Science Fair

G.P. Vanier Secondary School

Handout #1 – Choosing your topic – the beginning...

\ Given Nov 26 Monday

Name: _____

Fair Date: _____

Science Fairs? Explain,Please?

Contrary to popular belief, science fairs aren't about repeating familiar projects. Science fairs aren't a competition to see who can paint the prettiest Jupiter Styrofoam ball or build the biggest volcano! **In fact, the idea of the science fair is to encourage students to answer unsolved questions.** I mean, think about it – what's the purpose of doing a project that's already been done? What does that accomplish?

So,What's A Science Fair, Really? Chances are, the only science fairs you've been to, were your elementary school science fairs. When you're Grade 6 or under, most of the time you'll end up doing research science fair projects. You still haven't started to seriously learn scientific concepts in school, and as a result, you'll end up restating well-known facts and doing activities (they're not really experiments) from books you've found in the library. And that's not your fault! No one can expect you to discover or explore scientific concepts at such a young age. So here's where the problem lies. In those early grades, your teachers were simply hoping that you'd learn something from doing the project. But let's be honest. Research projects can be boring and a burden for anyone. I mean, who enjoys just researching material and re-wording it?

Science fair projects aren't just research projects! They are much more than that! In fact, research is just one of the stages of conducting a science fair project. From research, you go to developing an idea, to testing that idea, to analyzing the results and drawing conclusions. Research continues throughout your project!

There's nothing wrong with starting off doing research projects at a young age. In fact, it's probably good preparation for conducting science fair projects at the higher levels.

The beauty of science fairs is you get to actually do experiments and use the "scientific method". (More about that later!) **As you begin to use the scientific method and processes, and do real exploration of the world, science comes to life!** You don't need to be restricted to the tedious, cookbook activities often used in schools.

So...you ask, how do I get started?

Step 1: Choose a Topic

Choosing a topic can sometimes be the hardest part of doing a Science Fair Project. You may change your topic up to 5 or 6 times before you decide on one to investigate. First decide **what topics you don't like** by looking at the 8 different categories for Canadian Science Fairs. Here are short descriptions of each one of the 8 categories:

1. Automotive: Studies dealing with health, safety, and injury prevention; societal issues and the Future Automobile; materials and manufacturing; powertrains, fuels and emissions; design processes; intelligent systems and sensors.
2. Biotechnology and Pharmaceutical Science : Applying knowledge of biological systems to provide a service, create a product, or solve a problem. Three main subject fields in biotechnology are crop development, animal science, and microbial. Pharmaceutical Science projects study the interaction of chemical substances with living systems. Substances with medicinal properties – the potential to cure or reduce the symptoms of a disease or condition – are considered pharmaceuticals.
3. Computing and Information Technology : Projects in this area concentrate on development of computing hardware, software, or applications, including programming languages and algorithms, software design and databases, as well as the storage, transmission and manipulation of information.
4. Earth and Environmental Science: Projects focusing on geology, mineralogy, physiography, oceanography, limnology, climatology, seismology, geography, or ecology. Projects in this field generally deal with learning how the Earth works and tackling problems in the environment. Climate Change is a big area in this science fair topic.
5. Engineering : Projects in this field are based around using and developing innovative technology (e.g. computer hardware and software), often concerning the following engineering fields: chemical, electrical, industrial, mechanical, metallurgical engineering, and materials engineering.
6. Health Science: Any study dealing with human science, including the application of scientific knowledge to the health of humans.
7. Life Science: Using experiments, innovations, or studies to see how living things (non-human) work and function.
8. Physical and Mathematical Science: Physical science projects focus on the properties and principles of energy and matter and are often in the field of organic/inorganic chemistry, analytical and physical chemistry, astronomy, subatomic physics and space science. Mathematical science projects generally deal with the study of mathematical theories and the use of mathematical models to simulate biological and physical systems.

Now that you know the 8 different Science Fair categories, you can figure out which field you want to do a project in, by crossing out the ones you don't like (but cross out lightly, you may change your mind☺).

Make sure that your topic area is doable, that is, **you are capable of investigating the topic or question with the resources and skills available to you.** Do not choose a project that would require a mentor in a laboratory setting that is not accessible in our area. Don't panic if you have to change topics weeks after everyone else has started on their project. Just go back to your roots! Find something you really like! This is where working on your own is easier. **To compete in the bigger Science Fairs (Regional and Canada-Wide) you must do an individual project in Grade 8 onwards.** To compete in the local or school science fairs, you may do a project with a partner, but as was said, this may be harder to find a topic in which both of you are interested!

