Tasmanian Science Talent Search Information Booklet 2021

https://krishijagran.com/news/un-to-declare-2021-to-be-international-year-of-fruits-and-vegetables/. Accessed 10th November 2020

Food: Different by Design

About the Tasmanian Science Talent Search

The school theme for National Science Week 2021 https://www.scienceweek.net.au/ is *Food: Different by Design*. It will honour the United Nations International Year of Fruits and Vegetables and the International Year of Creative Economy for Sustainable Development.

Food: Different by Design will cover a broad range of areas in food production and sustainable agriculture, enabling students to explore topics such as biosecurity, food technology and laboratory-developed foods. Scientific development will be at the core to the theme, with other hands-on projects for students to explore.

The Tasmanian Science Talent Search (TSTS) is an initiative of the Science Teachers Association of Tasmania Inc (STAT). It has been operating continuously since 1960 (though not always by the same name) and has involved over 60,000 students since its inception.

Through the TSTS, STAT aims to:

1. Inspire a lifelong interest in science by:

2. Promote high quality teaching and learning

3. Highlight a Pathway to Excellence

TSTS 2020

In 2020, teachers and students had a challenging year, dealing with the restrictions of COVID. Despite this, about 1000 entries were received in the TSTS 2020, some involving groups of students. We were unable to hold our usual celebration event, (usually held in November) however, prize winners were acknowledged in an online presentation which can be viewed at https://stat.org.au/tsts-online-awards-2020/. About $15000 in prize money is awarded annually.

STAT MEMBERSHIP

School and teacher membership of STAT is encouraged. An online application can be made at https://stat.org.au/membership/

Essential Information TSTS 2021

Whether you have been involved in the TSTS for many years, or are considering involvement for the first time, the following information should prove helpful:

☐ it is open to all Tasmanian students K-12

☐ there is **no entry fee** in 2021

☐ all entries to be submitted electronically

☐ there are ten (10) Sections to appeal to different learners and learning styles

☐ sections fall into two categories:

- Themed – which relate to the current National Science Week topic; &
- Open – which allow students to choose any topic of interest

☐ Themed sections include:

- Picture Story Books
- Creative Writing
- Posters
- Photographic Essays
- Videos
- Scientific Essays
- STEM Challenge

☐ Open sections include:

- Research Investigations
- Natural Sciences Project
- Invention/Engineering

☐ judging occurs in Divisions:

- ECE (K-2)
- LP - Lower Primary (3-4)
- UP - Upper Primary (5-6)
- JS - Junior Secondary(7-8)
- IS - Intermediate Secondary (9-10)
- SS - Senior Secondary (11-12)

☐ not all sections are open to all divisions

☐ if a division has many entries it will be sub-divided and judged by year level

☐ each section has Entry Guidelines and Judging Criteria. Submissions than do not adhere will not be judged.

Judging of Entries

Entries are judged by members of STAT and other interested parties.

Becoming a Judge

If you, or a team of teachers from your school, are interested in judging (AITSL Standard 7) contact the Director: tsts.director@gmail.com

What recognition do students receive?

All students receive a participation certificate.
Awards for **1st, 2nd, 3rd,** and **Merit** are allocated for every Division in every Section.

ALL ENTRIES TO BE SUBMITTED ELECTRONICALLY

Submission Requirements

What standard of work is expected?

STAT expects that work submitted to the TSTS is of a high standard. On rare occasions, where entries do not meet that standard, the judging committee reserves the right not to award prizes in a division.
Student participation in the TSTS is a symbol of success in itself.

How much help can students receive?

STAT encourages conversation, communication and mentoring in all entries, with the proviso that **any contribution from those other than the student be acknowledged**.

Submission of entries

All entries to be submitted electronically.

* *Small Group entries **must not include more than three students**.

Electronic submissions must follow this file naming protocol:
School Name_Student First Name_Student Last Name_Section Code_Year Level
Eg. Marvel PS_Peter_Parker_PSW_Year 5

Register and submit entries online. This will open from 21st April.

