Booklet #

Athlone Science Fair

Information Booklet

WHY SHOULD I DO A SCIENCE PROJECT?

1) You will investigate a question or a problem and learn a lot about an area of science that is interesting to you.

2) You will be doing what a "real" scientist does - wonder, do, think, and tell.

3) You will have fun reading, researching, organizing, experimenting, measuring, solving problems, analyzing, reporting, and presenting.

4) You will develop skills that will help you in other subjects.

TYPES OF PROJECTS

1. Experimental Project

You investigate a question using the scientific method – purpose, hypothesis, procedure, results, and conclusion. You try to find an answer to a problem by designing and conducting an experiment in which you are trying to control one or more factors that will affect the outcome of the experiment.

In a more complicated problem, you may want to control all the variables that affect the outcome of your experiment.

Example:

a) How does the amount of light affect a plant's growth?
b) Which detergent has the most cleaning power?
c) What effect does temperature have on seed germination?
d) Which metals conduct heat the best?
e) What factors affect the growth of mold?

2. Study or Display

A study is a collection of science information and an analysis of the data. You may include posters, brochures, diagrams, models, and collections in your display. A written report based on your research of library materials is necessary. In your report, include your analysis of the information. Scientific thought or learning must be evident.

3. Model or Demonstration

a) You may build a model and/or improve existing models, technological systems, or computer systems.
b) You may wish to carefully observe a real-life situation and then create a display using the information you learned in your observation.

Scientific thought and creativity must b e evident in your project. A report containing information and data should be part of your project.

Athlone's Rules for the Science and Heritage Fair

1) No live animals allowed in the gym.

2) No unsealed containers of growing mediums for bacteria or mold.

3) You may work as an individual or in a pair. Remember to select a partner who will do his/her share of work. Do not come and complain just before the fair about your partner's participation!

4) Make sure you have a standard-sized backboard. Anything too heavy or too large can be a problem as it may fall over and damage both your project and nearby projects.

5) You may indicate a need for a laptop, a plug-in, or an oversized space at the time of registration.

6) No plagiarizing of information. This means that you cannot just copy and paste information that you find while researching your project. You must rewrite it in your own words.

7) You can only be a part of one project, but your partner may be from another grade level. You will be judged at the highest grade of your partnership.

8) Make sure you have a logbook.

9) All projects should be ethical and non-offensive to others, and must be approved by the teacher.

10) It is okay to have parents help you, but they should not know more about your project than you do! It is okay to indicate what help you received to the judges.

Science Fair Conditions and Regulations

Rules and Regulations (St. James-Assiniboia Science-Mathematics Fair)

1. Each entry must be certified by the sponsoring teacher, and the student's parents/guardians, to be the work of the student(s) entering the project. Where assistance is required, then the extent and nature of the assistance must be recorded on the application form.

2. Seventy-five percent of the project is to have been completed within the preceding twelve months of the fair.

3. An exhibitor may enter only one project in any one year.

4. It is the responsibility of the contestant to set up and display his/her project and discuss the project with the Judges and the general public.

5. The Exhibitors must be prepared to display their project intact for the entire length of the Fair.

6. The Committee reserves the right to exclude exhibits of a dangerous nature. All rocket fuels are classed as dangerous.

7. No gas or water outlets will be provided.

8. Students requiring electrical power for their projects are asked to provide their own extension cords. (Cords should be properly identified as to the owner and school).

9. No live vertebrate animal exhibits will be accepted.

10. Oversize Projects: Projects are to conform to the regulations established by the "Youth Science Foundation" (Canada Wide Science Fair) dimensions: All figures are maximum 120 cm. wide by 100 cm. high. Please contact the school if further information is required.

11. Any project requiring an open flame must have either a suitable fire extinguisher or a fire blanket. The extinguisher and blanket are the responsibility of the exhibitor and must be present at the display each time the flame is used.

12. The use of body fluids of any types, such as: blood, urine, saliva, or epithelial cells for use in experiments or displays are prohibited.

THE STEPS IN DOING A PROJECT

Step 1: DECIDE WHAT YOUR TOPIC WILL BE

- Select a topic in a science area that is of interest to you. Try to find a project that is original. If you are doing an experiment, pick something that you do not already know the answer to. Try to avoid topics that have been used many times in the past (e.g. Volcanoes, The Solar System, Mold on Bread, Which Battery Lasts the Longest?)
- Decide whether your topic would best fit into the experimental or the design section of the science fair.
- Check the resources in your school, public library, or from the Internet to see if you can find information on your topic.

