JUDGING HANDBOOK

FOR
ELEMENTARY AND SECONDARY PROJECTS

Please keep this handbook for reference:
only new judges will receive a hard copy in future years.

Issue 4-16

JUDGING HANDBOOK

~ All judges receive an electronic copy each year; only new judges receive a paper copy ~ Issue 4-16

WHAT IS THE CALGARY YOUTH SCIENCE FAIR SOCIETY (CYSF)?

The Calgary Youth Science Fair Society is a non-profit organization that is dedicated to holding an annual science fair competition for elementary and secondary students in Calgary and the surrounding area and was founded in 1960. Society members are volunteers from engineering, geology, medicine, business, computer science, psychology and education, to name but a few. They coordinate the largest regional science fair in Canada, with over 1000 students participating annually. The annual budget of about $35,000 consists entirely of corporate donations and covers prizes and medals for the participants and minor administrative costs.

WHAT ARE THE OBJECTIVES OF THE SOCIETY?

The Calgary Youth Science Fair Society holds as its major purpose:
"The promotion of an appreciation for scientific principles and methods in the youth of Calgary by means of an annual science competition."

The Society strives to meet the following objectives:

TO ENCOURAGE:

- Student interest in projects that require the development of the inquiry method and original thought
- Expertise and innovation in scientific fields
- Youth to take a serious interest in the field of science as a career

TO DEVELOP:

- The ability to collect, organize and interpret data by using the scientific method
- Skills in the art of presentation and communication
- Self-confidence and character in participants

WHAT IS THE ROLE OF JUDGES AT THE CYSF?

The judging experience for our science fair students is an integral part of the learning process and your role as a judge is very important. Interviewing the students, evaluating their projects and giving them appropriate verbal and written feedback introduces them gradually to the next step in the scientific process – peer review.
In the first round of judging, the students will only be evaluated by you and your team members. Therefore, you are important in determining which students go on to the next level of judging for special awards. In most cases, you will be the only source of feedback for the students on 'how they did' at the CYSF this year and how they might do better next time. It is essential that students leave our fair with a positive feeling about themselves, their projects and about science. It is your responsibility to make sure that this happens. Therefore, make your comments in a positive way.

HOW ARE PROJECTS SELECTED TO ENTER THE CYSF?

The schools have selected all students who participate in the elementary section of our science fair. Our fair is large and space is limited, so the number of projects allowed to represent each elementary school is calculated by adding the total number of grade 5 and 6 students and dividing by 15, then rounding up to the nearest whole number. For example, if a school has 75 grade five students and 65 grade six students, the total number of projects is ten [(75+65)/15]. There are no limits for the number of secondary students. All projects are accepted. Some of the students in our fair have won at their local school fair and others were selected differently. A maximum of two students per project is allowed. Students must have followed our prescribed safety procedures during their experimentation and must also pass an on-site safety check before they are allowed to bring their projects and illustrative materials into the Olympic Oval.

INSIDE THIS ISSUE:

THE SCIENTIFIC METHOD

Projects should demonstrate a thorough understanding of the scientific method. The scientific method attempts to remove bias when testing a hypothesis or theory. The scientific method comprises the following steps:

- a reasonable hypothesis is defined after a student has completed background reading
- relevant research (often including experiments) is conducted to evaluate the hypothesis
- a conclusion relating directly to the hypothesis is reached.

A discussion and explanation of the results (unexpected or expected), including ideas on how the project might be expanded and how results might be applied in the future, is essential.

EXPERIMENTAL PROJECTS

Problem/Purpose: The problem is a concise statement of what is to be investigated. It should be clearly stated and shown throughout the project. The student should not be testing variables that are not part of the problem.

Hypothesis: This is what the student predicts will be the result of the experiment. The statement is a 'best guess' as to what is going to happen and why based on existing knowledge and any background research. In elementary projects it is often stated in an 'if/then/because' format.

Background Information: This is the research that the student has conducted on the project prior to conducting the experiment. The information should be in the logbook and includes research notes and a list of references. The references should be from credible sources. The backboard should have a summary of this information.

Variables: There are several types of variables that should be described and explained in the project.
Fixed or controlled variables are values and quantities that are kept constant and do not change throughout the entire experiment. The student should list the fixed variables on the backboard. Variables that the students were not able to keep constant should be acknowledged as possible sources of error.
Manipulated (independent) variable(s) are changed in the experiment by the student to produce possible changes in the responding variables. Only one variable should be manipulated per experiment.
***Responding (dependent*)** variable is what changes when another variable is manipulated. This is what the students are measuring during their experiment.
Example*: *The plants grew taller after the amount of available light was increased. The light level is the manipulated (independent) variable, the height of the plants is the responding (dependent) variable and the room temperature, type of soil, seeds and the quantity of water are examples of fixed variables.
Variables should be listed on the board and the student should be able to identify the fixed, manipulated, and responding variables of the experiment.

Procedure/Method: This should be stated clearly and in sufficient detail that the experiment can be duplicated exactly using the directions given. There should be at least three trials, which means that the experiment must be repeated three times to show reproducibility of the data. There should be a control sample that is not manipulated in the experiment. The comparison of the control and manipulated samples will show the effects of the manipulation. As well, a sufficiently large sample size should be used to establish the validity of the results. Be sure that when marking the project you do not confuse sample size with number of trials. In human population studies, repetition may not always be possible due to learning effects, so a larger sample size is required.