NOTE

Tasmanian Colleges and UTAS, together with most Mainland and International Universities, use a program called **Turnitin** to check for plagiarism – i.e., checking that a student's work is their own, and all sources of information are acknowledged and referenced.

This should be **used by students in Intermediate Secondary and Senior Secondary Divisions** who submit entries for: Creative Writing, Scientific Essay, STEM Challenge, Research Investigations, Natural Sciences Project, and Invention/Engineering, with the summary report submitted with their entry.

If students are not able to access Turnitin, judges reserve the right to submit a student's entry for checking.

Themed Sections	Eligible Divisions	Entry Types	Submission Type	Submissions Due
Picture Story Books (PSB)	ECE - UP	Individual or small group** (ECE - UP), ECE & LP may submit whole class entries	PDF	Fri 2 July
Creative Writing (CW)	All Divisions	Individual entries only	PDF	Fri 2 July
Posters (P)	ECE - IS	Individual entries only	PDF	Fri 2 July
Photographic Essays (PE)	LP - SS	Individual entries only	PDF	Fri 2 July
Videos (V)	All Divisions	Individual or small group** (All Divisions), ECE & LP may submit whole class entries	Weblink	Fri 2 July
Scientific Essays (SE)	JS - SS	Individual entries only	PDF	Fri 2 July
STEM Challenge (STEM)	All Divisions	Individual or small group** (All Divisions), ECE & LP may submit whole class entries	PDF	**Fri 24 Sep**
Open Sections	Eligible Divisions	Entry Types	Submission Type	Submissions Due
Research Investigations (RI)	All Divisions	Individual or small group** (All Divisions), ECE & LP may submit whole class entries	PDF	Fri 24 Sep
Natural Sciences Project (NSP)	JS - SS	Individual or small group* *entries	PDF	Fri 24 Sep
Invention/Engineering (E)	UP - SS	Individual or small group** entries	PDF (with Weblink for video)	Fri 24 Sep

* *Small Group entries **must not include more than three students**.

Themed Section: PICTURE STORY BOOKS (PSB)
Entry: ECE to Upper Primary

Picture Story Books must relate to the theme: Food: Different by Design

Topics for 2021
These are the ONLY topics that will be judged.

1. **How can you make a vegetable garden?**
2. **Why should we eat nutritious food?**
3. **What should we do with waste food?**
4. **How can we grow food in ways that do not affect the environment?**

✓ *Tick that you have satisfied each of the entry guidelines and judging criteria below:*

Entry Guidelines

☐ Your book must use one of the above topics and be a work of **fiction**

☐ **Include science concepts/information** into the story. This must be done through pictures supported by **minimal text**.

☐ Briefly explain **5 key science ideas** used to develop your story in an **Appendix**.

☐ Include a **Bibliography** listing all the different sources used to develop your idea.

☐ Typed or printed text is best but not essential. Ensure handwriting is clear.

☐ Pictures can be created using **any medium**. Downloaded images/Clip Art cannot exceed 25% of total artwork and must be **cited**.

☐ Submit your Book as an **A4 or A3 PDF.** (Easily achieved in Word or PowerPoint).Include

☐ **Acknowledgements** listing any people who helped and what they did.

☐ **Word Limits:** ECE up to 200; others 300.

Judging Criteria
Scientific concepts:

☐ Identification of science concepts

☐ Accurate portrayal of science concepts

Presentation:

☐ Accurate grammar, spelling and punctuation

☐ Creativity of story line

☐ Clarity of expression

☐ Visual impact

☐ Integration of visual and text elements

Adherence to Entry Guidelines

☐ Inclusion of the Appendix, Bibliography, Acknowledgements and Word Count

Some helpful Australian resources:
Exploring Picture Story Books

Writing Your Picture Story Book

Acknowledgement: This task is based on work on the Science Teachers Association of Victoria (STAV)

Themed Section: CREATIVE WRITING (CW)
Entry: ALL Divisions

Creative Writing must relate to the theme:
Food: Different by Design

Choose **any topic relevant to the theme.**

✓ *Tick that you have satisfied each of the entry guidelines and judging criteria below:*

Entry Guidelines

☐ An entry must be imaginative. Could be a: diary, letter, speech, comic, cartoon, narrative, fable, parable, poetry, script etc.

