Step into the future with QRSTF

QRSTF STUDENT HANDBOOK v1.2

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The Quinte Regional Science and Technology Fair

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Introduction

INTRODUCTION

Intro:

Science Fairs provide students from grades 4 to 12 with the chance to develop original scientific research or innovative projects, which are subsequently showcased at multiple levels of competition. These science fairs are conducted at the school, district, regional, national, and international levels. Participants typically advance from a school or district fair to a regional Science Fair, where the most outstanding projects are selected to represent their region at the Canada-wide Science Fair. At this event, young individuals engage in a week filled with competition, social interactions, cultural experiences, scientific excursions, and workshops. Additionally, some students may have the opportunity to participate in International Science Fairs

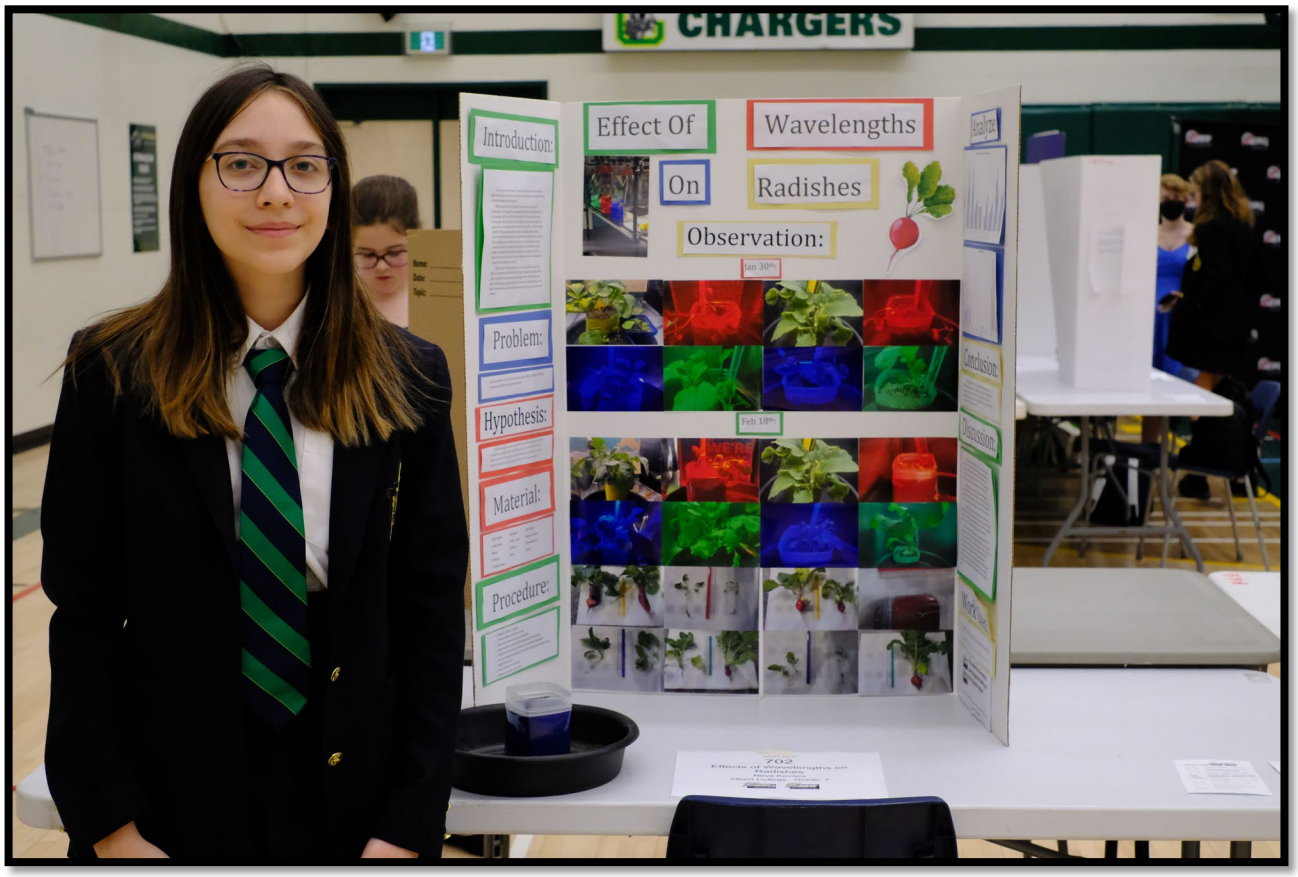
Eligibility for QRSTF

- A project shall be eligible for the QRSTF if the following conditions are met:

the project is the work of one or two students from start to completion. This does not include the assistance of teachers, parents, or collaboration with a mentor;

- the project is registered for the QRSTF by a teacher or science coordinator;
- registration for the project is completed by the published QRSTF deadline;

- the project is the only entry by the finalist(s) in the current QRSTF;
- the project complies with all Youth Science Canada policies governing ethical research and safety; and
- the project has complied with all other regional fair and CWSF eligibility requirements
- If different grade groups the pair must compete at the higher grade level.
- the participant must reside in the Hastings-Prince Edward area. (Quinte) but exceptions are made where appropriate.
- QRSTF -grades 4-6, 7-8, 9-10, 11-12 CWSF-grades 7-12, Jr. 7-8, Int. 9-10, Sen. 11-12



Venue for QRSTF

The Quinte Regional Science and Technology Fair has had a long history of having the science fair at a variety of locations. (Moira SS, Armouries, The Quinte Mall, Loyalist College and Centennial SS and now Saint Theresa CSS)

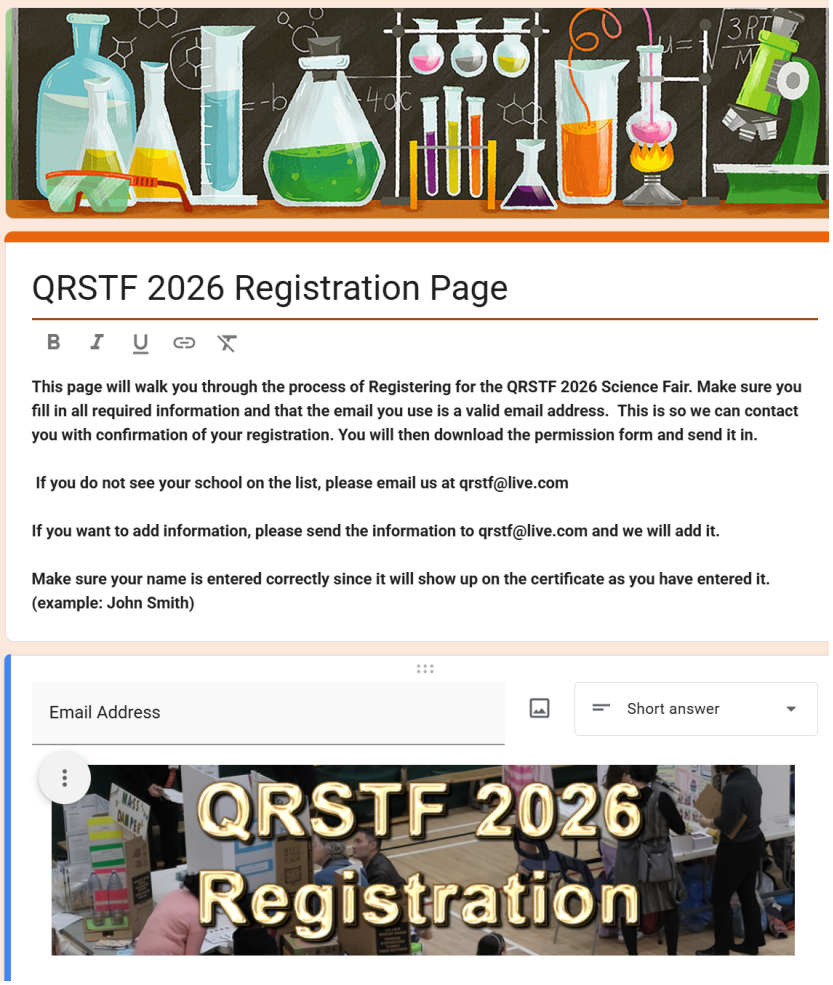
"Science is a way of thinking much more than it is a body of knowledge."
Carl Sagan

Registration for QRSTF

REGISTRATION FOR QRSTF

REGISTRATION:

The QRSTF Is an online registration process. It can be found on the www.qrstf.ca in the registration section, or at https://forms.gle/m1BXepp2SpLvCz459 Make sure you complete all appropriate and necessary sections. When complete, download the permission form, fill it in and make sure all signature sections are signed. Send it to qrstf@live.com. It can be sent by pdf, or by sending a photo of the completed form.



REGISTRATION REMINDERS

- A teacher's signature (or parent/educator if home-schooled) is required to register a project. (on the permission form)
- By signing the consent form, the participant(s), parent/guardians and teacher agree that the project shall follow the QRSTF rules and regulations.
- If one of the students in a pair project lives or attends a school belonging to a different Regional Science Fair, the students must select a single Regional Science Fair to apply to.
- If the students in a pair project are from different age categories, then they shall register the project in the age category of the older student.

PROJECTS

- *The project shall only be the work of one or two students from start to completion. Projects and work done by more than two students at any point in the project's development are not permitted.
- A project worked on at any point by two students cannot register as a single person project.
- A participant may not present more than one project each year, and may not display or reuse an identical project from a previous Regional Science Fair.
- A project presented at any Regional Science Fair in the past may not be presented again unless there is a

substantial expansion or extension of the previous investigation or design process. The project must only present work completed since the previous Regional Science Fair, though previous work may be referenced.