Aim to be creative! Science Fair projects are about trying to figure something out, by doing an experiment or study that has not been done before (to your knowledge). Studies done on teenagers are especially interesting to your peers. **You may not finalize your topic until after you do a lot of research, first.**

So you want to get ideas for science fair projects?
Check out these sites for research on topics:

1. http://www.virtualsciencefair.com/ online science competition!
2. www.cdli.ca/sciencefairs/ Newfoundland Science Fairs Homepage – lots of ideas for projects at this site! Go to "Intermediate Projects". All possible projects are listed as questions to be investigated.
3. www.sciencefairs.bc.ca Our BC Science Fair organizers official site. Go to "for students" and "success stories" for ideas.
4. www.howstuffworks.com get ideas and answers to questions!
5. www.ology.amnh.org American Museum of Natural History – a cool site. Click on an "ology" card and find "stuff to do" activities that may give you ideas for a project.
6. http://stas.edu.pe.ca P.E.I. Science and Technology Awareness Site. Go to "Science Fairs" then General Information then check out the Science Fair Power Point Presentation for help with organizing your project.
7. www.isd77.k12.mn.us/resources/cf/welcome.html Cyber Fair – the virtual Science Fair for students in Grades 3-6. Hey, this may be a lower grade level site, but the projects are pretty high level. Check them out.
8. www.ysf-fsj.ca This is the Canadian Youth Science Foundation site. There is a "Smarts" Project Help site here with many ideas for "how to do your science fair project".
9. www.nsta.org This is the National Science Teachers' Association (American). Go to their "Search Site" bar at the top left and type in "Science Fair Primer", you will get 5 results. Go to "Free For All" and then "Science Fair Studio", then "Soup To Nuts Handbook", then choose #2. Topic Research then Topic Ideas which will lead you to a list of project ideas!
10. www.madsci.org This is the Mad Scientists Network site. Use their search bar: type in: "Science Fair Project Ideas" then go to "Science Fair Idea Exchange" then to "Medium Science Projects" (middle school level). Some good ideas.
11. www.sln.org This is the Science Learning Network site. Try "exploring our resources" section for possible ideas.
12. www.discoveryschool.com The exciting Discovery Channel's site for students of science. Check it out for ideas!
13. www.all-science-fair-projects.com This is the best site for ideas for projects. Yes, I know I saved the best 'til last!

OK, now write down your project ideas in the lines below. Show them to your teacher for help and discussion. This is the most important step in doing a science fair project- choosing and researching a possible project that you are interested in! (The next steps after choosing possible project ideas will be in Handout #2 - coming soon!)

My Science Fair Project Ideas (in no particular order) are:

_____

_____

_____

_____

_____

_____

Teacher Signature : _____

Vanier Science Fair

Participant Guide Part 2

2010 - 2011

Name _____

Fair Date _____

1) Ask Question
2) research
3) hypothesis if – then – because
4) design an experiment
5) Test
6) publish results

Your Science Fair Project will be one of the most memorable experiences of your School years. Remember that you will be judged on how well you follow the **Scientific Method**, **not** on how great your discovery is! Your work in planning and executing a project is what you will be judged on, not on how great the display/exhibit is on the night of the Science Fair.

Remember the judges will not be impressed by commercially fabricated equipment, as these sorts of "glitter" are not really YOUR work. It is the STUDENT'S work which is to be judged.

In the first Vanier Science Fair handout given to you, **the first step, selecting a topic**, was outlined. Hopefully you are now ready for the next steps in this second handout, which will carry you into the winter when you will be doing your experiment/study!

STEP 2 : Finding A Mentor

A mentor – just what do I mean by that? Well, a mentor is someone who is there to guide you throughout the Science Fair process and help you throughout your project. If you've done any projects when you were younger,

your mentor was usually your teacher or your parents. However, a mentor can be anyone of the following:

* High School or College Student

* Teacher

* Professor at a College or University

* Parent

* Industry Professional

ETC.

Ideally, your mentor should be someone who is experienced in your choice of topic, although this usually depends on your project's level of difficulty. At the very least, your mentor should be someone more knowledgeable than you in that scientific field. Don't be afraid to ask, you never know!