☐ Include **science concepts/ information**

☐ List **at least 5 key science ideas** you used to develop your work. Include this in an **Appendix** (ECE and Lower Primary)

☐ Students in **Upper Primary & above** must do the above and provide a brief, 1-3 sentence explanation of **each** point. Judges will look for concepts incorporated into your writing.

☐ Typed or printed text is best but not essential. Ensure handwriting is clear.

☐ Illustrations can be used to complement your writing or as an integral part of the text style. **Any medium** can be used. Down-loaded images/Clip Art cannot exceed 25% of total artwork and must be **cited**.

☐ Submissions must be **A4 PDFs** in either portrait or landscape orientation.

☐ **Word Limits** apply:
- ECE: 50-300
- Lower Primary: 100-500
- Upper Primary & above: 250–1000

☐ Include a **Bibliography** listing all the different sources used to develop your idea.

☐ Include **Acknowledgements** listing any people who helped and what they did.

Judging Criteria
Scientific concepts:

☐ Identification of science concepts

☐ Accurate portrayal of science concepts

Creating imaginative texts:

☐ Accurate grammar, spelling and punctuation

☐ Creativity (choice of topic, text style, ideas)

☐ Clarity of expression (cohesion, vocabulary, sentence structure)

☐ Development of the story line (topic)

☐ Integration of visual elements (if applicable)

Following Entry Guidelines

☐ Inclusion of the Appendix, Bibliography, Acknowledgements and Word Count

Themed Section: POSTERS (P)

Entry: ECE to Intermediate Secondary

https://www.shutterstock.com/search/food+sustainability. Accessed 25/2/2021

Posters must relate to the theme: **Food: Different by Design**

Choose **any topic relevant to the theme.**

✓ *Tick that you have satisfied each of the entry guidelines and judging criteria below:*

Entry Guidelines

- ☐ Posters **should** be informed by personal research or part of a learning sequence.
- ☐ Entries must integrate **science** understanding and **artistic** skill
- ☐ **The poster should advertise a science concept**, issue or idea in a way that is eye-catching, informative and/or challenges a person's thinking
- ☐ Information posters, diagrams, scientific charts, and pictorial essays are **ineligible**.
- ☐ Posters usually combine graphic and text elements. **No more than 20 words** can be used in this section.

Judging Criteria

Scientific concepts:

- ☐ Identification of a relevant science concept
- ☐ Understanding of the selected science concept

Creativity and Technical Skill

- ☐ Quality and skill of composition
- ☐ Application of time/effort, attention to detail

Adherence to Guidelines

- ☐ The entrant followed the Entry Guidelines

Themed Section: PHOTOGRAPHIC ESSAY (PE)

Entry: Lower Primary to Senior Secondary

Photographic Essays must relate to the theme: **Food: Different by Design**

Choose **any topic relevant to the theme.**

✓ *Tick that you have satisfied each of the entry guidelines and judging criteria below:*

Entry Guidelines

☐ A Photographic Essay is a series of **5-8 photographs**, taken by the entrant, which **tells a story or creates an emotion**.

☐ All photos must have been taken with this competition in mind.

☐ Photos may be edited or 'touched-up' by the photographer but must retain, at the judges' discretion, an essentially **'natural'** look.

☐ Each photo may include a caption of up to 20 words.

☐ Include an artist's statement (up to 200 words) on page 1 **or** the final page.

☐ Include your Project Title, Name, Division and School on Page 1 (Artist's statement is optional). **Do not put photos on Page 1.**

☐ Photographs must be arranged into a sequence in the order you want them to be viewed with **one photo per page**.

☐ No single photograph can exceed 1Mb and **no entry can exceed 8Mb**.