- Ethics Pre-Approval is mandatory for all projects using animal and human participants. Contact us at qrstf@live.com if you have any questions or concerns.

TEACHERS:

- Registration will take place - starting Jan. 1, 2026 and ending March 29, 2026.. The science fair is on April 11, 2026
- Assist in the planning of the projects. Provide an opportunity for students to explain their projects
- Be advised that we take great pains to provide a safe environment for all our participants. 4. When the Registration is ready, we will be sending out a notification for the students to register.
- The science fair will take place.

- *“Everything is theoretically impossible until it is done.” - Robert A. Heinlein*

Day of the Fair

DAY OF THE FAIR

Arrival

When you arrive at the science fair venue, your parent's' will be greeted at the door. Please do not have your parents park at the front of the school. It is a drop off zone. You will have time to have your parents park the car. When entering the school, go to the table for your grade and register your project. They will have your name and your spot in the display area.

We have volunteers to guide to your project and help you set up in you need it. You display area will have many things for you to look at. The display area will also have your name, project number and a list of your special awards you have been nominated for. **Exhibition Hall will be closed to the general public for judging.**

Schedule

Schedule for the Day (Participants)

8:00-8:45 setup

8:30-9:00 Safety Check

9:00-11:30 First Round/ special awards

11:00-11:15 Judges decide on projects

11:30-12:00– First round awards are handed out

12:00-12:30 – Lunch in the gym

12:30-2:30 – Second Round of Judging – Public Viewing Time, Science displays

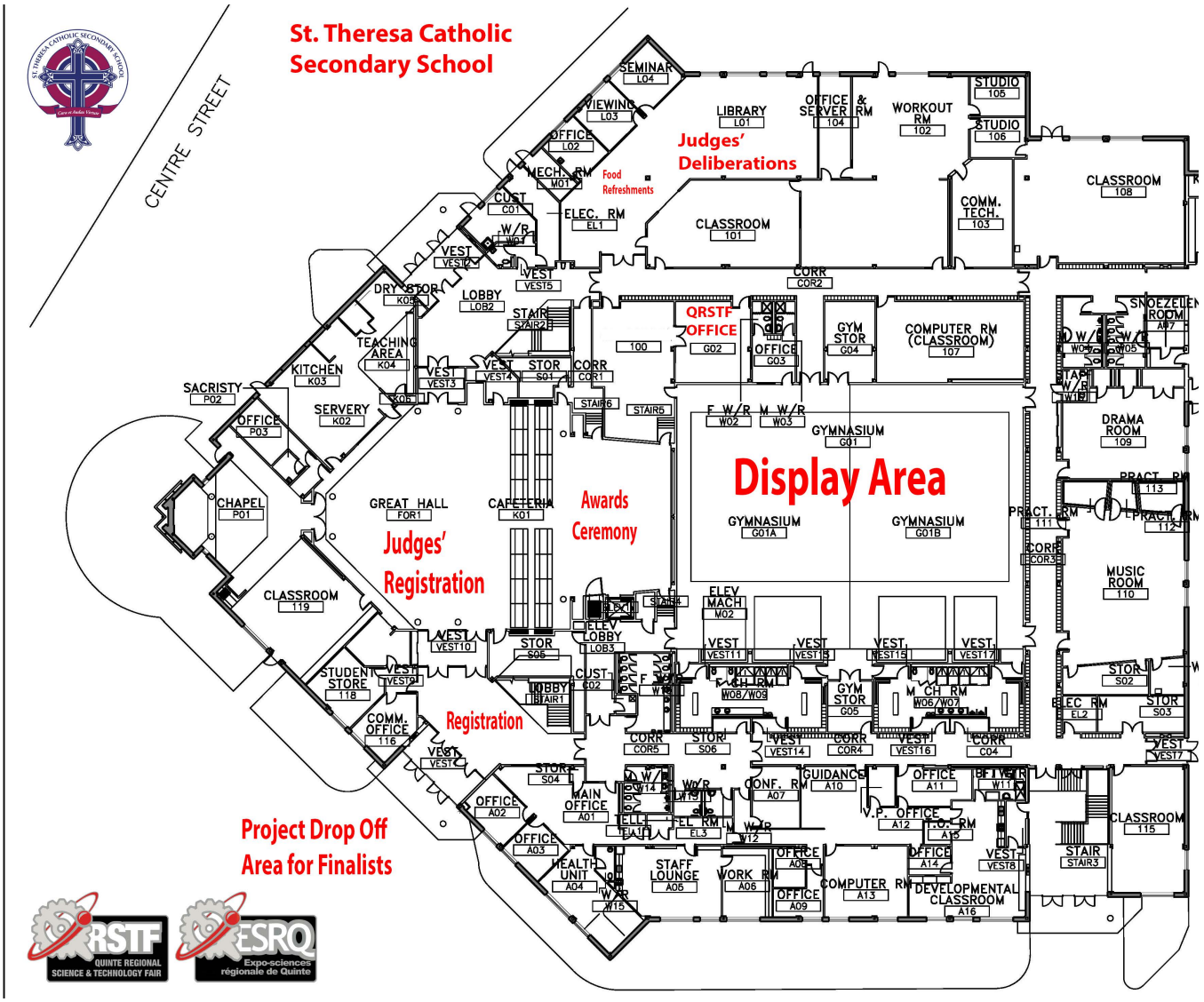
2:30-3:00 Students Pack-up

3:30 Awards Ceremony- 3:30-5:00

***special award judging is from 9:00-11:00 and 12-2:00

All schedules are due to change as we get closer to the fair Prizes will be awarded starting as close to 3:30 p.m. as possible. Sometimes the start is delayed because the Judging Teams are in need of a few more minutes to complete their final deliberations.

Map



Types of Projects

TYPES OF PROJECTS (DISCOVERY AND INNOVATION)

What to Consider?

The judging of scientific thought requires special attention. One important consideration is the existence of different types of projects. The most common types of science fair projects are Discovery (Experiments and Case Studies) and Innovations Many projects will contain elements of two or three project types. Projects of each type are equally capable of winning top awards at the Fair, providing they meet the necessary criteria. All types of projects have equal merit!

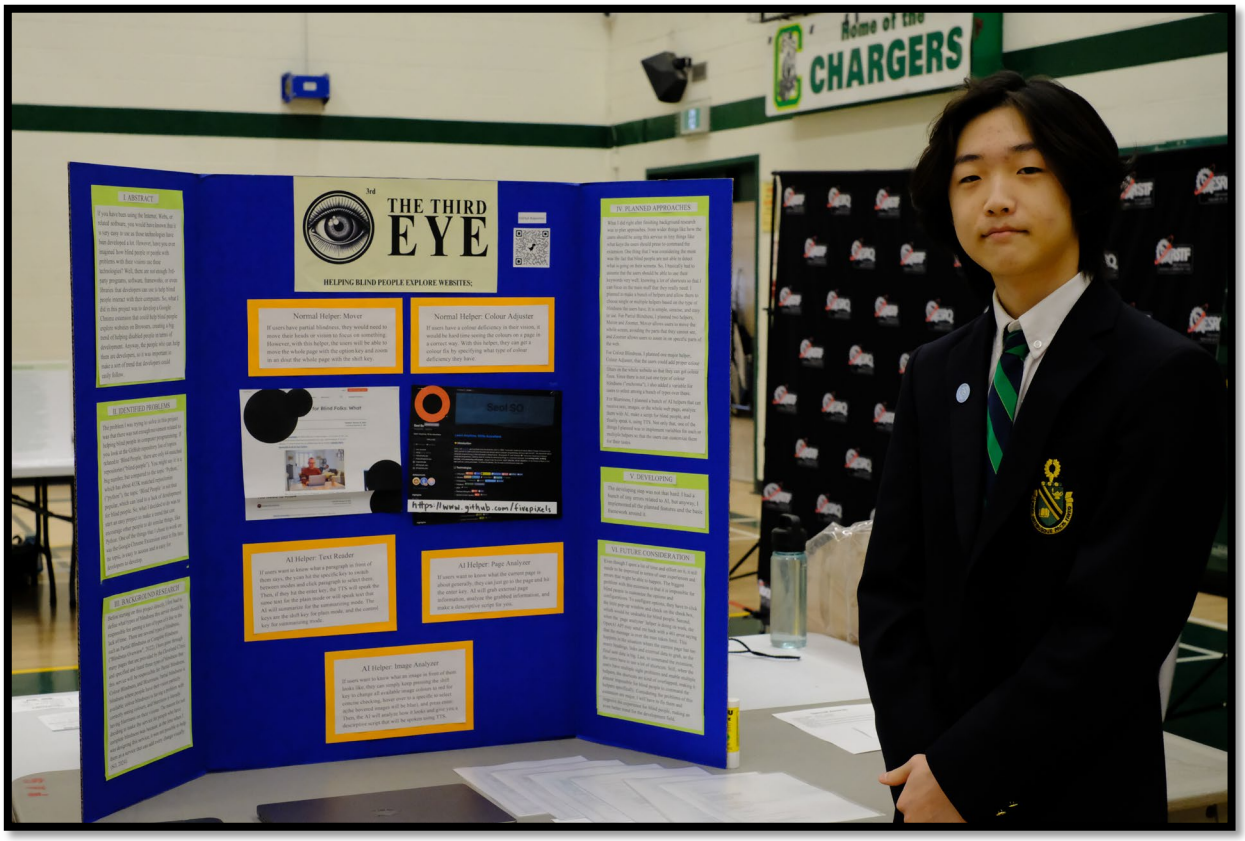
All types of projects are equal and judging equally.

Discovery Section: Discovery section includes

Experiments and Case Studies but not Innovations. It is by itself.