Example: In testing to see which of 4 detergents washed best, the student took 15 pieces of the same kind of cloth and stained them identically. One piece was used as a control sample and washed in water. Three pieces were then washed in detergent A, and then another 3 in detergent B and so forth. This constitutes one trial with a sample size of 3. The experiment is repeated twice more to give a total of 3 trials. The manipulated variable is the detergent and the stained material is the fixed variable.

Materials: They must be listed separately on the backboard or be included in the procedure.

Data/Observations: These are the observations and raw data collected at the time of the experiment and recorded in the logbook. They should be clearly displayed on the backboard in tables or charts. The charts/graphs should be clearly labeled and include the proper units of measurement.

Interpretation: The student(s) should be able to explain how the raw data relates to the problem/purpose. This may include calculations, charts, graphs, or an explanation of the raw data. Student(s) must be able to identify the manipulated (independent) and responding (dependent) variables. They should also be able to explain their research and practical application of the experiment. Why are their results important? Who can use them? How can the experiment be expanded or taken further?

Experimental Error: Students should be able to give potential sources of error either verbally or summarized on the backboard. They should recognize sources of error and be able to explain how these errors would have affected their project.

Conclusion and summary remarks: These remarks should make reference to the problem/purpose and hypothesis. The conclusion should relate directly to the experiment, and explain whether the hypothesis was correct.

Logbook: Should be handwritten and have all background research (books read, contacts made, etc), steps taken, experiment setup, data, observations and research the student recorded during the experiment. As well, all drafts of experiment write up should be available. Even rough copies of the raw data should be included in the log book. The

logbook should not be a reiteration of the backboard. Whether handwritten or computer generated, the logbook should appear to be genuine; not created after-the-fact to satisfy our marking system.

Scientific Accuracy: When judging experimental projects you are not judging for scientific accuracy, but rather whether the students have employed the scientific method correctly and whether or not their observations and conclusions are consistent with the data collected. Students should not be penalized for not being aware of all scientific theories which may apply to their experiment.

Backboard Presentation: Remember when assessing the visual presentation that this is a science report and not an art project. Project backboards should be tidy and legible with the experiment presented in its entirety, in a clear, logical manner. No discrimination should be made between projects done on the computer or written by hand.

NON- EXPERIMENTAL PROJECTS

These projects involve a considerable amount of research and may include literature surveys, construction models, computer programming projects, engineering design and case studies. The following should be included in the project:

Research Topic: The student should have this clearly stated and it should be evident throughout the project.
Research: The student should obtain information from various sources. The student should have talked or written to experts in the field they are researching and read books and articles related to the subject.
From this research they should be able to:

- Summarize their research on a backboard and give a logical explanation of the findings
- Provide an explanation for conflicting information. If two sources of information say two different things, the students should provide reasons why they chose one over the other, or why both could be correct.
- Provide a research report on their subject. This should be detailed and the students should be able to answer questions on the material in the report.
- Show a logbook that has a record of all their research notes. This should include contact information and a bibliography of references consulted.
- Draw logical conclusions based on the information supplied in the presentation.

Occasionally the students will build a model based on research. They should be able to explain the model and how it works. An exceptional project will include limitations of the model's use.

A good project will also make reference to:

- Applications of the research. Why are people studying this subject?
- Areas of future research related to the subject.

Logbook: The logbook should contain all the information necessary for the reader to be able to reproduce the experiment and its results. This includes:

- a daily record of experiment activities, background information, bibliography, etc.
- data collection sheets, summary of data, summary of observations, conclusions

It is good to see evidence that entries were made on a daily basis in handwriting. Marks should be awarded on the completeness of their logbook.

TYPES OF ELEMENTARY PROJECTS

The Calgary Youth Science Fair recognizes both **experimental** and **non-experimental** projects. In general, an experimental project involves the use and control of variables. You will need to fill out the appropriate section of the tally sheet. If your team cannot decide a project's category, a CYSF director will be able to help you.
An important part of judging a project is to see how well the student understands and is able to apply the scientific method to a specific topic. It is up to the judges to find out how well the student has applied the scientific method to find an answer to the problem.

TYPES OF SECONDARY PROJECTS

Secondary projects are judged in one of three categories, depending upon the nature of the project. The categories are **experimental projects, innovation projects,** and **study projects**. Regardless of the category in which the project is being judged, the participant(s) should clearly state the problem/objective, and hypothesis based upon existing scientific knowledge in such a way that direction is provided for the remainder of the project. Students should clearly understand the science that lead to their projects as well as future extensions to their work.
A rubric has been developed for use with the Secondary judging tally sheet.

Experimental projects:
These projects involve an investigation undertaken to test a scientific hypothesis using experimentation. The student must recognize variables affecting their research. Manipulated variables are clearly identified and changed one at a time for each experiment. Within each experiment, controlled variables are used to test the outcome of the manipulated variables on the responding variables. Repetition and (or) sample size is used to verify results obtained in the course of research. Sources of experimental error are identified and allowances have been made for them. The progress of the research is noted in the logbook.

Innovation projects:
These projects focus upon the development and evaluation of innovative devices, models or techniques in technology, engineering or computers (hardware or software). The student should demonstrate an understanding of the properties of the materials/methods used and the reasons for choosing them. An understanding of the effectiveness of the design is essential. The innovation should be tested and modified if shortcomings are noted.

Study Projects:
These projects involve the collection and analysis of data to reveal evidence of a fact or a situation of scientific interest. It could include a study of cause and effect relationships or theoretical investigations of scientific data. These projects include literature surveys, construction models or case studies.