☐ The final page must include a numbered list of your photos, in the order they appear, stating the date each was taken and what editing (if any) was performed. It may also contain **Acknowledgements** and **Bibliography** (if either are applicable).

☐ The final page can include your Artist's statement if it was not on Page 1. **Do no put photos on the final page.**

Judging Criteria

Scientific concepts:

☐ Photographs highlight a scientific concept or issue which is relevant to the theme

☐ The Artist's statement and captions show scientific knowledge and awareness

Creativity and Technical Skill

☐ Consistently skilful technique and composition

☐ Selection and sequencing of photos tells a story

☐ Artist's statement shows the link between intention and outcomes

Adherence to Guidelines

☐ The entrant followed Entry Guidelines

Themed Section: VIDEO (V)
Entry: ALL Divisions

Videos must relate to the theme: **Food: Different by Design**

Choose **any topic relevant to the theme** and **any genre** that conveys your scientific concept.

Check Sleek Geeks for inspiration!

✓ *Tick that you have satisfied each of the entry guidelines and judging criteria below:*

Entry Guidelines

- ☐ Videos should be informed by personal research or part of a learning sequence.
- ☐ Good video requires **good writing**. Choose an idea, develop your idea into a logical **structure** then write a detailed **script**.
- ☐ List information sources in a **Bibliography**
- ☐ Good video requires **technical skill**. Plan your use of sound, slow motion, subtitles, animation, close-ups, tripods, B/W, etc. Check out MyState Filmmaking Guides
- ☐ Videos must be the **work of the entrants**. Any footage/images from other sources should be incidental (<10%)
- ☐ You can use 'extras' as support actors, to hold a camera or for minor assistance. They should not make **major contributions**.
- ☐ **Only the entrants may work on the editing and post-production of the film**. Techniques taught by teachers/mentors must be done using unrelated footage.
- ☐ **Acknowledge** people who helped in your **Credits** and explain their contributions.
- ☐ Videos to be **90 seconds to 3 minutes** of content (excluding **Credits** – see below)
- ☐ **Credits** (up to an extra **30 seconds**) are required. Include: the roles of entrants, **Bibliography**, **Acknowledgements,** and **a list of the equipment/software used**.
- ☐ **Submit videos in a common format using a weblink. Check it works before submission!**

Judging Criteria

Scientific concepts:

- ☐ Identification of relevant science concepts
- ☐ Appropriate amount of science content
- ☐ Accurate use of science concepts

Composing a digital multimedia text

- ☐ Video conveys a coherent message
- ☐ Appropriateness of expression/language for the selected genre
- ☐ Inclusion of relevant scientific vocabulary and/or explanations

Presentation and Technical skill:

- ☐ Quality of footage (shots, lighting, stable)
- ☐ Editing (transitions, effects, pace, mood)
- ☐ Sound (dialogue, effects, music)
- ☐ Following the Entry Guidelines

Themed Section: SCIENTIFIC ESSAY (SE)
Entry: Junior Secondary, Intermediate Secondary, and Senior Secondary

The Scientific Essay must relate to the theme: **Food: Different by Design**

Topics for 2021

These are the ONLY topics that will be judged.

1. **How agriculture can be made more sustainable in Tasmania.**
2. **Why is it important to ensure Biosecurity in food production?**
3. **Food technology and laboratory developed foods.**
4. **Supply chains and sustainable production of fruits and vegetables.**

✓ *Tick that you have satisfied each of the entry guidelines and judging criteria below*

Entry Guidelines

☐ Your Essay must follow one of the above topics. Indicate the topic as a **header or footer on your entry**.

☐ Your essay must incorporate **scientific information and evidence**.

☐ Essay must follow **conventions for Persuasive Writing**. See examples.

☐ **Acknowledge** any people who give you assistance and how they helped. (Include at the end of your writing.)

☐ Include a **Bibliography** outlining all sources used.
Specific information must be **cited**. See: Plagiarism & Referencing

☐ Use images, tables, graphs etc **sparingly** and only if they support your argument.