STEP 3 : Doing Research

Type of Resources - For a lot of people, research is one of the most boring parts of any project. One of the advantages of doing a Science Fair project is that, hopefully, the research will revolve around a topic that you genuinely like. However, it is not rare for a student to start researching a topic they like, but after some research, they realize they don't really like the topic after all! And that's OK! **Doing a Science Fair project that you enjoy is the number one priority.** At this point you may only have a general topic (e.g. memory) or you could already have your finalized topic (e.g. the effects of caffeine and sugar on memory in teenagers). In either case, you still need to conduct research. Generally, you will get your information from these main sources:

* Books

* Magazines

* Newspapers

* **Journals** (Scientific, Engineering, Health)- contain research papers written by university professors/students and researchers. You probably won't use journals, but in case you do, keep in mind that you might need an adult or mentor to help you understand them. Scientific American magazine is the closest commercial magazine that reads like a scientific journal.

* **Internet**

* **People**

You are probably thinking: HOW MUCH RESEARCH? Well, to be perfectly honest, there is no straight answer. I can't say 5 pages of notes, or 1000 pages of notes. In fact, research does not necessarily mean making notes. **It means reading and understanding work done by other people, and using relevant information drawn from it, to advance your project.** Most important of all, remember that research is a **continuous** thing. Before, during, and after your study/experiment, you will probably still be doing research. Whether it is comparing your findings with similar studies, or trying to explain some unknown phenomenon you came across in your work, you **should** and probably still will be doing research. So don't worry if you don't know what exactly you want to study right away. Just keep researching, and when something sparks your interest, continue researching! **Good Research Leads To A Good Topic!**

As you do your research, **remember to keep track of your sources of information** in your JOURNAL (more about that later), so that when you write your report at the very end, you will have a complete list for your **bibliography**. (Don't know what that is? Just look at the back of any text or non-fiction book and you will find a bibliography, a list of works/writings/books that were used in the production of the text you are reading. We all share information, and it is only fair to give credit to the person(s) that helped you.)

STEP 4 : Picking Your Project Type

There are three project types :

1. Experiment - traditionally the most common type of project (especially in the Health Sciences, Life Science, and Physical Science divisions). It

involves scientific experiment (carried out at home or in a laboratory setting if you have this type of access) to test a specific hypothesis in which variables are controlled. You should show good collection and analysis of your results. In this type of project, the experiment **design** is more important than the **results**.

2. Innovation – This type of project is fairly common, and involves the development and evaluation of new devices, models, techniques, or approaches in fields such as technology, engineering, or computers (software and hardware). Usually, an original device is constructed or designed that has commercial applications or is beneficial to humans (or animals).

3. Study – This is the least common type of science fair project. It involves the collection and personal analysis of data from other sources to reveal evidence of a fact, situation, or a pattern of scientific interest. The data may be collected from outside sources, other than the student. Studies include cause and effect relationships and theoretical investigations of the given data. In studies, the data must have been collected with sound techniques, and the analysis must be generally profound and insightful. Many studies are carried out using surveys given to human subjects.

It is also important to note that **you don't necessarily just pick one. Projects can include elements from one, or all three types of projects.** No type of project is better than the other, and every type has equal chances of winning awards at the Science Fair.

STEP 5 : Research Objective

*** Why are you doing this project? (not just for marks :)**

*** What do you hope to find?**

*** What is the importance of your results to society?**

These are questions you should always be asking yourself as you conduct your project. Before you even start designing your experiment/study, you

should have an idea or what you are trying to find – your research objective or purpose. For example:

" The purpose of this study is to investigate the effects of caffeine and sugar on the short-term memory of teenagers. The effects of caffeine and sugar on short-term memory in a particular gender or age group will also be analyzed. In this study, three methods of storing data in short-term memory are examined. Thus, it will be determined how caffeine and sugar affects each of these types of data storage methods for short-term memory. The results found could shed some light on whether the consumption of caffeine and sugar by teenagers is actually improving or worsening their ability to retain information in short-term memory. Furthermore, the results could influence a teenager's choice to consume caffeine and/or sugar in the future." – written by a high school Science Fair participant.

Remember, your purpose dictates what you **hope** to find. Don't be discouraged if you are unable to find the answers to all your questions by the end of your project! Because, remember, **the design of the project/study is much more important than the results!**

For projects that are innovations, the purpose of the project should outline what the device would be able to do.