In presenting projects of this type the information should be of considerable depth, quantity and variety. The scope of the topic (whether far-reaching or of very narrow focus) should be understood by the student. The gathered data needs to be critically analyzed and interpreted by the student and the progress of their research should be chronicled in their logbook.

PRELIMINARIES

Friday Morning:

All judges should meet at **7:15 am** on Friday morning, downstairs in the Olympic Oval at the University of Calgary. **IT IS IMPORTANT TO BE THERE ON TIME.** At this time you will meet your team members and receive your project locations. During this time the judging teams will also prepare their judging tally sheets, review their timetable, and receive last minute instructions. Usually, judging teams evaluate 4 or 5 projects. This will give you about **30 minutes** per project.

Judging and evaluation begins at **8:15am** and is finished by **noon**. The judging takes place in the downstairs section of the Olympic Oval. If you are late, please go to the Judges Information Table near the Awards Stage and speak to a CYSF director.

After leaving your belongings in the Judges corral, introduce yourselves to the students you will be judging, and tell them the time that each of you will see them. Each team member will have a timetable of when to visit each project. Please follow this timetable to avoid two judges converging on a project at the same time.

It is important that you interview and evaluate each of the projects INDIVIDUALLY and not as a team. This allows the students to have more than one opportunity to show off their project. They have worked hard on their experiment and you and your team may be the only people who ever hear the students speak about their project. Try to spend as much time at the project as possible, but give yourself time to complete the marking after each project.

When you have finished evaluating all of your projects meet your team in the Judges corral. The final mark of each project does not have to be a mathematical average, but all judges must be in agreement. Once a final mark has been assigned to each project, please turn in the Judging Team Mark Summary Sheet **promptly by 11:15 am** The data will be used to determine second round judging in the afternoon for special awards and trophies.

Each team is responsible for:

- Deciding a project's final mark
- Handing in the Judging Team Mark Summary Sheet as soon as possible to the Judges information table **by 11:15**
- Filling out and completing a comment sheet for each student in each project
- Handing in all paperwork, judging sheets, forms, etc. with the comment sheets in the original envelope before leaving. Everything except the comment sheet is later shredded so the students never find out their marks.

THE INTERVIEW

This is the most important part of the Science Fair. The only chance for some students to present their project will be to you and your team members. It is important that you spend as much time as possible with the student. Your time should be divided between the presentation and discussion, with some time to complete the evaluation form.

Presentation: Smile, introduce yourself and invite the student(s) to present the project *("Could you tell me about your project*?"). It is better if you sit and they stand when doing the presentation. Listen to the student and do not look at other things. Please be aware of your body language. Be friendly and open; the students are often nervous so it is important for you to make them feel at ease.

Discussion: When the student has finished the presentation, try to summarize and paraphrase the project. This will allow the student to correct any misconceptions that you have as well as show that you have listened to their project. You can ask questions, and try to use 'I' statements. Remember that these students are not in university, so please tailor your questions and comments accordingly.
When you have finished asking questions be sure to thank the student for the presentation. You should also give them some praise about an aspect of the project that impressed you.

Useful Questions to Ask Students:

- How did you choose this topic?
- What are the controlled, manipulated and responding variables (*or* independent and dependent variables)?
- What do your graphs tell you?
- Why did you choose this method (type of graph, rank the results, etc.) to interpret your data?
- Did you have a control group? What does it tell you?
- Can you think of other experiments that you could do dealing with this subject?
- What is the application of this experiment to daily life?
- What are some possible sources of error? (What wasn't controlled as carefully as it may have been?)

- If you did this experiment again what would you change?
- What did or did not work?
- What are some of the most important aspects of your experiment?
- What were your sources of information?
- Who helped you with your project? What support did they provide?
- Tell me (more) about…

THE EVALUATION

Making notes after a student's presentation will help you evaluate the project and write comments later. It is easy to forget the details of a particular project after judging 4 or 5 of them. However, do not complete the evaluation forms in front of the students.

After interviewing a student, fill out the evaluation form in pencil in case you need to change the mark after seeing the other projects.

- Be consistent in your marking. Remember that marking too hard penalizes good projects, while marking too easy gives undeserved awards.
- Be objective and listen carefully. Give all students an equal opportunity. You may encounter the 'same' project topic more than once, but it doesn't mean they are all done equally well.
- Mark the science and not the backboard.

Once you have finished marking all the projects, meet with your team in the judging corral. Compare notes and marks for the projects and find a mark that the group can agree on. It does not have to be the average of the marks. When you have finished giving marks to all your projects, return the Judging Team Mark Summary Sheet to the committee right away. Only complete the evaluation and comment sheets after handing in your team marks. This is important because the marks are needed before the second round of judging can begin.

The range of marks is usually:

Gold: 90% and above;
Silver: 80-89%;
Bronze: 72-79%;
Honourable mention: < 72%

To be considered for second round judging, projects should have a mark of 80% or more.

LINKS TO TALLY SHEETS

Elementary: http://www.cysf.org/forms/tally_e.pdf

Secondary: http://www.cysf.org/forms/tally_s.pdf

GENERAL

All students who participate in the CYSF have worked very hard and have done their best. Their efforts should be recognized under all circumstances.

Feedback is the only way the students learn how they did on their project since they don't see their marks. Your comments are vital and let the students know how they could add material to or improve their project. IT IS IMPORTANT THAT STUDENTS LEAVE WITH A POSTIVE FEELING ABOUT THEMSELVES AND THE SCIENCE FAIR EXPERIENCE. Please structure your comments in a positive way, remembering that these students are young and don't have the experience that you may have in science. Many students look much older then they are, yet they are still only in elementary, junior or senior high and can be emotionally fragile. Constructive suggestions for improvement combined with praise will help guide students to become better scientists and will help them develop their projects in future years.