☐ **Word limits**: JS - 1200, IS - 1500, SS - 2000 (excluding Bibliography)

☐ **Formatting**: use a clear font, 12pt, 1.5 line spacing, 2.5 cm margins

Judging Criteria

Scientific concepts:

☐ Identification of the main science concepts

☐ Appropriate amount of scientific content

☐ Accurate use of scientific evidence

Composing written texts:

☐ Grammar, spelling and punctuation

☐ Clarity of expression

☐ Accurate use of specialised vocabulary

☐ Use of persuasive devices

Presentation and format:

☐ Engaging and informative introduction

☐ Variety and veracity of resources used

☐ Quality of conclusion

Adherence to Entry Guidelines (including the word count)

Open Section: STEM CHALLENGE
ENTRY: All Divisions

The school theme for National Science Week 2021 https://www.scienceweek.net.au/ is **Food: Different by Design**.

Access to enough safe and nutritious food is a vital requirement for a healthy life. Ensuring the food needs of all people will be increasingly challenging as the global population grows.
Based on the current projections, required food production over the next 35 years will need to match that produced throughout human history to date. A very big task indeed!
The food security challenge - YouTube

Of the many issues that impact the security of food, waste is one that has recently received important exposure.
Food waste can be considered in two parts.

1. Food that is wasted during production, including storage and distribution. This is often referred to as 'food loss'.
2. Food that is wasted by retailers and consumers.

https://www.farmonline.com.au/story/6706404/food-waste-hitting-farmers-hip-pocket/

The issue of food waste is a significant concern in Australia and something we can each consider as individuals, families, or larger organisations.

The Challenge

Bearing in mind the saying 'think global, act local' - consider the impact of food waste on current and future global food production. Within your local context, identify a food waste problem and design an innovative solution that improves the situation.

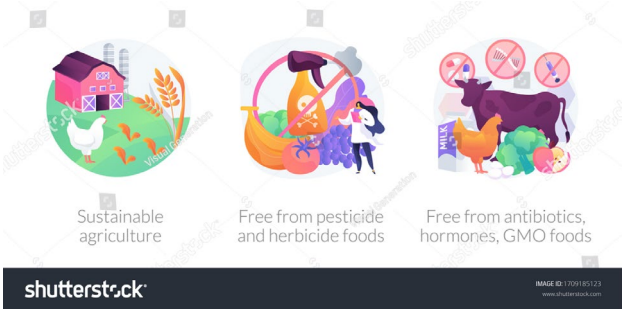
***Suggestions**: food waste at home, at school, at a local retail or hospitality venue or food loss on the school farm, in the school garden or at a local production site*

or

Consider the challenges and opportunities facing the future of food production, either nationally or globally. Choose one that is of particular interest to you and design an inquiry to help you discover more.
***Suggestions:** sustainable intensive agriculture, laboratory produced food, resource management (particularly water and soils), controlled environment production, Agri-technology*

The Challenge Designed by:

Andrew Harris | Statewide Coordinator
Food and Fibre Production | Revitalising School Farms
Curriculum Services | Support and Development | Department of Education



https://www.shutterstock.com/image-vector/sustainable-organic-agriculture-abstract-concept-vector-1709185123. Accessed 26/2/2021

Suggested STEM process

What is the problem you could solve, or the research opportunity that you would investigate, if you could?

- Find out more.
- What have other people done previously?
- What are the limitations or constraints?
- What is your goal or the mission of your project?

How can you solve the problem or conduct the research?

- What would you do?
- Tell us about your creative decision-making process.
- What are some of the various ideas you considered?
- Explain why you selected the approach you took and why other ideas were not chosen.

Plan a model!

- This doesn't have to be a real working model, a design on paper is fine. Unless you really want to build, then great! Maybe it could be a computer aided design, or a coded animation.
- If you are taking the research path, what equipment would you need? How would you conduct it? What would be your hypothesis?
- Describe the engineering details; list the steps that would need to be taken and the materials needed, and how it will work.
- Identify any safety issues and how you would lessen risk.