STEP 6 : Hypothesis

Once you know what you want to find out, you have to go about making a prediction – an educated guess – a **hypothesis**. Based on past research, you are making an assumption about what you believe should happen. Then you conduct your study or experiment, and see if you are right.

Here was the hypothesis for the student project on caffeine and sugar:

"The consumption of caffeine or sugar individually will improve a teenager's ability to retain information in short-term memory. The consumption of caffeine and sugar in combination will improve a teenager's short-term memory more so than the consumption of either of the two substances individually. Caffeine will be more effective in improving short-term memory in female teens than in male teens. The effect of glucose on short-term memory will be more beneficial in male teens than female teens. The effects of caffeine, sugar or caffeine and sugar combined, on short-term memory in teenagers will not differ by age."

Yes, you say, it does not follow the " If something increases or decreases, then something as a result, will increase or decrease." pattern taught to you by your science teacher. **The format of an "If...then..." statement is a guide** to help you remember that you need to declare your manipulated variable and responding variable for each part of you r study or experiment.

STEP 7 : Experimental Design

This is perhaps the most important and difficult part of doing a science fair project. In the experiment design, you outline the procedures and process you will undertake in order to obtain results, collect data or create your innovation. **Regardless of the results, experimental design is viewed as the most important aspect of your project.**

Is it original? Innovative? Scientifically sound?

No matter what kind of project, all experimental designs should keep the following elements in mind:

1. Materials - What will you need for your project? People? Animals? Lab. Equipment? Alloys? Tools? When you design your experiment, make sure you know all the materials you'll need. Obviously, without the right and necessary materials and equipment, you cannot carry out your project. Furthermore, it is necessary to document how much of each material you need (for your report, at the end). It is also important to know why you need the amounts that you have. This is where researching how others conducted similar experiments and what amounts they used will be important to find out.
2. Variables - In a cause and effect experiment, you basically develop an experiment where the change in one variable (manipulated or independent) causes a change in another variable (responding or dependent).

The third type of variable, the controlled or constant variables, are the ones that you want to remain the same while you watch the changes in the other two variables.

For example : When you go out for a run, the distance you run (responding or dependent variable), depends on how long you run for (manipulated or independent variable). The size of the person running is a controlled variable. Clearly, if we change both the size of the person and the time the person runs, we cannot make a clear determination how much of a factor each variable is on the total distance to be run.

Some important variables that should be kept constant can include time of day, temperature of the environment, etc....

3. Procedure – methods, or methodology – whatever you like to call it. This is one of the most important parts of your experimental design (and probably the most difficult since it really depends on each individual project). Here is where you actually develop the steps required to carry out the experiment. Feel free to look at past studies and experiments to see how certain aspects or variables can be tested, but keep in mind that you're still doing a completely different project!

Once you have finished your procedure in detail, you have also finished designing your experiment. At this point, it's time to move on and actually conduct your experiment.

Don't worry if you are a little bit confused at this point. Check out Science Fair projects from last year on the SMARTS NETWORK, website, so you can refer to that to clear up any misconceptions.

Conducting the Experiment will be tackled in the next installment of the Vanier Science Fair Guide. Stay tuned and do your research!

Vanier Science Fair
Participant Guide - **Part 3**

Name: _____

Fair Date:_____

Step 8 - Conducting the Experiment

This is where the paperwork ends...and the hands-on activities begin! At this point you actually conduct your experiment or study, or develop your innovation. While you are doing this, you should **keep several things in mind:**

1. Keep a Journal
   This is not mandatory or required for the Science Fair, but it is highly suggested and may be requested by your teacher or mentor to see how you are progressing. Keeping a journal of your experimental process allows you to record your thoughts and observations so you won't forget anything later on when writing up your report.
2. Develop an Ongoing Database of Results
   Entering your results into a database or spreadsheet is an efficient method of organizing your results. Microsoft Excel is great for sorting information, allowing you to do calculations, and preparing your data for future statistical analysis.
3. Take Photographs
   Taking photographs is almost always necessary if you are doing some type of lab. work. If the chemicals or specimens you use are considered harmful, you may not be allowed to bring them into the actual Science Fair. In that case, it is imperative that you have photographs to show the judges your procedure and materials that you used. Also have some common object or small ruler to show scale.
4. Don't Forge Your Results
   At some point, you may be tempted to forge your results, so that they fit your hypothesis. Besides the fact that this is **totally unethical**, remember that your experimental design is **much more important** than your results, so there should never be any need to tamper with the results!