Step 2: KEEP A RECORD OF WHAT YOU'RE DOING

- This record is called a logbook or a journal. This record is usually kept in a notebook or folder, not on loose paper. It is a diary of the entire process.
- In your logbook you should write down, in point form, everything you do on your project. This includes when deciding on the topic to any information you research. It does not have to be neat, but it should include dates. This shows the judges that you went through the process independently.
- Your logbook should include notes from information you've read, the title and author of books used as reference, a list of materials used, notes on observations, etc.
- You may also wish to keep observations in the form of tables, charts, or graphs.
- All entries, whether they be on charts or jot notes on research, or notes on observations and/or construction should be dated.

Step 3: PLAN YOUR PROJECT

- Set up a timetable for your project; decide on a completion date for each stage of your project.
- Set up a quiet area for you to work in, an area in which your work will not be disturbed.
- Start your project in enough time to allow yourself time to complete all aspects of it, especially if you need time to test or to observe things over a period of time.

Step 4: GATHER INFORMATION FOR YOUR PROJECT

- Every project should include a written report, which is made up of the information you read in order to understand your topic.
- Use as many different sources of information as possible.
- You can gather information from the libraries, the Internet, interview with specialists in the area, pamphlets that you can get by contacting companies, etc.
- This written report must be put into a folder or a duo-tang and displayed as part of your project.

- Remember that a good written report should include:
  - Title page
  - Table of Contents
  - Written Information
  - Illustrations
  - Glossary
  - Bibliography

Step 5: DECIDE ON A TITLE FOR YOUR PROJECT

- You will choose a title for your project by deciding whether it is an experimental, design, or study project.
- If it is experimental, your title should be in the form of a question that you are trying to answer.
- If it is a study or design project, your title should tell what you are displaying or studying.

Step 6: EXPERIMENTING AND PLANNING

- This is the main part of your project and will take the most time.
- Depending on the type of project you have selected, you will be using some or all of the scientific processes.
- You may:
  - Observe
  - Test
  - Measure
  - Experiment
  - Record results
  - Predict
  - Interpret data
  - Classify
  - Control variables
  - Draw conclusions
- Start early since it takes time to gather results and information.
- Be sure to keep notes in your logbook of all the things you do.

Step 7: PLAN YOUR EXHIBIT

- Remember, your backboard is **not** your project. It is only the means by which you will tell everyone what you have done.
- Build your backboard to the specifications (no larger than 1 m high, by 2 m wide, by 1 m deep) or buy a backboard from the school. Be sure to include all of the important information in your display.
- You want your backboard to stick out with vibrant displays. You may paint your backboard or use paper to frame your printed materials. Make sure it is a logical and easy-to-follow layout. Be certain that all the information is typed or neatly printed.

Step 8: PLAN AND PRACTICE YOUR ORAL PRESENTATION

- Make sure you understand and know your project. Decide what you are going to say about your project. You can use cue cards to write out a presentation or just points that you want to make. Some students just use the backboard to guide their oral presentation.
- Here are some sample questions that a judge may ask you so you can practice beforehand.
  a) How did you come up with the idea for this project? Why did you choose this project idea?
  b) Did you do any research? What did you learn from your research?
  c) What did you do to try to get answers to your questions?
  d) How long did it take you to do this project?
  e) How does your equipment/instrument work?
  f) What did you learn by doing this project?
  g) What would you change or do differently?
  h) How did you plan for a FAIR test?
  i) Would there be anything you could do to continue this experiment?
  j) Describe the strengths and weaknesses of your design (for design projects). Did you make any changes to your original design? How many trials did you run on your design?
  k) Do you think there is an application in the real world for this knowledge?

YOUR PRESENTATION TO THE JUDGES:

Your presentation is an important part of the project. PRACTICE will make the difference in how well you present your project to the judges. Here is a step-by-step approach to presenting your project.

1. Introduce yourself.
2. Give the title of your project.
3. Explain the purpose of your project.
4. Tell the judges how you got interested in this topic.
5. Explain your procedure.
6. Show your results. If you have charts, graphs, and a logbook, show them to the judges and explain them. If the results are shown on your backboard, point them out.
7. List your conclusions. Explain what you have proven or demonstrated. If you have had some problems, don't be afraid to admit them.
8. Tell the judges what you might do in the future to continue your experimentation or study. Tell what you would have done differently if you were to do the project again.
9. Of what importance is your project to the world? Explain any implications of your study.
10. Ask the judges if they have any questions? If you do not know the answer to a judge's question, then say that you do not know, but tell him/her what you think a reasonable answer might be.
11. **Thank the judges.**

Research Project Tips

Please note that research projects tend to be easier to complete and therefore are not usually given preference to go on to the Divisional Fair.