Test your model/research methodology (even if it is not real) and reflect.

- Imagine your model/research was real, what tests would you conduct to see if it works?
- What are the strengths and weaknesses of your plan?
- What modifications/refinements could you do to improve/adjust design?
- What are future possibilities?
- Record your steps with notes, diagrams, and/or photographs or video.

Judging Criteria

- Submits a report
- Identifies the problem
- Idea generation and design choice
- Model/prototype design
- Model testing process
- Effectiveness and quality of design
- Innovation and creativity
- Acknowledgements

ALL ENTRIES TO BE SUBMITTED ELECTRONICALLY

Open Section: RESEARCH INVESTIGATIONS (RI)

Entry: All Divisions

Students plan, carry out and report on an experimental inquiry on a topic in which they have a personal interest, or is of community relevance.

HINTS:

- ☐ Undertake relevant research to help understand the main concepts associated with the topic.
- ☐ Seek expert knowledge from within the school, family, community, or industry to develop a topic
- ☐ Identify a problem and try to find a solution or find something that is not understood and suggest a plausible explanation.
- ☐ Take time to understand different types of data, their strengths, weaknesses and validity for certain purpose and age groups.
- ☐ Consider importance of sample size, blind trials, confounding variables, randomization etc.
- ☐ Perform Controlled Experiments or adopt the principles of a Fair Test.
- ☐ Maximise the duration of data collection.
- ☐ Maximise the amount of data collected so that more meaningful conclusions can be made.
- ☐ Understand that a hypothesis and a prediction are fundamentally different. A **hypothesis** is a proposed explanation whereas a **prediction** is an expected result. A hypothesis should be **testable**.
- ☐ Do not use standard school experiments. If based on a school experiment, it should offer a novel application, have some change, or use the method across a wider range of conditions.

Judging Criteria

The following essential components will be judged:

- ☐ The research question(s)
- ☐ Safety consideration and risk management
- ☐ Predicting
- ☐ Fair Testing: Identification of variables and controls, or random sampling in field work, or trial and error approach
- ☐ Planning and conducting the research
- ☐ Processing and analysing information
- ☐ Investigation evaluation - discussion, conclusion, and recommendations
- ☐ Communicating

Writing a Primary Research Investigation

A **Research Investigation** showcases the entire process of planning, conducting, and reporting on a scientific experiment or inquiry.

Cover page – include a title, name, or names (if it is a group entry), school, year level and a relevant picture. The best pictures show students in action.

Abstract – most students do not use these until high school. Year 5 & 6s who enter the same work in e.g., the UTAS SEI Awards should have written one. It is an 80-100 word overview of your project (see Tips). Other students can opt to omit this.

Introduction/Background Information – this is where you explain why the topic was chosen. It could be a problem to solve or a question to answer. State what you already know and have discovered through research. Introduce terminology or vocabulary relevant to your topic, process, or the equipment you used.

Aim – state the purpose of your experiment, what you hope to learn, discover, or find out. Younger students can benefit from the use of a 'stem':

'The aim of the experiment was to…'

Prediction and/or Hypothesis – students must include one, the other or both. (See the previous page for differences). Students can have multiple predictions/hypotheses if more than one simple test is conducted as part of an investigation

Variables – these are the factors you change, control or measure/observe to determine if a **causal relationship** exists. See Variables

Materials – make a detailed list of all equipment (e.g., 6 x 1L plastic tubs; 15g salt). Diagrams/photos can help show how you set up the equipment.

Method – a clear, step-by-step description of what you did (**past tense**) written so that another person could repeat your method precisely. Diagrams or photos can help illustrate certain details.

Risk Assessment – a focus on safety is important. Untrained teachers/parents might not model safe practices. Include a section on risk/safety. This from UTAS may help guide your thinking.

Results – include **clearly labelled** tables, graphs, charts, photos, diagrams, maps, observations etc. Effective **Qualitative methods** can prove difficult for his age-group and are discouraged.