STEP 9 – Statistical and Data Analysis

For experiments with numerical data, statistical analysis is an extremely important component. In fact, Canada-Wide Science Fair judging sheets in the past have even had marking sections devoted to it. Statistical Analysis generally consists of examining the data, looking for patterns, and drawing conclusions.
The most basic form of statistical analysis are bar or line graphs, in which you are simply comparing a dependent (responding) variable and the independent (manipulated) variable, and drawing conclusions from your observations. For students who want to go further than that basic level (and be successful at Science Fair) you need to learn different methods used in statistics (e.g. inferential statistics). More on that later!

STEP 10 – Discussion

The discussion portion of the Science Fair Project is where you not only state the results you found, but it's also where you explain your observations and analysis. In short, this is your **interpretation** of your data and results – so **think creatively!**

Did you see any patterns? Why did a certain event occur? If you don't know, why do you think it happened? In other words, make an inference!
Did you find anything interesting and exciting?
These are important questions you need to address when doing your discussion.

Are your results similar? Why or why not?
Your discussion should also compare your results to those found by other scientists and researchers in similar studies.

What could I investigate in the future?
When drawing patterns from your results, it is also a great idea to propose theories that you can test in the future. Judges want to hear that you are interested in continuing your research, and that you already have something planned for the future!

STEP 11 – Conclusion

What can you conclude about your topic? Did your results match your hypothesis? Why or why not?

Generally the conclusion is short and simple: a clear statement of what you found in your study, experiment, or innovation. Most of the original and creative thought should have been included in the Discussion portion of the project.

STEP 12 – Written Report

Your written report has no page minimum or maximum (however, when you get to the Canada-Wide Science Fair, a 5-page summary report is required), and should contain the following sections:

ABSTRACT

The abstract is a brief overview of your project, no longer than 50 well-chosen words. In the abstract, you should describe what your experiment/study/innovation was about and a quick conclusion of what you found.

INTRODUCTION

The introduction is exactly what it says – an introduction to your Science Fair project. Here you talk about why you chose the project that you did, and what are the implications of its results on society (you don't talk about your actual results yet!).

BACKGROUND

The background consists of the important information you found in your research. Usually, the background will contain a lot of facts and material from your sources. Remember to clearly cite anything that you found in another source, including quotes, statistics and results from previous experiments and studies. The information here should be relevant and important, and lead up to the purpose of your experiment.

PURPOSE

In the purpose talk about what exactly you hope to find – specifics! The purpose is generally no longer than a paragraph. Go back to step 5 to find a more detailed description on what the purpose is about.

HYPOTHESIS

In the hypothesis you are making an educated guess about what you believe should happen. This is generally based on your research, including previous studies. Usually you try to predict results that answer the questions in your purpose. This is also usually no longer than a paragraph or two. Go back to step 6 for a more detailed description of the hypothesis.

METHODOLOGY

In the methodology, state the materials and methods that you used to conduct your project. State exactly how you conducted your experiment. For an innovation, describe how you designed and built your device. Pictures or diagrams help to illustrate the methods you used!

RESULTS

The results are basically the statistical data or observations drawn from your experiment. This section will generally contain graphs, charts, tables, and other form of display data in both raw and analysis form.

DISCUSSION

After the design of the experiment, this is perhaps the most important part of the Science Fair Project. The discussion section gives your interpretation of the data, including comparisons with previous studies.

CONCLUSION

In your conclusion, relate your findings to your hypothesis. Was your hypothesis correct? Why or why not? Also, how do your conclusions affect society? (Applications of your results) The conclusion is usually no longer than two paragraphs.

FUTURE DIRECTIONS/IMPROVEMENTS

Your findings in your project may even further drench you in curiosity! If that's the case, this is the section to talk **about how you could possibly continue your project and in which direction you would go**. This is also the section to talk about **possible sources of error in your project**, and **how you could improve them** to do a more accurate study or experiment. For innovations, talk about methods of improving your product.