A good tip for students who struggle with a plan for researching information is to find a book on your topic or a brochure. The book's table of contents can be used to guide you on what to research and to how to set up your information.

You will also need to include a bibliography. There is a sample bibliography included in this package. Make sure you record all the information on the sources you use, whether they are from the Internet or from a book. Try to include a variety of research books.

Make sure to use accurate and up-to-date information. Check the year and ask an adult to help verify the website.

It is a good idea to make a model or sample for people to view when displaying your project. You may include a binder of information that does not fit on your backboard. Some students even include an experiment as well. Don't forget to include your logbook.

You may use a computer to display information. Make sure you indicate that you will need a laptop when you register your project. It is **not** recommended that you bring your own laptop to school for the Project Fair.

Experimental Project Guidelines

If you are doing an experimental project, then your project **should** include the following titles on your backboard.

1) Problem or Objective

This is the question that you are trying to solve. You must be able to **prove** the answer. For example, a project with the objective of finding out what happens when you mix baking soda and vinegar together is **not** a good choice for a project. You already know the answer to what happens when you mix vinegar and baking soda and you also know that there is no variable to change in this experiment. However, if you changed your objective to how vinegar affects different substances, then you have an objective that would work because you can change the variables.

2) Hypothesis

This is an educated guess that is supported with a logical reason. Make sure you include the "what" you think will happen and the "why" you think it will happen.

3) Variables (Independent and Dependent)
These are things in the experiment that will change.
The **independent variable** is what you will change in the experiment. The independent variable is what causes the other variable to change.
The **dependent variable** is the variable that changes because of the independent variable.
Example:
In the experiment "Does the thickness of the wheel affect the amount of friction?", the independent variable is the thickness of the wheel and the dependent variable is the amount of friction.

4) Controls
These are things that **must** stay the same throughout the experiment to ensure that you have conducted a fair test.
Example:
In the experiment "Does the type of liquid affect the amount of plant growth?", the controls would be the amount of liquid added each time, the type of plant, how much sunlight each plant received, the size of the plant at the start, etc.

5) Materials
This is a list of all the things you need to conduct the experiment.

6) Method or Procedure
These are the steps that are required to complete the experiment. It is a good idea to take pictures as you do the experiment to show the steps to the judges.

7) Observations
This is where you include all your graphs or charts. You may also use photos or written descriptions. You can use computer programs to make your graphs.

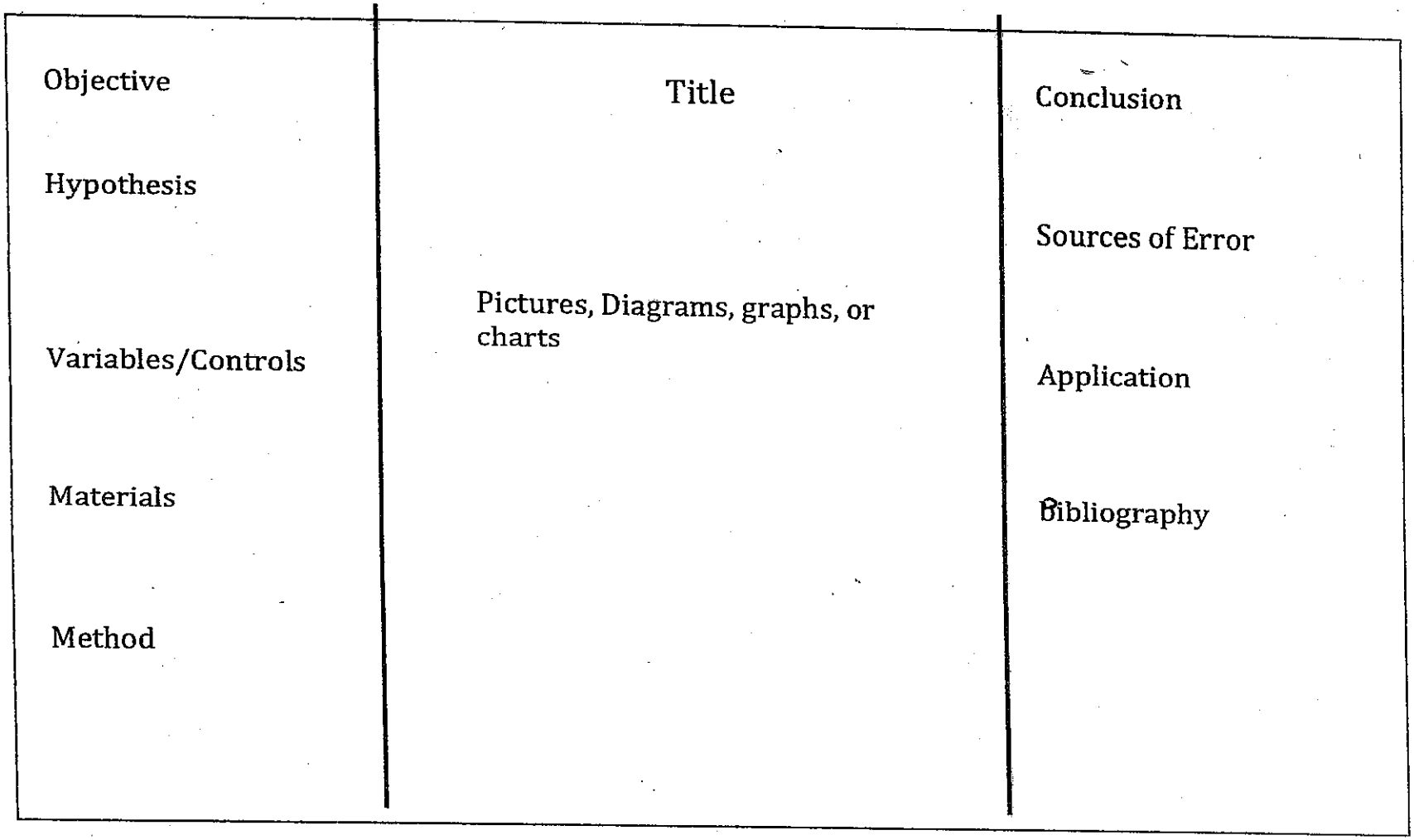
8) Conclusion
This is where you write what you discovered. You should refer back to your hypothesis and state whether you were correct or not.