FEEDBACK FOR PROJECTS

Once you have handed in the Judging Team Mark Sheet for the projects you judged, fill out the comment sheet as a group. **Make one comment sheet for each student in a project.** This will be the only written record that they receive from the fair day. **The Comment Sheet should have positive and helpful comments.** It should point out where the student has done well and where they can improve. Print or write legibly and all judges should sign the sheets. Make certain that the location numbers are filled in. You can use nice coloured pens and stickers too!

NOTE: If the student gets a 'needs improvement', make sure that you comment positively on why they received this and perhaps give some helpful suggestions as to how they could fix it. This sheet is very helpful for students who do Science Fair projects in future years. It is important to keep your comments structured in a positive and helpful way. For this you can use the 'sandwich technique' (see below).

Things to keep in mind:

- It is important to provide this feedback so that the student is aware of where improvement needs to be made in future years. Make sure you tailor your remarks to the level of proficiency they have attained. For example, if a bronze medal winner receives no indication of where they can improve, they might wonder why they didn't receive a silver or gold medal.
- You can either make up comments or use some of the suggested words and phases we have listed in this book for your convenience. We prefer that you make your own as the comments seem more genuine.
- When you have finished, please return all the material, including mark sheets, evaluation forms and comment sheets, to the Elementary or Secondary committee.

SANDWICH TECHNIQUE

This technique allows you to give comments in a positive and encouraging framework by 'sandwiching' a suggestion between two positive statements.

Sandwich technique = positive/helpful/encouraging

For example, you might say or write to a student:

> *"I really like the way you chose to present your results in a graph.* (POSITIVE) *Perhaps next time you could label the axes so that persons reading your graph will know what it is that you measured in your experiment.* (HELPFUL)
> *Once you used words to explain your graphs to me it was very clear that you used them to show the relationship between A and B. That was well done!* (ENCOURAGING)*"*

Try using the "sandwich technique" whenever you are offering a helpful verbal or written suggestion to a student.

Useful Sentences:

- Your objective was clear and your project was well organized and led to an interesting conclusion.
- You chose an interesting topic to demonstrate and used a variety of models to emphasize the points you made.
- Your use of models and diagrams made your project come alive.
- Your topic was interesting and presented in a visually clear manner.
- Your understanding and use of scientific vocabulary certainly added to your project.
- The conclusions you reached were well documented by your research.
- Your experimental design was clear and well thought out. It showed a good understanding of your question.
- Your creativity in developing a method to prove your hypothesis is commendable.
- Your ability to summarize your data in an interesting and meaningful way shows a good understanding of the topic.
- It was interesting to observe how you recognized and controlled the variables in your experiment. Your collection of data was precise and orderly and showed care in your experimentation and observation.
- Your conclusions are valid and are the result of careful experimentation and recording.

Useful Phrases:

- Thank you for…
- Keep up the good work.
- It was a pleasure to learn about…
- I really like the way…
- Congratulations for…

Useful Words: original, excellent, well thought out, unique, exceptional, high quality, creative, clever, impressive, valuable, remarkable, ingenious, amazing, commendable, enthusiastic, eager, scientific, intelligent, interesting, inspiring, superior, resourceful, capable, innovative, well prepared, imaginative, hard work, worthwhile, meticulous, wonderful, admirable, well presented, superb
Words Demanding an Explanation: adequate, fair, average, good, satisfactory
Words to Avoid: mediocre, bad, ordinary, too easy, pitiful, too simple, boring, inferior, miserable, uninspiring, simplistic, obnoxious, unacceptable, questionable, common, unprepared, banal, dull, uninteresting, tedious

ELEMENTARY PROJECTS

Tricky Situation #1: Student tackled a complex project and didn't really understand it.
Possible Approach: Acknowledge that they chose a complex project and commend them for their efforts. Make specific reference to something they have done well. Point out it would be perfectly acceptable to choose one aspect of the complex subject for a project in the future, possibly to be followed by other aspects of the same complex subject in succeeding years.

Tricky Situation #2: The student admits the parents did all the work. On questioning, the student does not know the material.
Possible Approach: Compliment them on their efforts and on the components of the project they understood. Offer them encouragement to come back next year.

Tricky Situation #3: A very well done project. The student knows all the material and is very enthusiastic. You wonder whether the student did all the work.
Possible Approach: Don't judge too quickly and give the student a chance to show what they know. You may wish to ask a few more questions so that they can demonstrate their understanding. One of the CYSF goals is to encourage children to learn science – how this is done is less important. As long as the child demonstrates a true understanding of the subject, we're happy.

Tricky Situation #4: A poor project with inconsistencies. A look at the logbook seems to indicate that it was done at the last minute.
Possible Approach: Commend them for their efforts. Choose something from the project to praise. Recommend that in the future they start earlier to collect data and analyze results that would give them more information to back up their conclusions. Then, if appropriate, suggest this would be a wonderful project to present in greater depth next year.

SECONDARY PROJECTS

Tricky Situation #1: Students do not really comprehend the complexity or depth of the topic they have chosen.
Possible Approach: Congratulate the students on their effort in attempting such a project. Start from their existing level of comprehension and work together to a higher level. Ask a few 'What would happen if…?' and 'How would we find out?' questions. Using this approach, you will at least be able to discover if the students have a grasp of the scientific principles and method. Suggest that for next year's project they select an aspect of this topic to study.