Discovery: An Experiment

Projects of this type should involve an original scientific experiment to test a specific hypothesis in which the student recognizes and controls all significant competing variables and demonstrates excellent collection, analysis, and presentation of data. The judge should also realize that it is not essential that the project produce a significant positive finding. It is the design rather than the results that is most important.
Example question: How does _____ affect _____?



Discovery: A Case Study

This type of project involves the collection and analysis of data from other sources to reveal evidence of a fact, situation or pattern of scientific interest. This could include a study of cause-and-effect relationships or theoretical investigations of scientific data. The data may be obtained from other sources rather than being collected by the student. Projects in this area must be able to demonstrate that the methods originally used to obtain the data are based on sound scientific techniques and controls, and demonstrate insightful analysis.

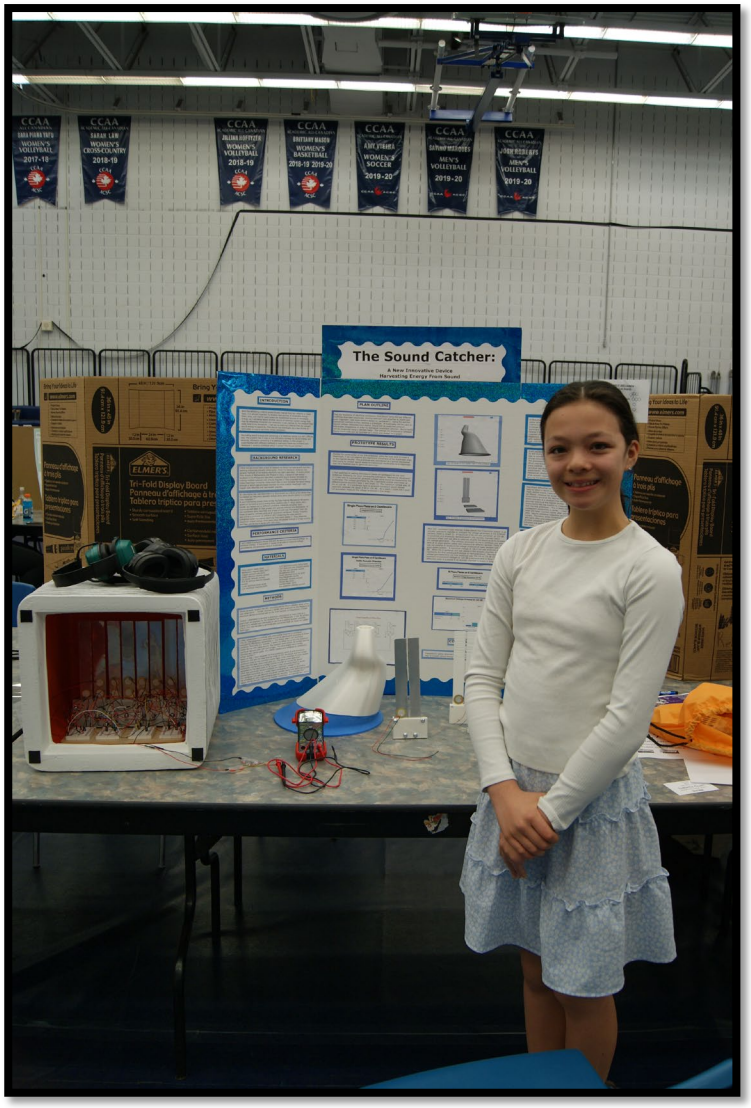
Example question: What type of relationship exists between _____ and _____?

An Innovation

A project of this type would involve the development and evaluation of new devices, models, techniques or approaches in fields such as technology, engineering or computers (both software and hardware). Projects should integrate several technologies, inventions or designs and construct an original innovative technological system that will have commercial application and/or human benefit. It must demonstrate how the innovation was designed or developed on the basis of a sound understanding of the scientific, engineering or technological principles involved.

Example question: In what way could _____ improve the performance of _____?

There are many ways these projects can overlap each other.



- *"If we knew what it was we were doing, it would not be called research, would it?" - Albert Einstein*

Ethics

ETHICS

Overview

Youth Science Canada (YSC), the entity responsible for supporting regional science fairs throughout Canada, has compiled essential information that all students should review to guarantee the safe and ethical execution of their science fair projects. It is advisable to visit the following page: YSC Safety & Ethics Information (https://mystemspace.ca/start-a-project/safety-and-ethics/) to become acquainted with the safety and ethical standards for conducting a science fair project in Canada.

**** Absolutely no experiments that involve ingestion ****

Use of Humans in Science Projects

Introduction There are two types of human involved experimentations, low and high risk. The purpose of this policy is to protect the identity and health of people taking part in science projects. Ingestion projects of drugs or chemicals are **not allowed.** Example: Testing which energy drink gives more energy is **not allowed** as they contain the drug caffeine. Testing chewing gum to see which lasts longest would **not be allowed**. Students wishing to do a project in this area should consult with the QRSTF Safety Sub-Committee first. If you have any questions, please contact us at qrstf@live.com

1 Low Risk Human Involved Experimentation 1.1 Low risk human experimentation projects include surveys and testing apparatus.

Surveys and testing data must be anonymous. A numerical identification system shall be used. The test subject will be given his or her test number. Items such as age or gender may be asked on the survey or test protocol. A test subject may withdraw from the project at any time either verbally or in writing. The original survey or test data will be returned to the test subject. **All subjects under the age of 18 must sign a release form found on the QRSTF site.**

1.2 Low risk human experimentation projects that are going to compete in the Canada Wide Science Fair must have the Low- Risk YSC form completed before the Regional Fair. It must be signed off by the Ethics chair of QRSTF **These forms can be obtained from the QRSTF website or searching the YSC website at https://youthscience.public.doctract.com/**

2.1 High Risk Human Experimentation Projects include projects where surveys are taken, bodily fluids, rigorous physical testing is performed or any other procedure that is deemed high risk by the QRSTF Chair, Safety Sub-Committee, National Judges Advisory Committee or YSC. **These projects must have permission from the Regional and the National Ethics Chairs.**

2.2 High Risk Human Experimentation Projects must first be passed by the QRSTF Chair/Safety

- Subcommittee before further qualification proceeds. The safety of the test subjects is paramount.
- The student must present the safety protocols, benefit to scientific investigation and ethical standards to the

Chair/Safety Subcommittee. Once the project has been passed at this level, the procedure and protocols must be reviewed by a university ethics and safety committee or an ethics review committee at an approved hospital. If and when one of these committees has passed the project, then the project will be submitted to the National Judges Advisory Committee for final review.

2.3 Deficiencies that are identified at any review level may be resolved by the student and resubmitted
for further review.

2.4 All of the YSC High Risk Human Experimentation forms must be completed before the project
is allowed to begin. These forms may be found on the YSC website

3 **Legislative Framework**

3.1 All Federal, Provincial and Municipal Freedom of Information and Protection of Privacy Acts shall be followed to protect the privacy of the test subjects.

***Approval must be done before the experiment is started and all forms must be filled out and approved. Participants under the age of 18 must have signed release forms* To receive the forms or to get clarification please contact us at qrstf@live.com**

Use of Animals in Science Projects

ANIMAL TISSUE AND BIOHAZARDS - ETHICS All projects involving animals must have prior approval

Introduction:

1.1 The QRSTF strictly adheres to the ethical treatment of animals. The procurement of animal tis-sues and parts is strictly regulated. 1.2 Animal tissues and parts must be procured from a registered science supply store. Teeth, blood and organs are included in Animal Tissues. The QRSTF has a high standard of bio-safety that will be strictly enforced. This high standard is for the protection of our students, their families and fellow students and teachers. Animal tissues are not permitted to be displayed at the Regional Fairs but pictures or models are allowed. Pictures that may be offensive or have shock value shall not be displayed on the student's backboard. Judges shall be told that the pictures in the student's workbook may be offensive prior to being judged. The student must prove to the QRSTF Ethics/Safety committee that the animal tissue was procured at a registered science supply store by showing the documentation and receipt that comes with the samples.

1.3 Naturally shed tissues, such as snake skins, may be used in a science fair project. The article should be displayed in a sealed container. The QRSTF Ethics/Safety committee should be consulted if the student/teacher is unsure if the article should/can be displayed. 1.4 Vertebrates must not be harmed. Lower forms of life may be used to replace vertebrates except for cephalopods. Intentional torturing or unnecessary killing of test subjects will result in the project being disqualified. Vertebrates are any animal with a backbone or spinal column including fish, amphibians and reptiles. Cephalopods include octopi and squid.

1.5 Students wishing to do science projects on any animal or animal tissue, must send a written proposal to the QRSTF Ethics/Safety committee. The committee will review the proposal for its scientific merit, ethics and safety procedures. The project, if passed, will then be sent to a Scientific

1.6 All projects must follow the YSC guidelines.

1.7 All containers must be sealed Ethics Review Committee at a research university or a hospital for review. The National Judges Advisory Committee of YSC will also be consulted and that committee may also review the proposal. Any of these committees may make recommendations for improvement to the project or its procedure. These recommendations shall be followed by the student before final permission to start the project is given.

Electricity

Electricity:

****No electricity will be provided for projects. ****

The only exception is those that are computer programing projects. Use pictures and other aids to display your project. (this is due to safety regulations and the number of electrical receptacles)

Your project display, including the backboard, title board, presentation and prop material, and all display equipment, must fit entirely within these dimensions:

1.2m wide, 0.8 m deep and 3.5 m high from the floor.