9) Sources of Error
This is where you list anything that may have caused your results to be off a little.

10) Application
This is when you take what you have learned and apply it to real-life situations.

Note: It is a good idea to repeat the experiment three times, if possible, to verify your results.

Sample Backboard for an Experimental Project



Tip: It is a good idea to take your own blank white paper and fold it so it resembles a backboard. Then you can use a pencil and plan your layout!

Preparing for the Science Fair Judging-Practice Makes Perfect!

- If you can communicate your science fair project well, you maximize your chances of winning.
- Write up a short "speech" (about 2–5 minutes long) summarizing your science fair project. Do not restate your abstract word by word. You will give this speech (from memory) when you first meet the judges. Include in the speech:
  - How you got the idea.
  - How you did the experiment (explain any relevant terms along the way).
  - Your results and conclusions.
  - Why your science fair project is important in today's society (how will it help people today?). You don't have to cure cancer. Perhaps your work will help a small group of people, but it's still important.
  - Demonstrate that you understand the theory behind why your project turns out the way it does.
  - If you can't fit all of this into your presentation, be prepared to discuss each of the above topics separately.
  - Expect to be interrupted when you talk to the judges. You will rarely finish your speech.
- Organize a list of questions you think the judges will ask you and prepare/practice answers for them. A few common questions are listed below.
  - How much help did you receive from others?
  - What does your data tell you?
  - Why is this research important? (Who cares if a rocket flies well?)
  - What do your graphs represent?
  - What does your data tell you?
  - What problems did you run into while doing your experiment and how did you fix them?
  - What are the three most interesting things you learned when doing this science fair project?
  - What further research do you plan on doing, or would do, to this science fair project? (Your future study)
- Study your background research as you would for a test. In some ways, presenting your science fair project is like taking an exam. The better you know your background research, the higher the chance you have of winning.
  - This is the part I usually had trouble with: I would do the research and understand everything, but then I needed to study it. I would eventually learn and remember all the facts I should know, but I had to sit myself down and study. Force yourself to pretend there is a test the next day on all of the information, and you will be prepared.
- Practice explaining your science fair project to others and pretend they are judges.
  - Practice explaining all graphs, tables, your short speech, answers to possible questions judges might ask, etc.
  - Practice explaining the theory behind your science fair project. Theory includes everything from your background research.
  - Videotaping yourself during practice can also be very helpful. Although it can be painful to watch the video, you will see the mistakes you made and be able to fix them the next time you speak.
- Practice explaining your science fair project in simple terms so anyone can understand it.
  - Many students do not know how to explain their science fair project to the general public. If you can explain your project in laymen's terms, you are one step ahead of everyone else!

Presenting Yourself— Be Professional!

- Always dress up nicely for the science fair judging period-NO JEANS! Everyone will take you more seriously if you look professional.