Tricky Situation #2: The project is very well done and you suspect that the student did not do all (or any) of the work.
Possible Approach: Don't be too sure! Junior and senior high students are capable of astounding work. Try to establish a friendly relationship and ask questions related to the project, but not directly demonstrated in the work. If it is obviously not the student's work, be supportive. It's quite likely the student does not want to be there in the first place.

Tricky Situation #3: Two students worked on the project and only one talks or answers questions.
Possible approach: Make a point of directing questions to the silent partner. If the talker constantly butts in, remind them that you asked the partner the question. Sometimes you discover the project is much better than the talker led you to believe and you can see that both did the work.

Tricky Situation #4: The project is terrific, the student is brilliant, hours of hard work have gone into the preparation, and you don't have the slightest idea what they are talking about!
Possible Approach: Take a deep breath and calm down. Don't hesitate to point out you are not too familiar with the topic. Remember, you are there to determine if the student has used a scientific approach to answering a question, not to judge whether or not they got the facts right. Use your tally sheet to help you evaluate the student's methods, not

THANK YOU TO OUR SPONSORS

Each year, the CYSF receives generous support from many corporations, organizations, individuals and professional associations whose donations to allow us to successfully host one of Canada's largest regional science fairs.

Please visit www.cysf.org/sponsors.html and http://www.cysf.org/prize-winners.html to see a complete list of this year's amazing sponsors and award donors!

CALGARY YOUTH SCIENCE FAIR

Elementary Project: Scoring Guidelines

Section 1: Scientific Content (Experimental Projects)

	Excellent	Good	Fair
Problem / Hypothesis	**(9-10)** The problem / hypothesis was exceptionally relevant and well considered. A significant amount of background research was done.	**(7-8)** The problem / hypothesis was relevant and well considered Some background research was conducted.	**(5-6)** An appropriate problem / hypothesis was formulated based on existing knowledge. Little background research was done.
Method	**(18-20)** The experimental procedure and materials used are clearly laid out. The experiment was repeated to ensure accurate results, or a large sample size was used. Manipulated and responding variables are indicated and understood. An effort was made to control many outside factors that could affect the experiment. Log book contains a full record of the experiment, including all original data.	**(15-17)** The experimental procedure and materials are described. An attempt was made to repeat the experiment or have an appropriate sample size. Manipulated and responding variables are clearly stated. Some effort has been made to control external factors. Log book contains a record of the project.	**(12-14)** There is some description of the procedure and materials used. Enough observations were made to reach a conclusion. Manipulated and responding variables are mentioned. Controlled conditions are acknowledged. Log book contains at least a description of the tasks undertaken over the course of the project.
Analysis / Conclusions	**(18-20)** Significant analysis of the data has been conducted and clearly presented (charts, graphs, calculations, etc.). Analysis is sufficient to support any conclusions made. Most possible sources of error have been acknowledged.	**(15-17)** Some analysis has been done and presented, and is relevant to the stated problem / objective. Appropriate conclusions have been drawn. Sources of error have been considered.	**(12-14)** Data has been clearly displayed. Conclusions are relevant to the presented data. Conclusion refers back to the testable question.

Section 1: Scientific Content (Non-Experimental Projects)

	Excellent	Good	Fair
Problem / Hypothesis	**(5)**. There is an innovative problem that directs the study and is both relevant and logical in scope.	**(4)** The problem was relevant and well considered. It gave clear direction to the study.	**(3)** A good topic was formulated although a specific problem may not have been identified.
Method	**(18-20)** A variety of sources was used in the course of research. Care has been taken to verify the accuracy of the information. Information is comprehensive and covers all aspects of the problem. Alternate approaches or theories have been considered and analyzed. The log book contains a full record of the project, including all original data.	**(15-17)** Multiple sources were used in the course of research. Some effort has been made to ensure that the sources used are reliable and are related to the study. An effort has been made to cover all aspects of the problem. The log book contains a record of the project.	**(12-14)** Few sources were used in research, or the sources used were not independent, but the sources used are reliable. Enough information is present to address the problem. The log book contains at least a description of the tasks undertaken over the course of the project.
Analysis / Conclusions	**(22-25)** The research material was critically analyzed, interpreted, and synthesized. Conflict or inconsistencies in the research material was actively sought out and investigated. The conclusion clearly answered the problem.	**(18-21)** The research material was examined with some attempt at synthesis. Conclusions have been drawn based on the problem that was asked.	**(15-17)** A good effort to examine the research material was made. Conclusions relating back to the original topic were drawn.

Elementary Project: Scoring Guidelines (Cont'd)

Sections 2 – 4

	Excellent	Good	Fair
Section 2. Creativity and Insights	**(22-25)** Independent thinking, creativity and resourcefulness were used in the design, implementation and analysis of the project. All aspects of the project (for instance problems, improvements, and applications) have been considered.	**(18-21)** Emerging evidence of independent thinking and analysis of the project was shown. Aspects of the project (for instance problems, improvements, and applications) have been considered.	**(15-17)** There is an understanding of some aspects of the project and consideration given to problems, extensions, improvements and applications.
Section 3. Communication	**(18-20)** Oral presentation was clear, concise and logical. All important written and visual materials were well displayed. All material from other sources was properly credited and a bibliography was provided.	**(15-17)** The major components of the project were presented and many questions were answered well. All important written and visual materials were present. All material from other sources was properly credited.	**(12-14)** Perhaps with prompting a good effort was made in doing an oral presentation and most questions were attempted. Most of the important written material was present. Some attempt was made to credit outside sources.
Section 4. Degree of Difficulty	**(5)** The problem approached was challenging beyond grade level, and a new understanding was gained.	**(4)** The problem was somewhat challenging and a good attempt was made to gain an understanding of it.	**(3)** The problem researched was appropriate to their grade level. A reasonable attempt to understand the problem was made.

