to your photographs if needed to help get the message across.
- printing your photographs.
- displaying your photographs.

* *It is important that a Risk Assessment is completed before starting your investigation. A Risk Assessment Form is required to be submitted with the entry or your entry will not be assessed. Make sure your teacher goes through your Risk Assessment form with you even if you are doing your project at home.*

A successful scientific photograph entry:

- has accurate science content based on your chosen theme or event.
- will communicate ideas clearly, with each photograph expressing a single idea.
- will contain good quality photographs.
- will have the photographs displayed as required.
- will show creativity and originality.

Some Winning Science Talent Search Project Titles

- Tornadoes
- The Colour of Chemicals on Fire
- A Photographic Demonstration of Osmosis - Using an Egg
- How to grow an avocado
- Coolgardie Sky, before, during and after school
- The Beauty of the Bees

Entry guidelines

You are required to:

- ☐ conduct a risk assessment **before** you take your photographs.
- ☐ make sure the photographs are your own, including adding any special effects. You may print your photographs at home, school or use a commercial printer.
- ☐ present three to six colour or black and white photographs.
  - Each numbered photograph should be mounted on single sheet of light weight A4 card. No glass, wood or heavy frame is permitted.
  - Each photograph should include a caption or short statement on the same page explaining how it links to your theme or event.
- ☐ produce a written report, which includes the following sections, in this order:
  - **Title**
  - **Introduction** – Explain your theme or event and why you have chosen it (1 paragraph)
  - **Equipment and method** – What type of camera did you use? What type of hardware or software did you use to alter theimages (if done)? Where were your photographs taken? Did you do anything special to take the photographs (e.g. selfie stick to look in a nest, ladder to gain height)? (1-2 paragraphs)
  - **Acknowledgements and references** – You should list all the books or websites you referred to for your chosen theme or event, and any people who gave you practical help or advice.
- ☐ submit your entry to your teacher in a manila folder or envelope (not a plastic sleeve), making sure to include your *Risk Assessment form*

Light my day (2015)

Risk Assessment Form

Project title: _____

_____

Activity: *(Give a brief outline of what you are planning to do)*

_____

_____

_____

_____

Are there possible risks?

Consider:

- **Chemical** – Check with your teacher that they are on the list of approved chemicals. Do you need to use them in a well-ventilated area?
- **Thermal** – Are you heating things? Could you be burnt?
- **Biological** – Are you working with any materials that could be poisonous?
- **Sharps** – Are you cutting things?
- **Electrical** – Do you need to use 240 V electricity or could you use a battery?
- **Radiation** – Are you using UV radiation or lasers?
- **Any other hazards**
- If humans are involved in any way you must get them to sign a permission note consenting to be part of your experiment. An example of a Human Subject Permission Form can be downloaded from the STAWA website (www.stawa.net).

Risks	How I will control / manage the risk
e.g. plant material could be poisonous if eaten	*Wash hands immediately after handling the plant.*

(Attach another sheet if required)

Risk Assessment indicates that this activity can be safely carried out

I have assessed that this activity can be carried out safely.

Teacher/supervisor's name: .....

Signature: ..... Date: ____/____/_____