ACKNOWLEDGEMENTS

Remember all the people who helped you throughout your Science Fair Project? They could have been parents, friends, family, teachers, - anyone! This is where **you thank them for their very valuable advise and support.**

REFERENCES

You've undoubtedly done a lot of research in your Science Fair Project. You should have also used many citations within your report. Here is where you list your citations and other references you used throughout your project – **a bibliography!**

BUT REMEMBER, THIS IS JUST A GUIDE!

I've given you the main sections of the written report for a Science Fair Project. The majority of these sections are mandatory and a given. However, you may choose to add your own sections or change things around. For example, you may include a section just for "Statistical Analysis" where you detail the statistical analysis you conducted on your data collection, or have a "Photo Journey" detailing the steps of the building of your innovative devise! Customize your report to fit your Science Fair Project. Don't worry if you don't understand how the entire report is put together. On the Youth Science Foundation, SMARTS Network website, there is a handful of past written reports that have been presented before at Science Fairs.

The next installment of the Vanier Science Fair Participant's Guide will include "how-to's" on making your display attractive and eye-catching, as well as what to do the day before and day of the Science Fair! Stay Tuned!

Vanier Science Fair

Participant Guide - Part 4- Finally!

Name_____
Fair Date _____
Partner(s) _____

STEP 13 - **The Display**

Your display is an extremely important aspect of your Science Fair Project. Why? Because as the judges approach your project, or guests walk by, **your display is the first thing they see!** As such you want your display to not only highlight important and relevant information, but you also want it to make an **impact** on your audience!

Display Size: Project Exhibit

The maximum **backboard dimensions** are:

1.2 m wide (120 cm / 3' 11")
0.8 m deep (80 cm / 2' 7")
2.0 m high (200 cm / 6' 6")
[or 3.5 meters total height (350 cm / 11' 5") from floor]

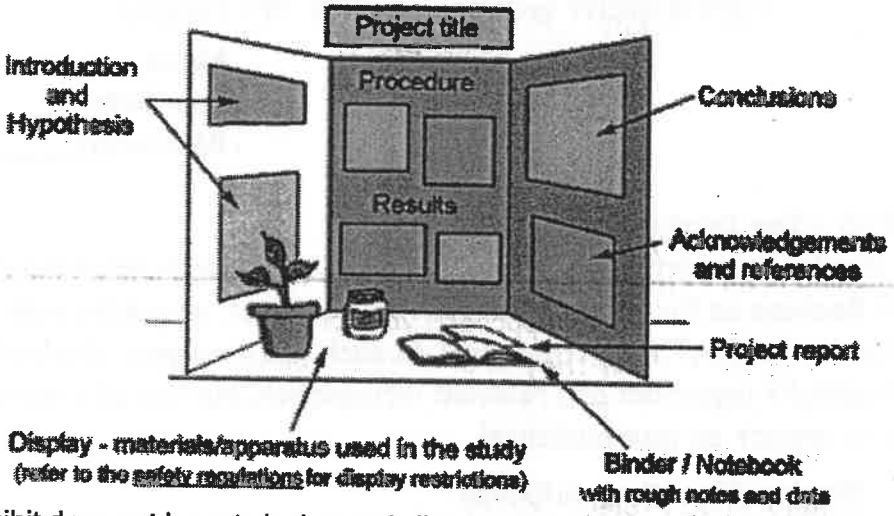
Your Science Board or display does not have to use the table provided. Students whose board sizes are larger than the above dimensions may be disqualified. The size of your board should reflect how much important information you believe should be shown on your board. Never have big empty spaces on your display board. The display on the board should highlight all the key components of your project – meaning all the main parts of the scientific process, including purpose, hypothesis, materials, methodology, results, discussion, conclusion, etc! However, keep in mind that the information on the Science Board should only be a **summary** of the information found in the more detailed, written report. Only put the **important points** of each section on your Science Board!

On the Science Board:

- Headings should stand out.
- All text should be clearly written and legible from three to four feet away.
- Graphs, charts, and diagrams need to be labeled and clearly drawn.

- In the display, include some apparatus so you can demonstrate key components of the experiment to judges and viewers.
- Also include any data books you used, your project report, and sources used in your arguments such as scientific papers and books.

Example of a Project Exhibit:



Your exhibit does not have to look exactly like this (ie. you may not want a separate title board) but you should include the key parts indicated and it should have a clear and logical flow.
You are not only being judged on the content of the Science Board, but also on its aesthetics – or the way it looks! Because of this, you want to use two or three main colours that contrast well and look good together. Lastly make sure that you use larger-than-normal font size for the information on your Science Board! You don't want the judges straining their eyes! (Use at least a 16 point font.)