CALGARY YOUTH SCIENCE FAIR

Entry No: _____ Location: _____
Project Title: _____
Student Name(s): _____
_____

Elementary Project – Judging Tally Sheet

Please use the following scale:

5 Excellent
4 Good
3 Satisfactory
2 Weak
1 Poor
0 Not Present

1. SCIENTIFIC CONTENT (maximum 50 marks)

***Complete* EITHER** *1A - Experimental Project* **OR** *1B – Non-Experimental Project.*
Circle the score for each statement and note the subtotal on page 2.

1A. EXPERIMENTAL PROJECT – an investigation undertaken to test a scientific hypothesis using experimentation, usually featuring the identification and control of variables.

PROBLEM/HYPOTHESIS

1. The problem/hypothesis was clearly stated 0 1 2 3 4 5
2. Adequate background reading was evident in the presentation 0 1 2 3 4 5

METHOD

3. Experimental design reflected understanding of the scientific method and underlying scientific principles..... 0 1 2 3 4 5
4. Controlled, manipulated and responding variables were identified and understood 0 1 2 3 4 5
5. Repetition of tests (minimum three trials) and/or appropriate sample size were used to achieve reliable results.... 0 1 2 3 4 5
6. Logbook recorded the project progress including detailed procedures, results, and original data 0 1 2 3 4 5

ANALYSIS/CONCLUSION

7. Observations were clearly summarized in tables/graphs and were consistent with data collected……. 0 1 2 3 4 5
8. Results were logically explained and understood 0 1 2 3 4 5
9. Conclusions and summary remarks were based on experimental data and related to the problem/hypothesis…… 0 1 2 3 4 5
10. Possible sources of error were recognized 0 1 2 3 4 5

SECTION 1 SUBTOTAL / 50 _____

1 B. NON-EXPERIMENTAL PROJECT - the collection and analysis of data to reveal evidence of a fact or situation of scientific interest.

PROBLEM/HYPOTHESIS

1. The topic was clearly stated and provided direction and appropriate scope for the project 0 1 2 3 4 5

METHOD

2. Evidence of extensive research including reading and contacting knowledgeable people was demonstrated 0 1 2 3 4 5
3. The scientific information presented was accurate 0 1 2 3 4 5
4. The information was effectively gathered, combined and organized..... 0 1 2 3 4 5
5. Logbook recorded project progress including detailed research notes, contact names and discussions 0 1 2 3 4 5

ANALYSIS/CONCLUSION

6. Key points and concepts of the research topic were identified 0 1 2 3 4 5
7. Problems or issues related to the subject were understood 0 1 2 3 4 5
8. Critical analysis/interpretation of research material was presented 0 1 2 3 4 5
9. A logical conclusion/summary based on the research was reached 0 1 2 3 4 5
10. New ideas were formulated as a result of the research project 0 1 2 3 4 5

SECTION 1 SUBTOTAL / 50 _____

2. CREATIVITY AND INSIGHTS (maximum 25 marks)

Complete this section for ALL projects.
Circle the score for each statement and note the subtotal at the bottom of the page.

1. The project was imaginative and creative..... 0 1 2 3 4 5
2. There was resourceful use of equipment/information gathered..... 0 1 2 3 4 5
3. Creativity was shown in the interpretation of the data/information gathered (i.e. outliers noted, unexplained findings examined)..... 0 1 2 3 4 5
4. Thought was given to how the project could be improved or done differently…… 0 1 2 3 4 5
5. Future spin-offs or potential applications of the project were identified..... 0 1 2 3 4 5

SUBTOTAL / 25 _____

3. COMMUNICATION (maximum 20 marks)

Complete this section for ALL projects.
Circle the score for each statement and note the subtotal at the bottom of the page.

1. The oral presentation was clear, concise and logical 0 1 2 3 4 5
2. Questions were answered competently and accurately 0 1 2 3 4 5
3. Outside sources were properly credited and a bibliography was properly cited 0 1 2 3 4 5
4. The display board effectively presented the project 0 1 2 3 4 5

SUBTOTAL / 20 _____

4. DEGREE OF DIFFICULTY (maximum 5 marks)

Complete this section for ALL projects.
Circle the score for each statement and note the subtotal at the bottom of the page.

1. The degree of difficulty of this project was exceptional 0 1 2 3 4 5

SUBTOTAL / 5 _____

SUMMARY OF MARKS

1. SCIENTIFIC CONTENT (**50**) ……. _____
2. CREATIVITY AND INSIGHT (**25**) ……. _____
3. COMMUNICATION (**20**) ……. _____
4. DEGREE OF DIFFICULTY **(5)**…….. _____