- Exhibits exceeding these dimensions must be modified before they will receive safety approval.
- No portion of the display shall project into any aisle; however, a limited number of separate display spaces are provided for oversized innovations. These must be requested by a Regional Coordinator in advance.
- Us of electricity in a project must follow all safety guidelines and be covered by all Electricity Code of Canada

Use of Projectiles and Chemicals

Use of Firearms, Hazardous Materials and Equipment, Use of Pesticides

All projects involving these materials must have prior approval

Introduction

1.1 Youth Science Canada (YSC) and the QRSTF allow students to conduct research involving hazardous materials, equipment and firearms as long as they adhere to federal and provincial/territorial

regulations and guidelines that are designed to protect the safety of the researchers.

1.2 Any experimental design involving firearms, and/or hazardous devices, must be approved by the QRSTF or YSC Canada Ethics/Safety Committee prior to beginning to ensure compliance with regulations and restrictions. If necessary, the QRSTF or YSC will refer the project to the authorities cognizant of current regulations.

1.3 Use of hazardous equipment, dangerous goods, explosives and firearms requires proper supervision by an Adult Supervisor. The Adult Supervisor must be directly responsible for overseeing student experimentation and must provide proof to the QRSTF Ethics/Safety Committee of his/her licensing and expertise in the use of a firearm, volatile substance or device, and/or explosives BEFORE the project commences. All adult supervisors must be approved prior to the experiment being started. (eg OPP officer)

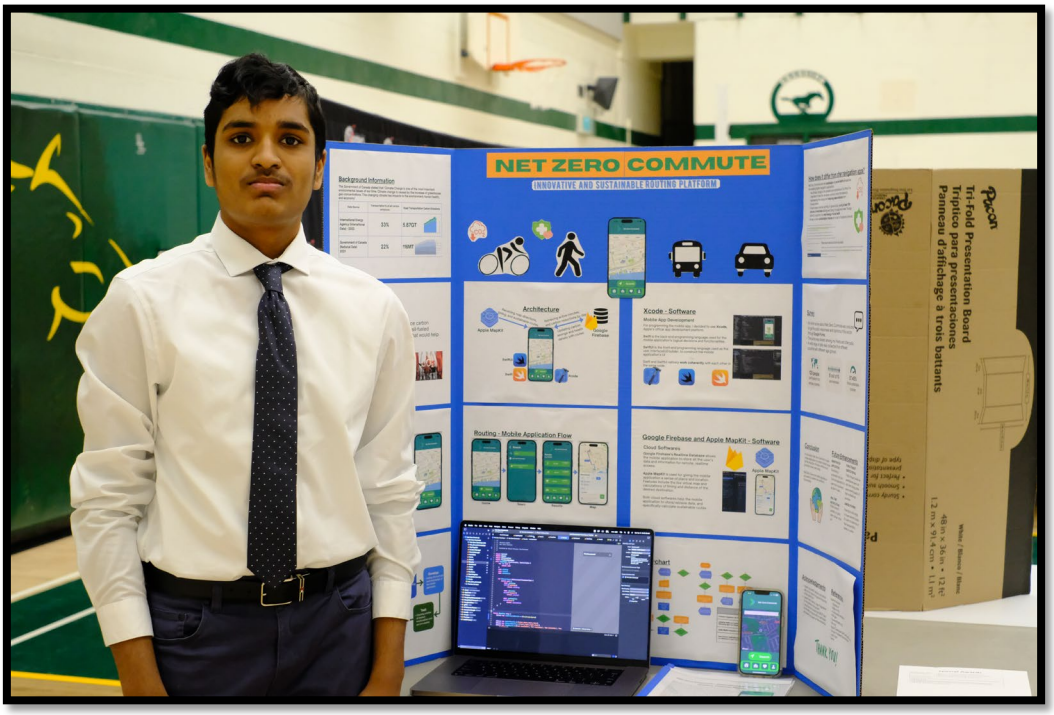
1.4 When considering a project which involves the use of firearms, ammunition, dangerous goods or explosives, students and Adult Supervisors must make contact with one or more of the following agencies/government ministries: Provincial Police, Municipal Police, Federal and Provincial Justice Ministries, Provincial Ministries responsible for hunting and fishing regulations, Municipal offices regarding the use of firearms within their jurisdiction, National and Provincial hunting organizations, federal Ministry of Mines and Resources.

Use of AI in Science Projects.

Guidelines for using Generative Artificial Intelligence in STEM Projects Adapted with thanks from a document developed by the Calgary Youth Science Fair Committee

The difference between generative artificial intelligence (GAI) and traditional artificial intelligence (AI) is described here: https://www.upgrad.com/blog/generative-ai-vs-traditional-ai/

ChatGPT is a specific example of a technology that uses GAI. If you are using GAI in your project, please follow these guidelines:



- **Clearly Define the Purpose**: Clearly outline the purpose of using GAI in your project. Explain how it enhances or supports your work on your research question or topic.
- **Acknowledge the Tool**: Clearly state that you used GAI as a tool and acknowledge its role in your project. Make it clear that the responses generated are based on the training data and model capabilities.

- **Ethical Considerations**: Address ethical considerations associated with using AI, such as privacy, bias, and potential misuse. Discuss how you mitigated these concerns in your project.
- **Explain Limitations**: Highlight the limitations of GAI. Discuss areas where it may not provide accurate or reliable information.
- **Demonstrate Understanding**: Show your understanding of the technology. Explain how you selected and processed the input prompts and how you interpreted and applied the model's responses.
- **Comparison and Validation**: If possible, compare GAI-generated responses with information from other reliable sources. Discuss how you validated the accuracy of the information obtained from GAI.
- **Educate the Audience**: Briefly explain how GAI works, its underlying technology, and the data it was trained on. Help the audience understand the context and limitations of the tool.
- **Interactive Demo (if applicable):** If your project involves an interactive demo with GAI, ensure it is well-prepared and user-friendly. Allow judges or visitors to interact with the system and observe its responses.
- **Address Questions and Concerns**: Be prepared to answer questions about your project's ethical considerations, limitations, and validation methods. This demonstrates your awareness of potential issues.
- **Stay within Project Scope:** Ensure that the use of GAI aligns with the scope and objectives of your project. It should complement your research rather than overshadow it.

- **Cite the use of GAI in your project:** For example, where a section of text has been generated by a GAI: “AI or Large Language Model-generated text in the body of your project” (OpenAI, 2023) References [later, in your references section] OpenAI. (2023). ChatGPT (Mar 14 version) [Large language model]. https://chat.openai.com/chat

“The science of today is the technology of tomorrow.”
Edward Teller

SAFETY GUIDELINES

Planning a QRSTF Entry
Display Safety Guidelines

Size:

The exhibit is no more than:

- ☐ 3.5 m high (11.4') from the ground
- ☐ 1.2 m wide (3.9')
- ☐ 0.8 m deep (31.2")

Safety:

- ☐ No hazardous materials have been used.
  OR
- ☐ Hazardous materials were involved.

The experiments were supervised by:

Read all safety regulations from Youth Science Canada

Name: _____

Qualifications: _____

- ☐ Hazardous moving parts are protected.
- ☐ NO exposed heat component will be used. (flame, wire etc...)
- ☐ Flammable and poisonous chemicals are simulated in the display.
- ☐ No weapons of any type are used or displayed.

Electricity: No electricity will be provided

Read all safety regulations from Youth Science Canada

- ☐ No electrical cords
- ☐ No electical connections allowed
- ☐ Any non-current-carrying metal parts are connected to the ground lead.
- ☐ Exposed live parts are at a potential of less than 10V to ground.
- ☐ No voltages above 10kV are generated.
- ☐ No car batteries.

Read all safety regulations from Youth Science Canada

Radiation: (Make sure all forms are completed)

- ☐ Lasers will not be operated during public display.
- ☐ X-ray and other high energy radiation sources, if used, have been registered and approved by provincial authorities.
- ☐ Radio-isotopes present at normal background activity.

Read all safety regulations from Youth Science Canada

Animal Use: (Make sure all forms are completed)

- ☐ animals were used. - Read on.

These experiments must be approved before you begin -Must follow all QRSTF and National guidelines.

- ☐ Live animals are not displayed.
- ☐ Active procedures which could harm or distress the animals were not used.

Read all safety regulations from Youth Science Canada

Micro-organism Use: (Make sure all forms are completed)

- ☐ All microbial cultures have been sealed.
- ☐ No organisms pathogenic to animals are on display.
- ☐ No biological toxins are on display.

Some science fair projects must be pre-approved by the QRSTF ethics committee; for example, projects involving live animals. **No human based projects -no ingestion projects.*

If your inquiry meets the expectations of this checklist, then it will be accepted at the Quinte Regional Science and Technology Fair.

Planning a QRSTF Project

PLANNING A QRSTF PROJECT

Planning a Project

The Process for developing Experiment or Study projects

**** make sure before you do an experiment you check all safety and Ethics guide lines and have approval ****

If you wish to use AI to find a project idea please try out the Youth Science Canada's Spark website. https://mystemspace.ca/spark/

Displaying Your Project

Before you build your display consider

• What materials are easily obtainable bi-fold and tri-fold display boards are available at stationary stores. What design is best for displaying my project

Getting Started

Here is what you should do once you have chosen your topic.

Research your Topic

Read books from the library; observe related events; gather existing information; look for unexplained or unexpected results. Talk to professionals; write to companies; and obtain or construct needed equipment.

Organize and Theorize

Organize your research, narrow your hypothesis by focusing on a particular idea.

