Judging Manual

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Chief-Judge ERSF 2024

Introduction

Thank you for agreeing to judge ERSF 2024!

This will be ERSF's 61st in person Fair or 64th Fair including virtual fairs.

Goals of a Science Fair

The goal of a science fair is to engage youth in the research process at an early age through science inquiry and critical thinking. By engaging students with science when they are young, ERSF hopes to instill a life-long love of discovery and learning.

Divisions

There are five divisions at the Edmonton Regional Science Fair (ERSF): Grade 4, Grade 5, Grade 6, Junior (Grade 7 & 8) and Senior (Grade 9-12).

Awards of Excellence

The ERSF has implemented a system of Gold, Silver and Bronze awards in each division. This is adjusted each year to reflect the target of 25% earning awards.

Division	Gold	Silver	Bronze
Grade 4	3%	9%	12%
Grade 5	3%	9%	12%
Grade 6	3%	9%	12%
Junior (JR)	3%	9%	12%
Senior (SR)	3%	9%	12%

Each project will be judged five times for the Awards of Excellence. Eight students from the Junior and Senior Divisions will be attending the Canada Wide Science Fair to represent Edmonton.

Special Awards

Students self-nominate themselves for Special Awards when they register for the Science Fair. A complete list of Special Awards can be found at www.ersf.ca/Awards Judges who judge Special Awards will only be judging Special Awards.

Overview of the Judging Process

1. Each Excellence Judge & Special Awards Judge will be assigned the projects that they will be judging.
2. Round 1 9:00-12:00
3. Round 2 1:00-2:00 for Elementary students
4. Round 2 1:00-4:00 for grades 7-12
5. After each project is judged you should find a quiet spot to complete required paperwork. The first sheet of the judging form will NOT be returned to the student(s) but the second sheet will be returned to the student(s). When completing the feedback page be positive in your comments with your suggestions for improvement. In the Appendices is a list of words that may assist you in writing positive comments.

6. After completing all assigned judging, hand in all judging forms and materials to the Division Coordinator (DC).
7. The Division Coordinator will go out on the floor to finalize the Gold, Silver and Bronze medals allotted to each division. No interviews are needed to complete the final list of awards for each division.

QUALITIES OF A GOOD SCIENCE FAIR JUDGE

A judge for the Edmonton Regional Science Fair will have a memorable impact on the lives of some very talented young people. Judging involves face-to-face interviews with the students. For some, a judge is the first professional scientist or engineer they have encountered; thus, part of a judge's job at the Science Fair is to be an ambassador for his/her profession. It is a good idea when approaching a student for the judge to introduce himself/herself and describe their background.

Remember: These are students who may be as young as nine years old and do not have the background or experiences of university level students.

Conveying Fairness
As a judge, it is very important to demonstrate to students that he/she is fair and knowledgeable.

- ✓ Spend approximately the same amount of time with each student.
- ✓ Listen carefully to the student's explanation of the project.
- ✓ The questions asked are intended to find out more about the project and how it was done, not to embarrass or intimidate the student

Asking Questions (see Appendices for 100 Questions)
The best tool in judging is the ability to ask questions and listen carefully to the answers. Ask questions that the student can answer, and continue a conversation for about ten to fifteen minutes.
Sample questions might include:

- How did you come up with the idea for this project?
- What did you learn from your background search?
- How long did it take you to build the apparatus?
- Did you have help in building this apparatus?
- How did you build the apparatus?
- How much time (days, weeks, months) did it take to run the experiments? (i.e., grow the plants, collect each data point, record observations, etc.?
- How many times did you run the experiment with each configuration?
- How many experiment runs are presented by each data point on the chart?
- Did you take all data (run the experiment) under the same conditions, e.g., at the same temperature, time of day, lighting conditions?
- How does your apparatus (equipment/instrument) work?
- What do you mean by: _____(terminology or jargon used by the student)?
- Do you think there is an application in industry for this knowledge (technique)?
- Were there any books/websites that helped you do your analysis (build your apparatus)?
- When did you start this project? Or, how much of the work did you do this year?
- (Some students bring last year's winning project back, with only a few enhancements.)
- What new questions did your results suggest?
- What is the next experiment to do in continuing this study?
- Are there any areas that we have not covered which you feel are important?
- Do you have any questions for the judges?
- More questions are in the Appendices

Note: These questions are only suggestions to keep the dialog going. You will find other questions to be more useful in specific interviews.

One type of question to avoid is: “Why didn’t you do...?”

Probing questions are useful to stimulate the thought processes of the student.

However, a solution or extension to the work presented may be obvious to a judge with years of experience, but the student may not understand why such a question is asked. This question could be asked in a more positive manner as in: “Could you have done…?” or “What do you think would have happened if you had done…?” When phrased this way, the question is an invitation for the student to think about the experiment in a different way, and the question sets a positive, rather than a negative mood.

A Big Picture Question

At one time Google sponsored a global Science Fair. One of the questions for participants was “How does your project benefit society?”

Time Allotment

The interview for each project should take about 15 minutes with five minutes to fill out the judging sheet scores and write the comments.

Prior to Handing in Score Sheets

Please double check that all parts of the score sheet are completed and all the subtotals and totals are added correctly.

Artificial Intelligence

This is a new concern, as AI is readily available for students. ERSF’s approach is as follows:

1. When students register, they would declare if they used AI.
2. If the answer is yes, they need to briefly describe how they used AI.
3. Each student project should have with them at the Fair, a signed declaration if they used AI and a longer written description of how they used AI.
4. A good use of AI would be as a tool to generate ideas for a topic for the project.
5. A bad use of AI would be to design an experiment, make up results, writeup a research paper, and generate false references

Mentorship

All professional scientists receive extensive mentoring.