TOTAL / 100 _____

CALGARY YOUTH SCIENCE FAIR

Secondary Project: Scoring Guidelines

Section 1. Scientific Method – Experimental Projects

	Excellent	Good	Fair
Hypothesis / Objective	**(9-10)** A significant amount of background research has been done. Research materials have been sought in order to formulate a scientifically significant experiment.	**(7-8)** Some background research was conducted. The hypothesis is relevant and well considered.	**(5-6)** Little background research was done, but an appropriate problem / hypothesis was formulated based on existing knowledge.
Method	**(18-20)** The experimental procedure and materials used are clearly laid out. The experiment was repeated to ensure accurate results, or a large sample size was used. Manipulated and responding variables are indicated and understood. An effort was made to control many outside factors that could affect the experiment. Log book contains a full record of the experiment, including all original data.	**(15-17)** The experimental procedure and materials are described. The experiment has been repeated at least once, or a large sample size was used. Manipulated and responding variables are clearly stated. Log book contains a record of the project.	**(12-14)** There is some description of the procedure and materials used. Experiment may not have been repeated, but enough observations were conducted to make a conclusion. Manipulated and responding variables are mentioned. Log book contains at least a description of the tasks undertaken over the course of the project.
Analysis / Conclusions	**(13-15)** Significant analysis of the data has been conducted and clearly presented (charts, graphs, calculations, etc.). Most possible sources of error have been acknowledged. Analysis is sufficient to support any conclusions made.	**(11-12)** Some analysis has been done and presented, and is relevant to the stated problem / objective. Sources of error have been considered and some effort has been made to control external factors. Appropriate conclusions have been drawn.	**(9-10)** Data has been clearly displayed. Obvious sources of error and controlled conditions are acknowledged. Conclusions are relevant to the presented data.

Scientific Method – Innovation Projects:

	Excellent	Good	Fair
Problem / Objective	**(9-10)** A significant amount of background research has been done. Research materials have been sought in order to ensure a successful and appropriate design.	**(7-8)** Some background research was conducted. The problem reflects a reasonable amount of background knowledge.	**(5-6)** Little background research was done, but an appropriate problem was formulated based on existing knowledge.
Method	**(18-20)** The design has acknowledged all aspects of the problem. Significant testing has been done. If possible, the results have been quantified. A complete description of any methods and materials is included. Log book contains a full record of the experiment, including all original data.	**(15-17)** The design shows an understanding of the factors involved. The methods and materials used are described. Conscious effort has been made to deal with possible factors and variables, including some testing. Log book contains a record of the project.	**(12-14)** There is some description of the methods and materials used. Some factors have been considered to optimize the design. Log book contains at least a description of the tasks undertaken over the course of the project.
Analysis / Conclusions	**(13-15)** Results of testing have been used to improve the design, and any possible shortcomings have been described. Attempts have been made to overcome these shortcomings. Results of testing are used to accurately describe the effectiveness of the design.	**(11-12)** Any testing done has been related to the effectiveness of the design. Some discussion of the effectiveness of the design and its shortcomings is included, and is appropriate to the testing done.	**(9-10)** The effectiveness of the design is discussed. The possibility of shortcomings is mentioned.

Secondary Project: Scoring Guidelines (Cont'd)

Scientific Method – Study Projects:

	Excellent	Good	Fair
Problem / Objective	**(9-10)** A significant amount of background research has been done. Research materials have been sought in order to formulate a problem that is both relevant and reasonable in scope.	**(7-8)** Some background research was conducted. The problem is relevant and well considered.	**(5-6)** Little background research was done, but an appropriate problem was formulated based on existing knowledge.
Method	**(18-20)** A variety of sources was used in the course of research. Care has been taken to verify the accuracy of the information. Information is comprehensive and covers all aspects of the problem. Alternate approaches or theories have been considered and analyzed. Log book contains a full record of the project, including all original data.	**(15-17)** Multiple sources were used in the course of research. Some effort has been made to ensure that the sources used are reliable and are related to the study. Significant effort has been made to cover all aspects of the problem. Log book contains a record of the project.	**(12-14)** Few sources were used in research, or the sources used were not independent, but the sources used are reliable and authoritative. Enough information is present to address the problem. Log book contains at least a description of the tasks undertaken over the course of the project.
Analysis / Conclusions	**(13-15)** The research material has been analyzed to form conclusions related to the problem. Any inconsistencies in the data gathered have been analyzed critically to determine what information is reliable.	**(11-12)** Conclusions have been drawn based on the research material gathered. Inconsistencies have been acknowledged, and some effort has been made to determine the reliability of the information.	**(9-10)** Research material is presented in a manner that is relevant to the problem. The reliability of the data gathered has been considered, and the possibility of inaccurate or conflicting data has been acknowledged.

Sections 2 – 4

	Excellent	Good	Fair
Section 2. Creativity and Insights	**(22-25)** The student showed independent thinking in the design, implementation and analysis of the project. All aspects of the project (problems, extensions, improvements, applications, etc.) have been considered.	**(18-21)** The student was able to independently expand on any existing form of the project, and has acknowledged problems, extensions, improvements and applications that can be made.	**(15-17)** The student may not have designed the project independently, but shows an understanding of the aspects of the project and has considered problems, extensions, improvements and applications.
Section 3. Communication	**(18-20)** All required information was presented in the display or clearly described by the student. All material from other sources was properly credited and applicable forms were present. Student was able to answer all questions relevant to the project.	**(15-17)** All components of the project are present. All material from other sources was properly credited and applicable forms were present. Student presented the major components of the project, and was able to answer questions.	**(12-14)** Most aspects of the project were readily available. Some research from outside sources lacked citations. Student was able to answer most questions with little difficulty.
Section 4. Degree of Difficulty	**(9-10)** The student has approached material beyond their grade level, and has gained new understanding.	**(7-8)** The student has done independent research and made some progress in understanding.	**(5-6)** The student has learned something outside of their curriculum from the project.