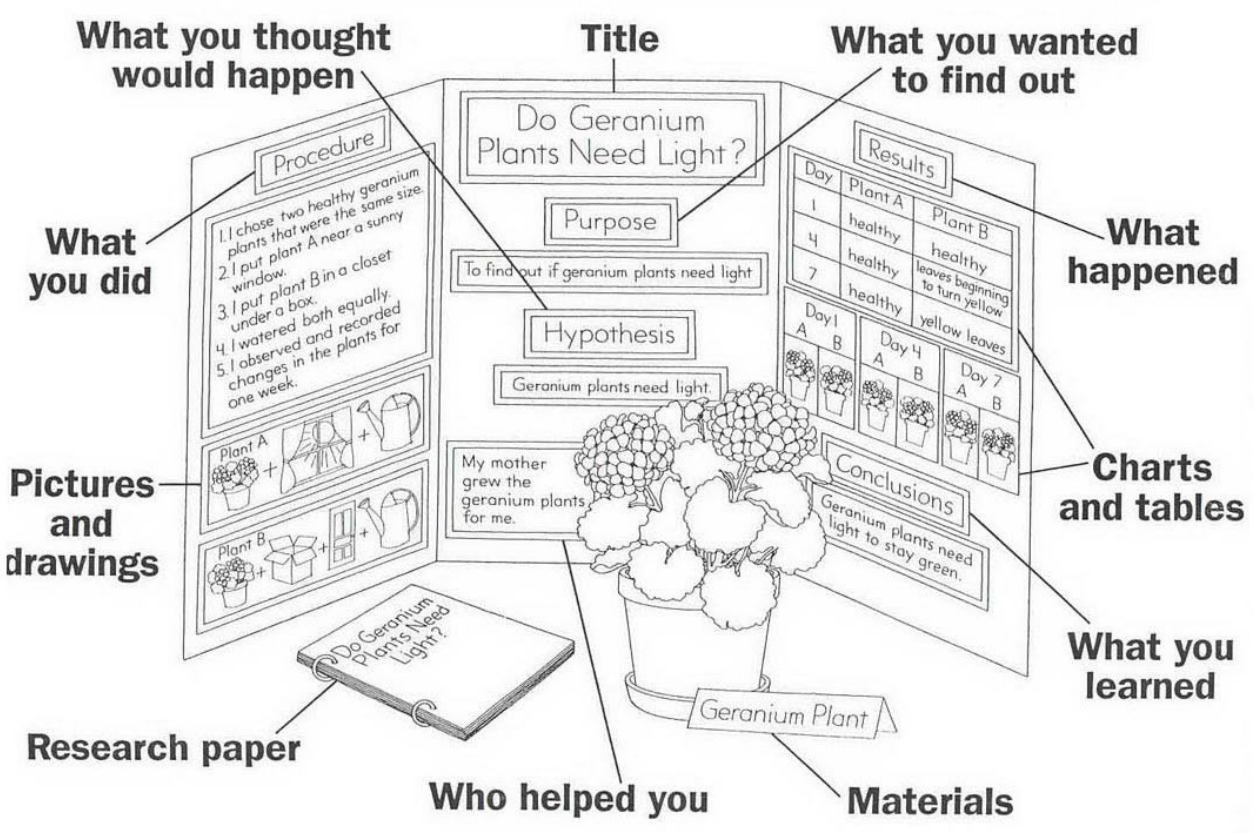
Make a Timetable

Choose a topic that can be done in the amount of time you have. Identify important dates. Check www.qrstf.ca for important dates.

Allow plenty of time to experiment and collect data. Leave time to write a paper and put together an exhibit.

Plan your Experiment, Study or Innovation

- Write a research plan to explain how you will do your experiment.
- Consult your Teacher/Supervisor/Mentor
- Discuss your work with an adult supervisor on an ongoing basis.
- Conduct Your Experiments, Study or Innovation
- Keep detailed notes of every experiment, measurement and observation. Change only one variable at a time when experimenting. Include control experiments in which none of the variables are changed. Include sufficient numbers of test subjects in both control and experimental groups.
- Examine Your Results
- When you complete your experiments, examine and organize your findings. Did your experiment give you the expected results? Was your experiment performed with the exact same steps each time? Are there other causes that you had not considered or observed?
- Were there errors in your observations? If possible, analyze your data statistically.
- Draw Conclusions
- Which variables are important? Did you collect enough data? Do you need to conduct more experimentation?



Displays should be neat and informative.

When placed on tables they should be:

• Self-supporting and sturdy

• Tall enough to view at eye level and judge will not need binoculars to see the print

• Large enough for showing charts, pictures and information.

• Tall enough to view at eye level

• If elements of your project cannot be safely exhibited at the Fair, incorporate photographs of important phases of your experiment to use in your display.

• Your display should be presented logically and be easy to read. When you arrange your display, imagine you are seeing it for the first time.

• Make your display stand out. Use neat, colourful headings, charts and graphs. Homemade equipment, construction paper and coloured markers are excellent for project displays. Pay special attention to the labeling of graphs, charts, diagrams and tables.

Displays should be neat and informative

When placed on a table they should be self-supporting.

We have an award for the best-looking display!

Make sure your display follows all guidelines detailed in this handbook

"Science is organized knowledge. Wisdom is organized life."
Immanuel Kant

Planning a QRSTF Entry:

The Process for developing Innovation projects

	DEVELOP A FOCUS	
Background Information	▸	think about something that interests you or puzzles you in your Science/Technology
	▸	research the topic
	▸	include a description of the features of a previously developed prototype(s)
Problem	▸	describe concisely the problem, product and its purpose or practical value
Performance Criteria	▸	outline what your invention is to be like and how well it is to perform
	DEVELOP A PLAN	
Possible Solutions	▸	outline the planning steps to be followed
	▸	list a description and a costing of materials
	▸	outline a framework to record the results of the tests of the prototype against performance criteria
Preliminary Discussions	▸	draw rough sketches showing different views of a possible end product
Working Drawings	▸	make scale drawings showing all information needed to produce a prototype
	▸	specifically describe the construction methods to be used
	CARRY OUT THE PLAN	
Prototype	▸	describe the results obtained from the working model
Data Collection & Analysis	▸	summarize the results of the trial tests
	PROCESS INFORMATION	
Discussion	▸	summarize the relationships between the performance criteria and the test results
	▸	base statement claims on your data
	▸	identify modifications needed to improve the performance of the prototype
Application	▸	outline possible applications to other situations
	▸	relate findings to real-life situations
	COMMUNICATE	
Display	▸	produce a display that will clearly demonstrate your work to the public

2006-12-05

The Inquiry Process

The Scientific Method and the Inquiry process use similar processes but the Inquiry process expands on the questioning process. It leads to more questions.

The steps are as follows:

Problem Statement (Initial Inquiry)

Hypothesis (Predicting)

Experimental Design (Materials and Procedure)

Data Collection (Observations / Measurements)

Analysis / Interpretation of Data (Inferring)

Drawing Conclusions (Answering the question / problem)

Extension (Further Inquiry - pose new questions that are related to the original question that can lead to new investigations)

SCIENCE PROCESS SKILLS

1. OBSERVING - Using all the senses
2. CLASSIFYING - Grouping related objects and ideas
3. QUANTIFYING - Using numbers & measurements related to length, width, volume and ratios.
4. COMMUNICATING - Describing verbally or non-verbally, tabulating, graphing
5. INTERPRETING DATA - Explanation of an observation

6. HYPOTHESIS - A hypothesis is a possible tentative explanation for a phenomenon
7. PREDICTING - Based on observations, measurements, and relationships between observed variables.
8. DEFINING TERMS - All our interactions are vitally dependent on the precise use of terms.
9. DEFINING AND USING VARIABLES - Identify and distinguish when using variables in an investigation which are controlled (held constant) and which are manipulated.

Variables

Independent Variable

The **independent variable** refers to the factor that is manipulated or altered in a scientific experiment to observe its impact on the dependent variable. It operates independently of other variables and is not influenced by the factors that the experimenter aims to measure. In experimental contexts or graphical representations, the independent variable is typically represented by the letter x.

EXAMPLES OF INDEPENDENT VARIABLES

Two common instances of independent variables include age and time. While these can be quantified, they cannot be controlled. In experimental settings, even if time is not the primary variable of interest, it may still be relevant in terms of duration or intensity. For instance, consider a scientist investigating the influence of

light and darkness on moth behavior by alternating a light source. In this scenario, the independent variable is the intensity of light, while the moth's response serves as the dependent variable.

In another example, if one is examining the relationship between sleep duration and academic performance, the number of hours slept would be the independent variable, whereas the resulting test scores would be the dependent variable. A modification in the independent variable leads to a corresponding change in the dependent variable. When formulating a hypothesis that explores whether x influences y, x consistently represents the independent variable, and y denotes the dependent variable.

Dependent Variable

The **dependent variable** is the variable that is examined and quantified in relation to alterations in the independent variable. In essence, it is contingent upon the independent variable. Alternative terms for the dependent variable include the responding variable or the measured variable.

Examples of Dependent Variables For instance, if you wish to investigate whether your daily food intake varies, you can design an experiment to track the quantity of food consumed over a period. You would tally the total calories ingested each day or measure the weight of food consumed daily. To obtain significant results, it is advisable to conduct this study over the course of a month. The quantity of food consumed is influenced by the day, making it the dependent variable.

In another scenario, you may want to determine if heart rate is influenced by temperature. Specifically, if you alter the temperature, does it have an effect on your heart rate? In this case, temperature serves as the independent variable, which you manipulate, while your heart rate acts as the dependent variable, measured in response to temperature changes. Identifying the Dependent Variable To identify the dependent variable, consider the experiment in terms of “if, then” or “cause and effect.” The dependent variable represents the “then” or the effect. When you modify one aspect (the independent variable), a corresponding change occurs in the other aspect (the dependent variable). You have the ability to set or

control the independent variable, but the dependent variable can only be observed and measured.