Discussion – (**Analysis, synthesis** and **evaluation** are skills that can be learnt from a young age). As a **minimum**, this section should:

- Describe patterns in the results
- Explain patterns by suggesting the cause
- Explain any errors/problems that occurred and what you did to fix them
- Identify what could be done to discover more about the topic (i.e., the next point of learning)

Conclusion – summarise what you did, the reason you did it and state the main outcomes/findings. Was the aim fulfilled? Was the prediction accurate? Was the hypothesis supported? Can you relate your findings to the real world?

References and/or Bibliography – these record the sources used in your background research. By Upper Primary many students cite facts in-text.

Acknowledgements – of people who gave input, advice, help, equipment **and what they did**. Did a teacher suggest the idea? Did a parent do some of the typing?

Appendix – include logbooks, photo records, risk assessment and any other **relevant** information judges may need.

ALL ENTRIES TO BE SUBMITTED ELECTRONICALLY

Writing a Secondary Research Investigation

A **Research Investigation** is an extended written task in which students show the entire process of planning, conducting, and reporting on a scientific experiment/inquiry. Top senior entries are really Project-Based Learning or Depth Studies.

Cover page – include title, name, or names (if it is a group entry), school, year level & possibly a picture.

Abstract – a brief overview of your project comprising around 80-150 words (see Tips)

Introduction/Background Information – explain why you chose the topic, define terminology and explain the research you've done (see Planning research). This should be detailed and directly relevant. **Cite** information from your sources.

Aim – state the purpose and relevance of your experiment. What you intend to discover or find out.

Hypothesis (or Prediction) – these are different! A **hypothesis** is a proposed explanation whereas a **prediction** is an expected result. Good hypotheses are **testable** and **falsifiable** (see Khan Academy).

Variables – these are factors you change, control or measure/observe to determine if a causal relationship exists. See Variables

Materials – list all the equipment used. Be specific: (e.g., 4 x 250mL beakers; 20.0g sodium acetate). Consider a diagram or photo to show how they were assembled if using an unconventional set up or if using materials that have been improvised.

Method – a clear, step-by-step description of how your procedure was conducted (**past tense**) written so another person could repeat it precisely. If you made mistakes these should be reported honestly (the assumption being, you adopted changes to address any errors).

Risk Assessment – entrants **must** focus on safety. Do this **before** starting your experiment. Local & national competitions (UTAS, TSTS, BHP Awards) **ALL** require completion of a Risk Assessment. Many schools use software to assist. Alternatives exist such as this from UTAS.

Results – include **clearly labelled** tables, graphs, photos, diagrams, maps, etc. **Qualitative data** have a place, but it can be difficult (not impossible) to address a testable hypothesis with qualitative methods. Discuss your ideas with your teacher.

Discussion –Your discussion is where you use **thinking skills** such as **analysis, synthesis,** and **evaluation** . As a **minimum**, you should:

- Describe any patterns in your results
- Explain the cause of any patterns in your results
- Analyse the validity of your results by identifying any errors/problems in your experimental design
- Evaluate the relevance, importance, or 'real-world' application of your findings
- Identify extensions or new hypotheses that require future investigation.

Conclusion – summarise what you did, the reason you did it and state the main outcomes/findings. Was the hypothesis supported? How does the study relate to the real world?

References & Bibliography – **References** are those sources you **cite**; a **Bibliography** records all sources used in research, experimental design etc.

Acknowledgements – identify people who gave advice, help or equipment **and state what they did.**

Appendix – include logbooks, risk assessment and any other **relevant** information judges may need.

Open Section: Natural Sciences Project (NSP)
Entry: ALL Secondary Divisions

A **Natural Sciences Project** can be used to report on a 'grass-roots' initiative in agriculture, conservation, land management or related disciplines. Projects can be **Case Studies** of works **completed** by a school, local community citizen science group or partnership. Works currently **'in progress'** are also appropriate.