Backboards and title boards must be constructed of the following materials:

1. **Corrugated cardboard** - corrugated cardboard backboards (such as those available at art supply stores) will be allowed at the Vancouver Island Regional Science Fair. However, students chosen to go to the Canada Wide Science Fair must have a backboard constructed of the material(s) listed below.
2. **Wood** products and lumber at least 6mm (0.25 inch) thick (includes plywood, fiberboard, hardboard, Masonite, particleboard and other Class III or C materials).
3. **Metal**
4. **Plexiglass/ Acrylic**
5. **Sintra**, **Intecell**, **Intefoam** (not foam board) - these are trade names for PVC plastic foam board up to 12 mm (0.5 inch) thick, which are chemical resistant and fire retardant.

6. Flame-Rated Corrugated Products - These are made of factory-treated, fire-retardant corrugated cardboard. Must display certification mark of "WH (Warnock Hersey) Listed Fire Retardant Paper Product" (UL-94 equivalent).
7. Any material that meets **UL-94** standard bearing factory-attached label – i.e. Coroplast Firewall F.R.B. - Fire Resistant Board.

*Do **not** use the following to construct your backboard or title board: Foam Board, Styrofoam and paper products such as Art Board, Plastic, Coroplast (except Firewall F.R.B.)*

Display material (fire safety)

1. Presentation information including text, graphics, photographs and other data on the backboard must be printed on bond (laser, inkjet, or standard copier), photographic or laminated paper (i.e. construction paper).
2. Construction Paper, Bristol board and papers listed above (under 1) may be used to outline or border presentation information, or to add decorative elements to the backboard.
3. Display material (listed above) should be attached to the backboard with an adhesive so it makes a solid contact over the complete surface.
4. Anything raised 2 mm above the surface of the backboard must be constructed of an approved backboard material.

On the Table:

Your display will undoubtedly be propped up on a table. But you are not only going to have your Science Board, right? For sure, you will have your written report (5 pages 12-point font) laid out on the table. If you have developed any other written material, also lay that out on the table. It's also a good idea to have all your research in a journal or duotang or binder on the table. This is just in case the judges want to see the depth of the research you've done. It is also a good idea to put any models you created or have for display on the table, along with standing cards that describe the models. The table is also a good place for displaying flat materials such as photographs.

Still confused? Go to the Vancouver Island Regional Science Fair website or the Youth Science Foundation website to see pictures of science displays from past winners at both the local and national level.

Rules and Regulations for your Safety:

Safety Regulations

Teacher sponsors are responsible for ensuring the safety of the exhibits and the appropriateness of the experimentation that is conducted by the student. The following is a summary of pertinent rules and regulations regarding science fair project exhibits. The

VIRSF committee has the complete authority to request that the exhibit not be activated during the fair, and if necessary may demand the withdrawal of an entry from the fair.

Fire Safety

- Fire hazardous materials shall not be displayed with the exhibit.
- No open flames or other heating devices are allowed at the exhibit.

Chemical Safety

- If projects involved chemicals that may be harmful if spilled or tampered with (including prescription drugs or over-the-counter medication), then the display should use harmless substitutes in sealed containers or photographs of the material for display purposes only.
- Simulated chemicals can be used for display purposes such as table salt to represent a drug, water to represent alcohol, or molasses to simulate a petroleum product. In such cases they should be preceded by the word "simulated" with the actual contents indicated. Again, exhibitors do not have to actually do their projects for the judges; they only have to report on it.

Electrical Safety

- All electrical live parts must be safely contained.
- All homemade devices need proper grounding with a three-prong plug.
- X-ray equipment or any other equipment capable of emitting high energy radiation should not be operated.
- Projects involving voltages above 10kV should be considered to pose a potential hazard.
- Lasers may not be operated during public viewing times.

Animal Experimentation

- Live vertebrate animals (mammals, birds, fish, reptiles and amphibians) will not be displayed in the Fair.
- The only parts of vertebrate animals that may be presented are those that are naturally shed or parts that are properly preserved. Examples are snake skin, hair samples, and skeletons.
- The results of experiments conducted on living vertebrates may be displayed, providing the animal care form of the registration is completed and the teacher sponsor recognizes that he/she is solely responsible for ensuring all humanitarian considerations have been applied during the work.
- No experiments deleterious to the health or physical integrity of the animals may be carried out. Chick embryo studies that involve external intervention with drugs or other chemicals may not be made.