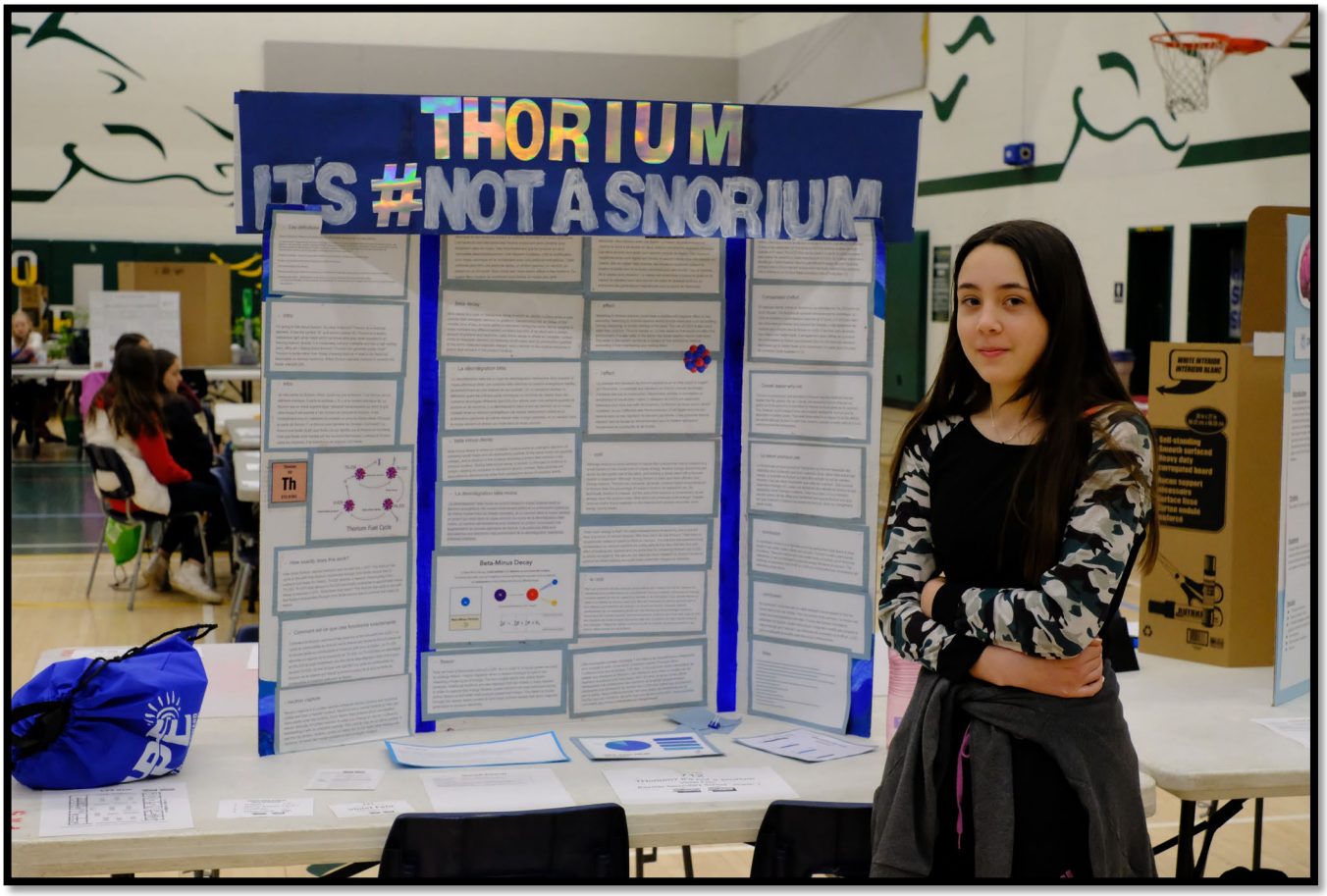
Control Variable

A **control variable** refers to any factor that is maintained at a constant level throughout an experiment. It is also referred to as a controlled variable or a constant variable. An experiment may involve multiple control variables. Unlike independent and dependent variables, control variables do not form part of the experimental framework; however, they are crucial as they can influence the results. It is beneficial to distinguish between control variables and control groups, and to examine examples of control variables

Significance of Control Variables It is essential to note that the independent variable is the one that is altered, the dependent variable is the one that is measured in response to that alteration, and control variables are the additional factors that are regulated or kept constant to prevent them from impacting the experiment.

Control variables are significant for several reasons: They facilitate the reproducibility of the experiment. They enhance confidence in the experimental outcomes. For instance, if an experiment investigates the impact of light color on plant growth without regulating temperature, the results may be skewed. One light source may generate more heat than another, thereby influencing plant growth. This discrepancy could lead to erroneous conclusions

regarding your hypothesis. Conversely, if temperature is controlled but not documented in the methods section, another researcher may struggle to replicate your findings. If your experiment was conducted at 15 °C, would you anticipate similar results at 5 °C or 35 °C? The potential influence of a control variable may even inspire a new experimental inquiry. At times, one may believe that all variables except the independent one have been controlled, yet still encounter unexpected results. This phenomenon may be attributed to what is known as a “confounding variable.” Examples of confounding variables include humidity, magnetism, and vibration. In some cases, a confounding variable can be identified and subsequently managed as a control variable; however, there are instances where confounding variables remain undetected or unmanageable.



Project Content Checklist

Scientific Thought

_____ Is the problem stated clearly?

_____ Was there an effective plan for obtaining a solution?

_____ Does the project carry out its purpose?

_____ If controls were necessary, was there a recognition of their need and were they used correctly?

_____ Are the variables clearly recognized and defined?

_____ Is there adequate data to support the conclusion?

_____ Are the experimental errors inherent in the measurements made and recognized in the materials used? (The variability inherent in living materials is often overlooked by students.)

_____ Is it clear how the project ties in with related research?

_____ Does the project cite scientific literature?

_____ Does the project state that further research is indicated?

_____ Is there a practical application for your work?

Originality

_____ Does the work reflect your own thought, experience and knowledge? Avoid reproducing the work of others. Collections are not considered original unless they are used to support an investigation and help to answer a question in a creative way.

Skill

_____ Are the data complete and are they the product of individual research?

_____ Did you build the equipment?

_____ Did you make skillful use of the information facilities available?

_____ Is an adequate scientific vocabulary demonstrated in relation to the problem?

_____ Do you understand the terms used?

_____ Is the finish on the exhibit display board attractive, neat and well done?

LOG BOOKS

Log books Are important!

Begin a Log Book (http://www.qrstf.ca/docs/logbooks.pdf)
The log book is a hand-written start to finish dated record of all work done on a project. It is generally hand-written with all pages numbered in the top right corner. It is to contain detailed notes of every step of the project from beginning to end - all notes on background information, all observations, all plans and actions, all data, and all thoughts, reflections, and conclusions. You may acknowledge those who helped you but refer to them as “teacher,” “parent,” etc. Do not include names of any people in your log book, report, or on your display. The log book is the single most valued piece of work in your project. Your log book begins with a record of possible topics and ideas, areas of interest, and a brainstorming list of possible problems to study. You always keep your log book with you whenever you work on your project. It is your personal record of your science fair project.

INCLUDE:

READING NOTES, ARTICLES, AND DATA

Any information you gather for your research goes in this section. Your notes and recorded
data belong here as well.

DECISIONS, ACTIONS, OBSERVATIONS

I’ve decided to experiment with plants.

ACTIONS

Today I went to the library to find books on my topic. I found a lot of books…

I set up my planters and grow lights, and I took pictures of them to show my progress.

OBSERVATIONS

I noticed that the plants are starting to wilt, so I need to water them more.

The crystals are very fragile, so I can't put them on my display. I will need to take lots of

pictures.

THOUGHTS AND REFLECTIONS

I noticed that many of the seedlings are dying. I wish I used more seeds. I'm worried that

all my plants will be dead before the experiment is finished.

CASE STUDIES

Case Studies Information

Case Study

*Case studies are no less in importance than experiments or innovations. All three types of projects are judged equally.

Choose your Study Design

A case study is the research on a certain topic and follow the process of the experiment except that there is no quantitative data. **Inventions---Innovation**

Invention Study (the purpose is a specification set for a model or experiment)-Mostly Engineering, Math, and Computer projects. Create something new.

DEVELOP A FOCUS

Background

- think about something that interests you or puzzles you in your Science/Technology

research the topic

- include a description of the features of a previously developed prototype(s) Information

Problem

- describe concisely the problem, product and its purpose or practical value

Performance Criteria

- outline what your invention is to be like and how well it is to perform

DEVELOP A PLAN

Possible Solutions

- outline the planning steps to be followed
- list a description and a costing of materials
- outline a framework to record the results of the tests of the prototype against performance criteria

Preliminary Discussions

- draw rough sketches showing different views of a possible end product

Working Drawings - Photographs too..