- Make good use of your display board. Point to diagrams and graphs when you are discussing them.
- Always be positive and enthusiastic!
    - Show the judges you are interested in your research and they will be more likely to remember you.
    - Do not be negative unless you are emphasizing a frustrating problem you ran into.
- Be confident with your answers. Do not mumble and say "Ummmmm...I think maybe this is happening?" Even if you answer a question incorrectly, at least they will not think you are a wimp!
- Emphasize how you were creative/unique/innovative with your science fair project.
    - One of the major criteria on a judges' list is creativity and originality.
- If you have no idea what the judge is asking, or do not know the answer to their question, it is okay to say "I do not know."
    - This is better than making something up that probably is not correct.
    - It's better to get on to the next question for which you probably do know the answer.

Websites for Project Ideas

http://www.sciencefairadventure.com

http://www.sciencebuddies.org

http://chemistry.about.com

http://www.education.com/science-fair/

Just google "science fair projects for kids" and see where it takes you!

Sample Bibliography Format

Books	*Author's Last name, First name. Title. Place of Publication: Publisher, Year.* Example: Rees, Yvonne. The Complete Book of Dogs. New York: Crescent Books, c1996
Articles from magazines and newspapers	*Author's Last name, First name. "Title of Article". Name of Magazine: Volume Number (Date): Pages.* Example: Came, Barry. "Millenium Countdown." Maclean's (November_1, 1999): 38-41
Encyclopedia	*"Title of Article." Name of Encyclopedia, <URL> [Date of Access}* Example: Diaz, Bartolomeu". World Book Encyclopedia, 1997 ed.
On-line Encyclopedia	*"Title of Article." Name of Encyclopedia, Year ed.* Example: "Canada" Britannica Online http://search.ed.com/bol/topic?eu=117918sctn=1#top [October 10,1999]
Article found in CD-ROM database	*Author's Last name, First name. "Title of Article". Title of the Periodical. Date: page. Title of database. CD-ROM. Place of Publication: Publisher, Date.* Example: Gray, Robert. "Do You believe in Dragons?". Ranger Rick Oct 1993: 21-29. SIRS Discoverer. CD-ROM. Peabody, MA: Ebsco, March 1996.
CD-ROM's	*Title. Place of Publication: Publisher, Year.* Example: The Middle Ages NGS Picture Show, Washington: National geographic Society, c1997
Internet	*Author's Last name, First name (if available). "Title of work" Title of complete work. Complete URL [Date of access]* Example: Columbus, Christopher. "Medieval Sourcebook: Christopher Columbus: Extracts from Journal." The Internet Medieval Sourcebook. http://fordham.edu/halsall/source/columbus1.html [Nov. 5, 1999]

Interview	*Name of person interviewed last name first. Method of Interview, date.* Example: Brown, John. Telephone interview, December 3, 1999.

BIBLIOGRAPHY FORMAT:
▶ The bibliography is arranged alphabetically by the first letter of the first word in each entry.
▶ For each source listed, begin first line at margin and indent each line that follows.
▶ If there are two or three authors, the entry is written: Last name, first name and first name last. (**Example**: Wright, William and Benjamin Dewey.)
▶ If there are two or three authors, the entry is written: Last name, first name et al.. (**Example**: Amento, Beverly, et al.)
▶ If required information, such as author or place of publication isn't available, just leave it out.

SCIENCE FAIR JUDGING FORM

DISPLAY PROJECTS

PROJECT TITLE _____

NAME(S) _____

GRADE/CATEGORY: _____ PROJECT # _____

SCIENTIFIC THOUGHT:

Effective models/ pictures displayed	0	1	2	3
Science related	0	1	2	3
Scientific vocabulary used	0	1	2	3
Accurate information collected and displayed	0	1	2	3
Degree of difficulty	0	1	2	3

ORIGINALITY:

Original Topic	0	1	2	3
Student's own work (some help is okay!)	0	1	2	

VISUAL PRESENTATION:

Layout neat and organized	0	1	2	3
Dramatic Value (WOW factor)	0	1	2	3
Correct conventions (spelling/ grammar)	0	1	2	3
Evidence of planning and record keeping	0	1	2	3
Visual display/ model	0	1	2	3

ORAL PRESENTATION:

Presentation clear and concise	0	1	2	3
Confidence and ease of delivery	0	1	2	3
Questions answered accurately and quickly	0	1	2	3
Understands vocabulary	0	1	2	3
Summarizes project in sequential order	0	1	2	3

TOTAL _____ out of 50 marks

Judge's comments