CALGARY YOUTH SCIENCE FAIR

Entry No: _____ Location: _____
Project Title: _____
Student Name(s): _____
_____

Secondary Project – Judging Tally Sheet

1. SCIENTIFIC METHOD (Choose only one category, 1A, 1B or 1C)

*Judge the project in **only one** of the following categories:*

***Experimental (1A)**, **Innovation (1B)**, or **Study (1C)**.*

*Please contact a member of the CYSF evaluations committee **before** judging if you have difficulty choosing a category.*

Please use the following scale:

5 Excellent
4 Good
3 Satisfactory
2 Weak
1 Poor
0 Not Present

1A. EXPERIMENTAL PROJECT – an investigation undertaken to test a scientific hypothesis using experimentation, usually featuring the identification and control of variables.

PROBLEM / HYPOTHESIS

1. Existing knowledge and background research were integrated into the formation of the problem/hypothesis..... 0 1 2 3 4 5
2. The hypothesis related to the problem, was clearly stated, and provided direction for the project..... 0 1 2 3 4 5

SUBTOTAL / 10 _____

METHOD

3. Experimental design was clearly described and appropriate for solving the problem. 0 1 2 3 4 5
4. Controlled, manipulated and responding variables were identified and understood..... 0 1 2 3 4 5
5. Repetitions of tests and/or appropriate sample size were used to achieve reliable results. 0 1 2 3 4 5
6. Logbook recorded progress of the project including detailed procedures, results and original data..... 0 1 2 3 4 5

SUBTOTAL / 20 _____

ANALYSIS / CONCLUSIONS

7. Appropriate methods were used to present and analyze data (e.g. graphs, charts and statistics). 0 1 2 3 4 5
8. Sources of error and experimental limitations (e.g. the effect of variables that could not be controlled) were understood..... 0 1 2 3 4 5
9. Conclusions were related to the problem/hypothesis and were supported by the data presented. 0 1 2 3 4 5

SUBTOTAL / 15 _____

1B. INNOVATION PROJECT – the development and evaluation of innovative devices, models, or techniques in technology, engineering or computers.

PROBLEM / OBJECTIVE

1. Existing knowledge and background research were integrated into the formation of the problem/objective. 0 1 2 3 4 5
2. A problem was clearly identified and provided direction for the project..... 0 1 2 3 4 5

SUBTOTAL / 10 _____

METHOD

3. Suitability and limitations of the chosen materials/methods were understood..... 0 1 2 3 4 5
4. The project design was efficient, effective, and addressed the problem/objective..... 0 1 2 3 4 5
5. The project design was appropriately tested. 0 1 2 3 4 5
6. Logbook recorded progress of the project, including detailed procedures, results and modifications. 0 1 2 3 4 5

SUBTOTAL / 20 _____

ANALYSIS / CONCLUSIONS

7. A connection was established between the problem/objective and results. 0 1 2 3 4 5
8. Testing was carried out to modify the project design and correct shortcomings as the project proceeded. 0 1 2 3 4 5
9. The student understood how well the problem was solved..... 0 1 2 3 4 5

SUBTOTAL / 15 _____

1. SCIENTIFIC METHOD CONT'D (Choose only one category, 1A, 1B or 1C)

1C. STUDY PROJECT – the collection and analysis of data to reveal evidence of a fact or situation of scientific interest, possibly including surveys, the study of cause and effect relationships, or theoretical investigations of previously published scientific data.

PROBLEM / OBJECTIVE

1. Existing knowledge and background research were integrated into the formation of the problem/objective. 0 1 2 3 4 5
2. The objective was clearly stated and provided direction and appropriate scope for the project. 0 1 2 3 4 5

SUBTOTAL / 10 _____

METHOD

3. The information acquired showed depth and variety. 0 1 2 3 4 5
4. The data gathered were reliable and appropriate (multiple independent sources were used and verified). 0 1 2 3 4 5
5. The research data were comprehensive and well-organized. 0 1 2 3 4 5
6. Logbook recorded progress of the project including detailed research notes, resources and discussions. 0 1 2 3 4 5

SUBTOTAL / 20 _____

ANALYSIS / CONCLUSIONS

7. Key scientific concepts, including alternate viewpoints, of the research topic were identified and explored 0 1 2 3 4 5
8. Critical analysis/interpretation of research material was presented (e.g. comparison of sources, surveys and statistics). 0 1 2 3 4 5
9. Logical conclusions based on the research were reached. 0 1 2 3 4 5

SUBTOTAL / 15 _____

SECTION 1 TOTAL / 45 _____

2. CREATIVITY AND INSIGHT

1. The problem was approached with originality. 0 1 2 3 4 5
2. Independent motivation, design and thinking were demonstrated. 0 1 2 3 4 5
3. Resourceful use of equipment and/or materials was shown. 0 1 2 3 4 5
4. Improvements that can be made to the project were indicated. 0 1 2 3 4 5
5. Practical applications and future research for the project were identified. 0 1 2 3 4 5

SECTION 2 TOTAL / 25 _____

3. COMMUNICATION

1. The oral presentation was clear, logical and concise. 0 1 2 3 4 5
2. Answers to questions were clear and signified depth of understanding. 0 1 2 3 4 5
3. All required written information including credits, citations and applicable ethics/consent forms were presented. 0 1 2 3 4 5
4. The visual display was effective, with a logical and self-explanatory layout. 0 1 2 3 4 5

SECTION 3 TOTAL / 20 _____

4. DEGREE OF DIFFICULTY

1. The project was exceptional (consider the student's grade level). 0 1 2 3 4 5
2. The student gained a deeper understanding of the topic. 0 1 2 3 4 5

SECTION 4 TOTAL / 10 _____

5. TOTAL SCORE

Add the scores from Sections 1 through 4 and record the final mark here.

TOTAL SCORE / 100 _____