- make scale drawings showing all information needed to produce a prototype
- specifically describe the construction methods to be used

Prototype

describe the results obtained from the working model

Data Collection & Analysis

- summarize the results of the trial tests

PROCESS INFORMATION

Discussion

- summarize the relationships between the performance criteria and the test results base statement claims on your data identify modifications needed to improve the performance of the prototype

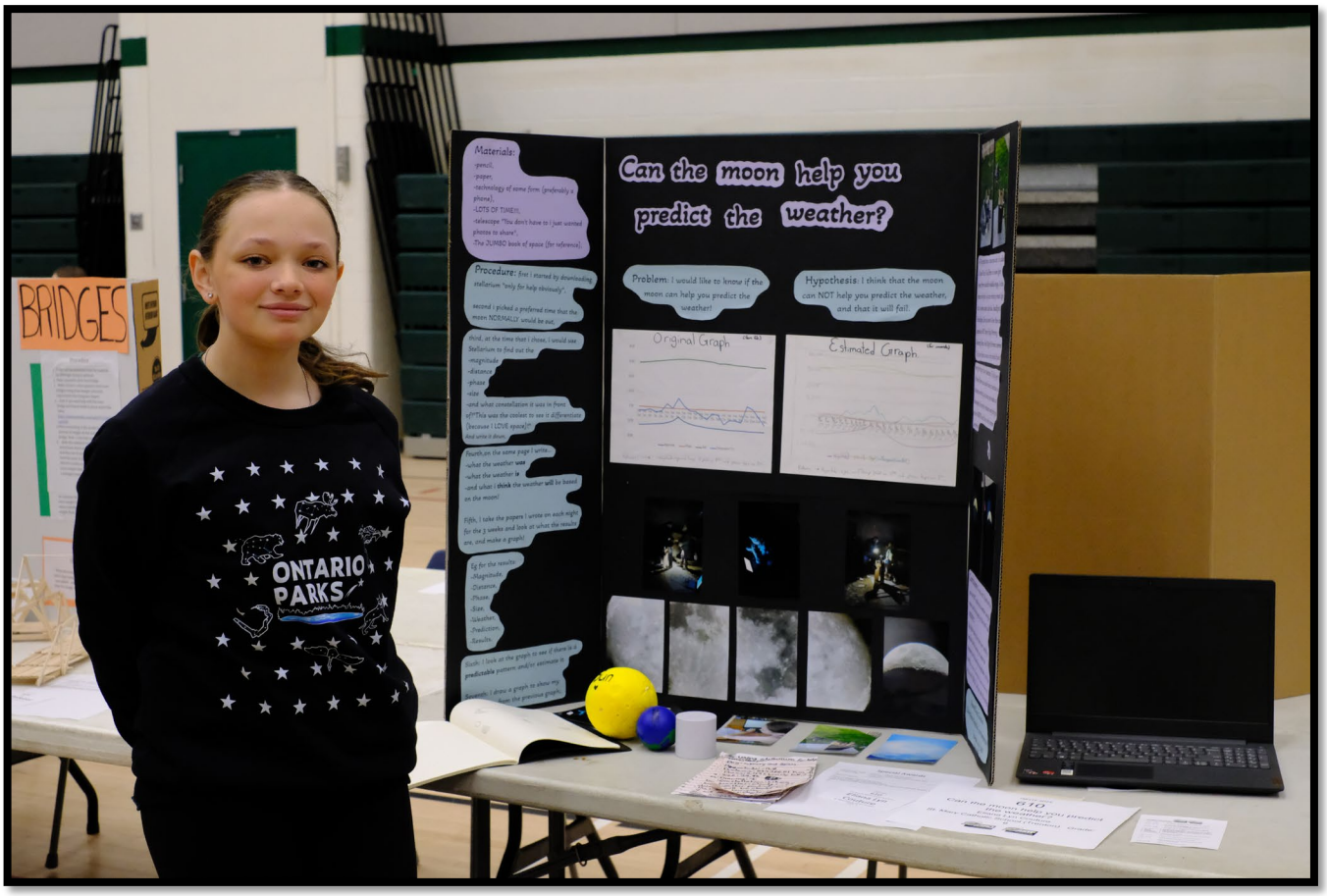
Application

- outline possible applications to other situations
- relate findings to real-life situations

COMMUNICATE

Display

- produce a display that will clearly demonstrate your work to the public



Judging

JUDGING

Judges

QRSTF judges are volunteers from throughout the community: a mix of returning and new judges. Whenever possible, new judges are paired with experienced judges. Judges receive an orientation session prior to the fair, and a briefing immediately before the fair.

Participant Judging

All of the exhibits in Grades 4 - 12 will be placed into groups of 5 - 7 according to grade, type, and class (either life science or physical science, when possible). One judge or a pair of judges will be assigned to each group, whenever possible. Judging will continue for the day. Special awards are done all day while first round judging is done in the morning. We expect all participants to stay at their project unless otherwise told. Judges may come at any time and the public may want to talk to you about your project.

Canada-wide Science Fair Judging

Canada Wide Science Fair Selection Judging is completed by a panel of selected judges and committee member who usually have experience at the National level. This panel has former and current national judges, former competitors at the national level, many who have been

as delegates or volunteers and those with a specialized knowledge field.

The selection of students who go to compete at the national level is done in the afternoon. The participants chosen for this honour do not necessarily come in first or even second in their divisional judging. The criteria for the national level is based on criteria set down by the national judging form, Quinte Regional Science and Technology fair judging form, committee experience and the project.

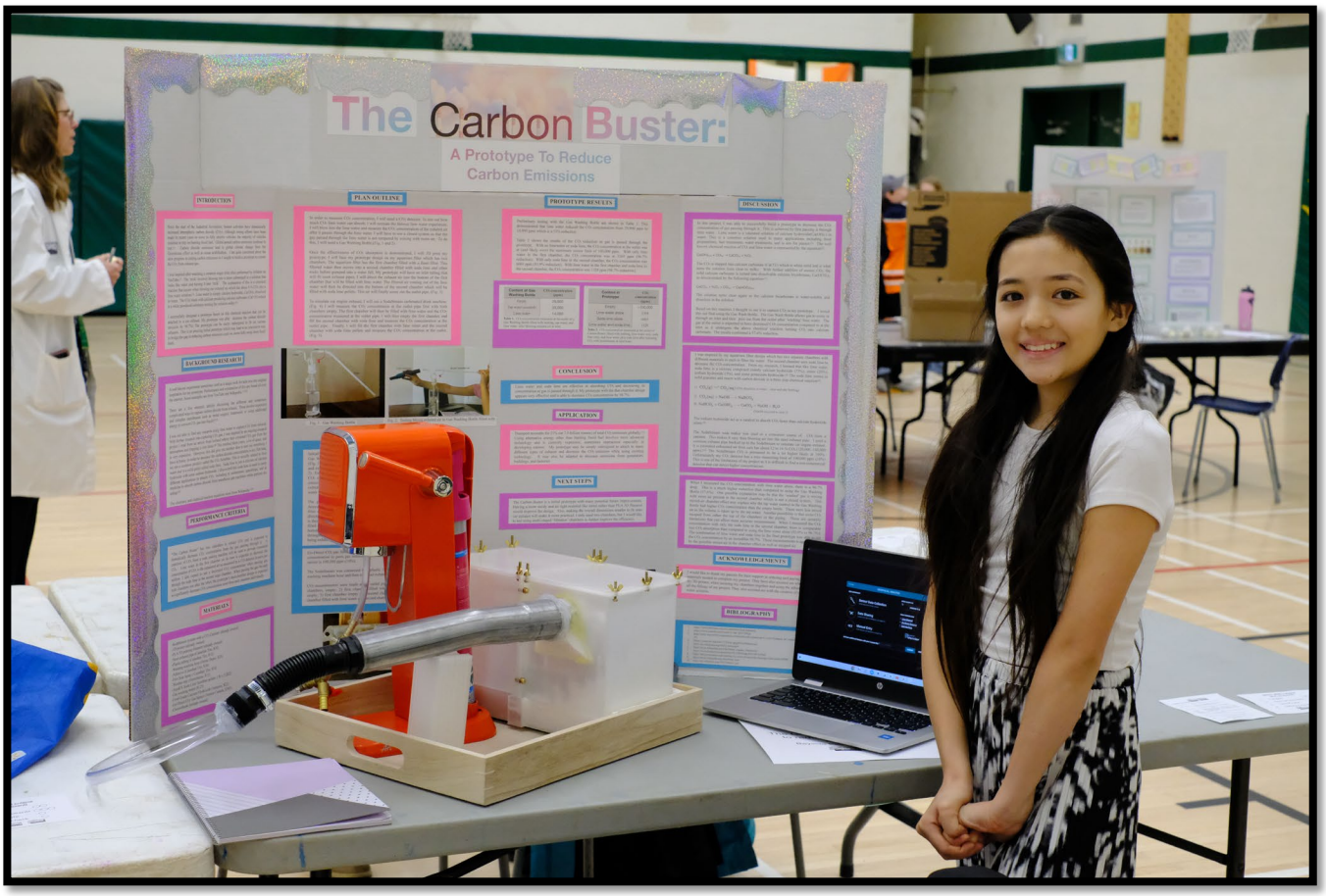
Preparation for Judging

Make a special effort to look nice. You are representing your work. In effect, you are acting as a salesperson for your project and you

want to present the very best image possible. Your appearance shows how much pride you have in yourself and is the first step in introducing your product, your science project. Below are some dress code guidelines:

- Slacks (no jeans), Skirts or dresses, No t-shirts, comfortable shoes, No gym shoes, No shorts, Lab coats (optional) ... In other words.. look good and ready to present.

- Stand when the judges come and offer a seat to the judge.
- Do not read from the board, tell the judge about your project and further extensions
-
- If you have a partner share the presentation...
- Read over the judging form before the judges arrive



Oral Presentation

The judges give points for how clearly you are able to discuss the project and explain its purpose, procedure, results, and conclusion. The display should be organized so that it explains everything, but your ability to discuss your project and answer the questions of the judges convinces them that you did the work and understand what you have done. If you do not know the answer to a question, never guess or make up an answer or just say, “I don’t know.” Instead, say that you did not discover that answer during your research, and then offer other information that you found of interest about the project. Be proud of the project, and approach the judges with enthusiasm about your work.

Introduction

- Tell the judge/audience your name.
- Say the name of your project.
- Explain how or why you became interested in this topic.
- Tell where you obtained your information.