A **Natural Sciences Project** gives students the opportunity to **showcase applied science.** It differs from a Research Investigation because it is not focused on generating a hypothesis or controlling experimental variables:

✓ *Tick that you have satisfied each of the entry guidelines and judging criteria below*

Entry Guidelines

☐ Entries must showcase (a) results of an initiative completed in the last 3 years; **or** (b) the status of an initiative 'in progress'.

☐ Projects must be **directly relevant** to the entrant's school or local community.

☐ Entries should address a clearly identified problem or challenge.

☐ The Project must incorporate **scientific information and evidence** from research.

☐ Comprehensive **Background information** must be presented to provide context.

☐ Describe the **Method, Intervention or Strategy** used to address the problem.

☐ Present **Observations & Results** as tables, graphs, photos, interviews, maps, etc. Use measurements where possible.

☐ The **Discussion** is where you describe the outcomes of the work, analyse what was successful and what was not, identify errors/problems and suggest possible future improvements.

☐ A **Conclusion** must summarise whether the problem/challenge has been resolved or, if not, what future effort is required.

☐ Include a **Bibliography** outlining all sources used. Specific information must be **cited**. See: Plagiarism & Referencing

☐ Include an **Acknowledgements** page identifying people who worked on the initiative or who helped with your entry.

☐ Word Limit: 1500 – 3000 words

Judging Criteria

Your entry will be judged using these criteria:

☐ Identifies a locally relevant problem.

☐ Explains how science informs the decisions and actions of land managers.

☐ Collects and records information and data

☐ Draws conclusions and communicates findings

☐ Uses appropriates grammar, spelling and punctuation

☐ Uses referencing and a bibliography

☐ Acknowledges key collaborations

Open Section: INVENTION/ENGINEERING (E)

Entry: Upper Primary, and All Secondary Divisions

Using an **Engineering Design Process,** students identify a problem then create, test, and refine a working **invention**.

An invention may be a completely **new idea** or a **significant refinement** of an existing device. A **method** or **process** can be an invention.

Invention/Engineering Projects rarely occur in science classrooms. They are more suited to **Project Based Learning**. Students should discuss ideas widely with teachers of Science, Mathematics, MDT, Digital Technology, Home Economics, PE & Agriculture – fact ideas can come from anywhere! Specialist mentors can be found in the wider community.

Visit the UTAS SEIA and BHP Awards sites. They offer tips, ideas and provide a pathway for your **Invention/Engineering Project**.

Entry Guidelines

- ☐ An entry must be a **working** invention that solves a **real problem.**
- ☐ ICT-based projects in an Engineering or Science context are also eligible.
- ☐ It must **apply scientific principles**.
- ☐ It must be **safe.** Do a **risk assessment**.
- ☐ It must be **well manufactured**.
- ☐ You must show evidence of research into similar and rival inventions or devices.
- ☐ You must have followed an **Engineering Design Process** and keep a **logbook**.

Written Report

You must submit a report 800 - 3000 words.

- ☐ **Aim** – the goal of your invention
- ☐ **Introduction** – explains the problem you identified, limitations of existing solutions and what is new about your invention.
- ☐ **Design Brief** – how you built, tested & refined your invention.
- ☐ **Discussion** – explains scientific principles that apply to your invention. Analyses the results of tests. Describes limitations and proposes further improvements.
- ☐ **References & Bibliography** – provides a record of your background research.
- ☐ **Acknowledgements** – of people who gave advice, help, equipment **and** what they did.
- ☐ **Appendix** - Logbook, risk management, link to video of your invention in operation etc.

Video

Video the invention in operation. Video quality is not assessed, but judges need to see and hear the invention working to judge it.

Judging Criteria

Judges will use your written report, logbook, and video to assign marks. The criteria are those used at the BHP Awards:

- ☐ Design Approach (including risk) 30%
- ☐ Design Ingenuity 30%
- ☐ Value 20%

STAT thanks its generous sponsors in 2020 and looks forward to continuing these and other partnerships in the future.

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