Experimental Research

(Junior, Intermediate & Open Divisions)

Experimental research involves:

1. Choosing and defining a topic. Pick a topic that interests you, preferably one which will give you the opportunity to learn something you did not already know. Don't forget to use skills you already have!
2. Asking questions about your topic.
   - What if...?
   - What can I investigate in this topic that is useful to the world and perhaps solves a problem(s) or makes life better or easier?
   - What is this investigation going to achieve?
3. Search out what has been done previously (libraries, internet) in this area to become familiar with this topic and ensure you don't repeat existing work. Maybe discuss ideas with others familiar with your topic. NEW, ORIGINAL, and USEFUL IDEAS are paramount!
4. For projects based on standard experiments, please note that these are generally not original and have been previously investigated. However, you could apply them in a NEW way to solve a problem or benefit the community. Make some changes, or repeat the experiment a few times under different conditions to make it a new investigation with outcomes to potentially benefit the world. Remember that Science continuously builds on previous research and discoveries.
5. Any investigations, especially one that solves a problem, with the aim of making life better or easier for the community, in an ORIGINAL way and for a USEFUL purpose that has not been previously investigated, are likely to be more highly regarded by judges.
6. Forming an hypothesis: what you think will happen in a certain set of circumstances/conditions. Make it specific, so that at the end, you can clearly say supported or rejected.
7. Investigating your hypothesis. To do this properly you need to design and carry out experiments in a safe manner.
   - The method should be logical and test the hypothesis.
   - Allow sufficient time to get meaningful results.
   - Repeat the experiment several times to reduce random errors.
   - Use Experimental Controls to make results meaningful.
8. Carefully recording the results of the experiments. A survey, if it is used to collect data as part of an investigation, is regarded by STS as an experiment. (Keeping a log book or taking photographs are useful ways of recording).
9. Analysing results. What do your results mean?
10. Being prepared to change your original ideas and procedures as you get unexpected results. You may want to completely change the topic if something unexpected shows up.
11. Working logically through your results to support or reject your hypothesis.
12. Writing a report to tell others what you did and what you found, based on experiments you carried out. The experimental report is NOT a library research assignment.

Writing an experimental research report

✓ *Tick that you have satisfied each of the guidelines below.*

Entry guidelines

Your report format may be written in passive or active voice but must include the following headings:

- ☐ **Abstract** - Give a brief description of what you did and what you achieved. Around 100 words should suffice.
- ☐ **Introduction** - This must be relevant to the topic and explain why you chose this topic. It must define key terms and provide some background information as well as answering the question "what were you looking at?" Some information from your background reading would be useful.
- ☐ **Aim** - this must give a clear indication of your investigation. Include your specific hypothesis.
- ☐ **Materials** - List or describe the equipment you used to carry out your experiment.
- ☐ **Method** - Presentation of the method should allow someone else to follow your experiment step by step. Method should report what was actually done, not what you should do. Include any mistakes.
- ☐ Remember to include a description of the **safety precautions** you used to conduct the experiment. Attach **Risk Assessment Form**, sample provided on page 23.
- ☐ **Observations and Results** - Present your results in an easily understood format which may include tables, graphs, photos, maps and descriptions. All information should be clearly labelled. Where possible, results should involve measurement. Avoid subjective results such as those involving likes and dislikes.
- ☐ **Discussion** - Judges pay particular attention to the quality of your discussion. Analyse what your results show. Discuss the implications and validity of your results. Did your results support or reject your hypothesis? What problems did you encounter? How could you improve on your experimental design or data collection? What errors did you make? Reflect on unexpected results.
- ☐ **Conclusion** - The conclusion must relate to the aim. Has the hypothesis been supported or rejected?
- ☐ **Acknowledgements and references**
  A reference list must be included. All research is based on some background information. You should list the books, journals and websites you referred to. Acknowledge the people who gave you help or advice and explain in what ways they helped you. Specific information from another source, when used, must be cited. See page 23 for methods of citing others' work.
- ☐ When finished ask your teacher or parent(s) to check your report to make sure it follows the guidelines.
- ☐ **Keep a full electronic copy of your work**, including scans of log book etc. See page 23 for naming your file
- ☐ Posters, videos and other accessories are not judged.

Entries must be electronically submitted:
Project files should be given to your teacher at least a week before the due date.
Online submission portal closes: 18 July 2021

All guidelines should be followed to avoid being disadvantaged during judging.

Students in the experimental research and inventions section may be selected for entry to the National BHP Foundation Science and Engineering Awards. You must notify STS if you do NOT want your project forwarded to BHP Foundation Science and Engineering Awards. For more information go to http://www.scienceawards.org.au