Body of Your Presentation

- Explain what you have learned about the subject or process.
- Describe the equipment, specimens, and/or pictures as you explain the procedures you used.
- Point to the tables and graphs as you explain the results of the experiment,
- Show and explain the conclusion and whether your hypothesis was supported or not by the data.
- Explain the background knowledge that helped you understand your experiment and the results better.

-

Closing

- State the most important thing you learned by doing the experiment.
- Explain any new questions you may now have as a result of working on this project.
- Offer to answer any questions from the audience or judges.

"Equipped with his five senses, man explores the universe around him and calls the adventure Science."
Edwin Powell Hubble

Volunteering and Supporting the Fair

VOLUNTEERING AND SUPPORTING THE FAIR

Ways to support QRSTF

- do a science fair project
- Become a member of our committee
- Volunteer for volunteer hours
- become a sponsor of our fair
- become a member of one of our sub-committees that deal with specific tasks.
- Become a judge
- Donate a prize or award to be given at the awards ceremony.
- Help with a school's science club or science fair
- encourage others of the importance of science and science research
- volunteer at a local school to mentor a student with a science project.
- volunteer for our fair to be a tour guide
- become a volunteer that provides service at one our booths we have at our fair.
- provide ideas for dynamic entertainment.
- Create a poster for our fair.
- Support our fair.

Rubrique de jugement des projets
Expo régionale de science et technologie de Quinte

Utilisez cette rubrique pour assigner un niveau (1, 2, 3, ou 4) pour les critères du projet. Choisissez ensuite une note pour l'intervalle correspondant à chaque niveau. Cette note doit refléter la qualité et l'impact du project par rapport aux autres projets que vous avez assignés au même niveau.

Partie A : Pensée scientifique **Note : ____ / 50**	
Découverte : une expérience ou une étude	**Innovation:** Développement de machines, modèles ou techniques
Niveau 1 Note pour l'intervalle 26 à 30 (le moins impressionant)	
Répliquer une expérience connue pour confirmer d'anciennes découvertes ou collection de données d'une variété de sources sans plus d'analyse.	Construire des modèles (appareils) pour dupliquer des technologies existantes ou pour démontrer une théorie physique ou une intervention sociale/comportementale bien connue.
Niveau 2 Note pour l'intervalle 31 à 35	
Complémenter une expérience connue avec de modestes améliorations de ses procédures, collecte de données ou applications ; ou synthèse de données à partir d'une variété de sources afin de confirmer des conclusions existantes. Essais visant à adresser une issue spécifique.	Améliorer ou démontrer de nouvelles applications de systèmes technologiques existants, d'interventions sociales/comportementales, de theories physiques existantes ou équipement, et les justifier.
Niveau 3 Note pour l'intervalle 36 à 41	
Imaginer et réaliser une nouvelle experience. Identifier et contrôler certaines des variables significatives ou synthétiser des données à partir d'une variété de sources pour renforcer ou améliorer des conclusions existantes. Conduire une analyse en utilisant de l'arithmétique, des graphiques, ou des statistiques simples.	Conceptualiser et construire une technologie innovative ou fournir des améliorations à une technologie ou intervention sociale/comportementale existante ; améliorer ou inventer une nouvelle théorie physique. Le bénéfice humain, l'avancement de la connaissance, et/ou les applications économiques doivent être évidents.
Niveau 4 Note pour l'intervalle 42 à 50 (le plus impressionant)	
Imaginer et réaliser une nouvelle experience qui a comme but de contrôler d'étudier la plupart des variables significatives. L'analyse des données est complète et représentative du niveau d'études. Il y a une consistance interne –chaque partie du rapport remplie sa function. Les résultats ont une signification concrète. Des approfondissements d'étude sont proposés.	Intégration de plusieurs technologies, inventions ou design et création d'une application innovante qui aura des bénéfices humains et/ou commerciaux. La performance du prototype ou des procédures est évaluée en détail. Des suggestions pour des améliorations sont fournies. La pertinence et la signification du projet sont expliquées.

Partie B : Créativité et Originalité **Note : ____ / 20**			
Niveau 1 (9 à 11)	**Niveau 2 (12 à 14)**	**Niveau 3 (14 à 16)**	**Niveau 4 (17 à 20)**
Implémentation simple avec une participation minimale de l'étudiant(e). Type de projet de manuel scolaire/internet.	Créativité notoire d'un projet classique et bien pensé. Le sujet est commun.	Projet imaginatif très bien pensé. Créativité notoire de l'implémentation et utilisation de l'équipement/ matériaux.	Approche hautement originale démontrant une grande débrouillardise et créativité de l'implémentation et utilisation de l'équipement et analyse.

Partie C : Communication **Note : ____ / 30** **Le niveau se rapporte à quatre éléments : résumé, interview, présentation visuelle du projet, pages du cahier d'étude.**			
Niveau 1 (15 à 17)	**Niveau 2 (18 à 20)**	**Niveau 3 (21 à 24)**	**Niveau 4 (25 à 30)**
La plupart des quatre éléments, ou tous, sont simples ou incomplets. Il y a très peu d'attention à une communication efficace. Pour les projets effectués en paire, un des étudiants est plus impliqué que l'autre dans la présentation.	Certains des quatre éléments sont simples ou incomplets, mais il y a un réel effort porté sur la communication. Pour les projets effectués en paire, un des étudiants contribute plus fortement que l'autre à la présentation.	Tous les quatre éléments sont complets et démontrent une attention aux détails. Les composants relatifs à la communication ont été bien pensés et exécutés. Pour les projets effectués en paire, les deux étudiants ont contribué de manière équitable à la présentation.	Tous les quatre éléments sont complets et excèdent les attentes d'étudiants de cet âge/niveau scolaire. Les composants visuels sont logiques et bien présentés. Le résumé et le cahier d'étude sont informatifs et écrits de manière claire. La bibliographie va au-delà de textes et articles trouvés sur internet. La présentation orale est claire, logique, enthousiaste et égalitaire pour les projets présentés en paire.

Note totale _____ / 100 mars 2025

Entrez les notes sur la feuille récapitulative des résultats. Déterminez l'intervalle. Remettre la feuille dans la salle du comité. ***Ces formulaires ne doivent pas être donnés aux étudiant(e)s.*** Donnez le formulaire du feedback du projet à chaque étudiant(e).

Judging Form

Project Number_____ Project Title_____

Part A: Scientific Thinking	Mark:_____/ 50	
Experiment	**Innovation**	**Study**
Level 1 Mark Range 26 to 30		
Duplicate a known experiment to confirm previous findings	Build models (devices) to duplicate existing technology.	Study existing printed material related to the basic issue.
Level 2 Mark Range 31 to 35		
Extend a known experiment through modification of procedures, data gathering, and application.	Make improvements to or demonstrate new applications for existing technological systems or equipment and justify them.	Study material collected through a compilation of existing data and through personal observations. Display attempts to address a specific issue.
Level 3 Mark Range 36 to 41		
Devise and carry out an original experiment. Identify and control some of the significant variables. Carry out an analysis using graphs or simple statistics.	Design and build innovative technology or provide adaptations to existing technology that will have human benefit and/or economic applications.	Carry out a study based on observations and literary research illustrating various options for dealing with a relevant issue. Include appropriate analysis (arithmetic, statistical, or graphical) of some significant variable(s).
Level 4 Mark Range 42 to 50		
Devise and carry out original experimental research which attempts to control or investigate most significant variables. Include statistical analysis in the treatment of data.	Integrate several technologies, inventions or designs and construct an innovative technological system that will have human and/or commercial benefit.	Correlate information from a variety of significant sources which may illustrate cause and effect or original solutions to current problems through synthesis. Identify significant variable(s) with an in-depth statistical analysis of data.

Part B: Creativity and Originality	Mark:_____/ 20		
Level 1 (10 to 11)	**Level 2 (12 to 14)**	**Level 3 (14 to 15)**	**Level 4 (16 to 20)**
Simple design with little student input. A textbook /internet type project.	Some creativity in a project of fair to good design. Topic is a common one.	Imaginative project, well thought out. Some creativity in design or use of materials.	Highly original approach, showing much resourcefulness and creativity in design use of equipment or analysis.

Part C: Communication	Total Mark:_____/ 30		
The level is based on four elements: visual display, oral presentation, project report with background research and logbook.			
Level 1 (15 to 17)	**Level 2 (18 to 20)**	**Level 3 (21 to 24)**	**Level 4 (25 to 30)**
Most or all of the four elements are simple or incomplete. There is little evidence of attention to effective communication. In a pair project, one member may have dominated the presentation.	Some of the four elements are simple, or incomplete, but there is evidence of student attention to communication. In a pair project, one member may have made a stronger contribution to the presentation.	All four elements are complete and demonstrate attention to detail. The communication components are each well thought out and executed. In a pair project, both members made an equitable contribution to the presentation.	All 4 elements are complete and exceed age/grade expectations. The visual display is logical and well presented. The project report and logbook are informative and clearly written. The bibliography goes beyond web-based articles. The oral presentation is clear, logical, enthusiastic and contributed to equally in a pair project.

Submit Judging Forms to the Main Desk in the Judges' Headquarters after completing your ranking. ***These forms are not to be given to students.*** To provide feedback to students use the Project Feedback form.

Total Score:_____/100 *Dec. 2018*

Email qrstf@live.com

Web: www.qrstf.ca

Facebook: http://www.facebook.com/QRSTF

X www.twitter.com/#qrstf

Youtube: www.youtube.com/user/qrstf

Bluesky: https://bsky.app/profile/qrstf.bsky.social

Threads: https://www.threads.net/qrstf

We would like to thank all students who take part in the Quinte Regional Science and Technology Fair. With your help we will continue well into the future. Please support the science fair.