- Detailed copies of the animal care rules may be obtained from the Fair Chairperson, or by contacting your local chapter of the SPCA for general humane treatment guidelines.

Microorganisms / Bio-Hazards / Drugs

- The following hazardous biological materials may not be displayed:
  - Radioisotopes at activities above normal.
  - Biological toxins
  - Microorganism cultures
  - Cells or tissues infected with viruses
  - Cells or tissues including blood, except on sealed microscope slides which can be displayed.
  - Human body fluids (blood, urine, saliva, etc.)
  - Open containers of any organic matter (i.e. food)
  - Illegal or street drugs are prohibited

Human Subjects

- If your exhibit involves the use of volunteer human subjects in any manner (collection of information, physical testing, questionnaires, etc.) then you must obtain their prior permission, explaining fully what you will expect of them and how you will use the results of the tests. You must also present the results in such a way that the individual's privacy is guaranteed. No experiments, which may be deleterious to the health or physical integrity of the subjects, may be carried out.

STEP 14 : The Presentation

Although you may not realize it initially, your presentation basically determines how well you do at the Science Fair. Why?

Because the judges only get out of your project what you tell them- they never even look at the contents of your written report !

Shocked? Trust me, I was too. I spent hours on my written report, only to find out that my judges never flipped through my book once (except to check if I had done my acknowledgements and bibliography). As it turns out, at your local school Science Fair, you will have about 7-10 minutes (or less) to present your project to the judge. And trust me, you don't want to have your time spent with the judge having him or her reading your written report!

If you are able to convey your project more confidently and clearly than your fellow participant, you have a huge edge! If you have trouble explaining your project, the judge will think that you don't really understand the project, and thus,

maybe didn't even do it! By the time you are ready for the Science Fair, you should know your project inside out! When you practice your presentation, make sure you stay at around 7 minutes. Also remember to **use eye contact** when speaking to the judge. **Stand tall** and **don't put your hands in your pockets!** If you get rattled, slow down and take a pause. Point to the visuals on your display when necessary. **Another big tip: Don't Read!**

STEP 15 : The Judging Process

It is probably clear that how the judges mark your project determines whether or not you will move on to the next round of the Science Fair or win a category prize. So I am guessing you want to know how they mark, right?

Part A – Scientific Thought and Creativity (50 marks)

Higher marks are given to original experiments, studies and innovations. At the same time, the science in your project must be true and feasible. It must make sense.

Part B – Display (20 marks)

In this section you are judged on both the content and the aesthetics of your Science Board. 10 marks for legibility of your text, neatness, and if the bibliography and acknowledgements are included. The other 10 marks are based on how much attention the display draws, which is why attributes like colour are so important.

Part C – Abstract (10 marks)

Personally I don' see why this is worth so much, but it is basically a free 10 marks if you do the abstract correctly.

Part D – Interview (20 marks)

This is where you are marked on how well you speak, answered questions, and explained various parts of your Science Fair project.

Step 16 : The Night Before the Science Fair

You do not want to be doing any last minute work on the day of the fair! On the night before the fair, you should do the following things:

1. Check to make sure that your written report is printed and put together in a respectable manner (e.g. a duotang).
2. Make sure your entire display is finished, including the Science Board. Check for folding paper, and fix any problems like that on the display. You

may need to wrap your display in something like a garbage bag to protect it from the rain.

3. Bring tape, glue, scissors, and whatever equipment you might need to fix up your display during the fair.
4. Bring a bottle of water to keep your throat fresh during the fair.
5. Check to ensure that everything you need for the fair is packed and ready to go.
6. Be sure to bring a pen or pencil and paper with you to jot down notes. Trust me, this comes in handy!
7. Bring a book, or something to amuse yourself while waiting to be judged (or after judging, if your judging is done early). You have to stay with your display at all times, in case a judge comes back to talk to you or when the guests are viewing the displays.
8. Make sure you know where and when to be with your display.
9. And last, but not least, make sure you get a good night's sleep!

Good Luck! A Science Fair Project is a great educational experience and even if you don't win an award, you will have fun and learn a lot from the process and other projects that you see!