The levels of mentoring are:

1. I did not receive any mentoring.

2. I exchanged a few emails or phone calls, and/or met with my mentor once or twice to discuss my ideas.

3. I had occasional contact with my mentor by email or phone, and/or met occasionally with my mentor who provided some advice or materials.

4. I had regular contact with my mentor by email or phone, and/or met regularly with my mentor who provided advice, materials, assistance with design/testing, or data analysis.

5. I had regular face-to-face contact with my mentor and regular access to advice, materials, space, equipment, design/testing, or other personnel in a specialized facility.

6. I worked closely with my mentor over an extended period of time to develop the project idea, plan and conduct the research/development, and analyze the results or test the innovation.
7. Does the student have a good grasp of the project, and did he/she do the work?
8. Do not discount a project just because it was mentored!

What to Look for In a Participant

Beyond the project itself, as a judge, you're also evaluating the participant. Here's what to look for:

- **Understanding:** Do they genuinely understand the scientific principles behind their project?
- **Passion:** Are they enthusiastic about their topic and findings?
- **Preparedness:** Have they thoroughly researched and prepared their presentation?
- **Clarity:** Can they explain complex concepts in understandable terms?
- **Ethical Considerations:** Have they considered the ethics of their research, especially if it involves live subjects?

Guiding and Assisting Participants

While your primary role is to assess, it's also essential to guide. If a student struggles to answer a question, help them think it through. Offer constructive feedback and encourage them to consider different angles or deeper implications. Remember, the goal is to inspire and foster a love for science

Types of Projects

Experiment	Innovation	Study
Undertake an investigation to test a scientific hypothesis by the experimental method. At least one independent variable is manipulated: other variables are controlled.	Develop and evaluate new devices, models, theorems, physical theories, techniques or methods in technology, engineering, computing, natural science, or social science.	Analysis of, and possibly collections of, data using accepted methodologies from the natural, social, biological, or health sciences. Includes studies involving human subjects, biology field studies, data mining, observation and pattern recognition in physical and/or socio-behavioural data

The ERSF's judging form (see Appendices) reflects these three types of projects and there is no preference given to one type of project over another.

The breakdown of scoring sections are:

The main sections are:

Scientific Method	45%
Creativity & Insight	25%
Communication	20%
Degree of Difficulty	10%

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Appendices

Example Questions

Project Concepts and Objectives

1. What inspired you to choose this topic for your science fair project?
2. Can you summarize the main objective of your research?
3. How does your project address this objective?
4. What hypotheses did you start with, and how did they evolve?
5. Who do you think will benefit most from your findings?
6. What makes your project stand out from others here?
7. Were there any existing inventions or theories that influenced your work?
8. How did you narrow down your research question?
9. What real-world problem does your project aim to solve?
10. How do you hope your project contributes to the scientific community?
11. Did your project require you to create a new concept or theory?
12. Can you explain the core principles or science behind your project?
13. How would you explain your project to someone without a scientific background?
14. What do you think is the most innovative aspect of your project?
15. How did you ensure that your project's objective was realistic and achievable?
16. Was your project inspired by personal interests or experiences?
17. How did you determine the scope of your project?
18. If you had more time, what additional objectives would you like to explore?
19. What kind of feedback did you get on your project's concept before starting?
20. How do you define success for your project?

Research and Methodology

1. What research methods did you employ in your project?
2. Can you walk me through the experimental design and how you conducted your tests?
3. How did you ensure your methodology was sound and reliable?
4. What criteria did you use to select your sample or test subjects?

5. Were there any alternative methods you considered but didn't use?
6. How did you handle the data collection process?
7. Did your project require any unique or specialized equipment?
8. What challenges did you face in creating or conducting your experiments?
9. How did you ensure the reproducibility of your experiments?
10. Did you have any surprising findings during your research?
11. How did you deal with variables and controls within your experiments?
12. What was your process for analyzing the data you gathered?
13. How did you plan the different phases of your research?
14. Can you explain any innovative techniques you used in your research?
15. How did technology play a role in your data gathering or analysis?
16. Was there a peer review or feedback process for your methodology?
17. Have you conducted any pilot studies before proceeding with the main research?
18. How did you adapt your methods in response to unexpected results?
19. What were the limitations of your research methodology?
20. How did ethical considerations shape your research approach?

Challenges and Problem-Solving

1. What was the biggest challenge you faced during your project, and how did you overcome it?
2. Were there any hypotheses that were disproved during your experiments? How did you handle that?
3. How did you troubleshoot issues that arose while conducting your research?
4. Can you share a particularly difficult problem you solved in the course of your project?
5. How did you stay motivated when facing obstacles?
6. Did you have to revise your project plan or direction based on challenges faced?
7. Was there ever a point you thought about giving up? How did you push through?
8. How did you apply critical thinking to solve unexpected problems?
9. How did failure play a role in your learning process for this project?
10. Did you need to learn any new skills or concepts to overcome challenges?
11. Were there any tools or resources that were particularly helpful in solving problems?

12. How did you balance creativity and scientific rigor when addressing obstacles?
13. What did you learn about the scientific process through your problem-solving?
14. How did you prioritize which problems to tackle first?
15. How did you test the solutions to the problems you faced?
16. Did you receive any advice or help in overcoming the challenges, and from whom?
17. How did you ensure that the solutions to the problems did not affect the project outcome negatively?
18. What would you do differently if faced with the same problems again?
19. How did you validate the solutions you came up with?
20. What was the impact of resolving these challenges on your final project?

Applications and Real-world Connections

1. How can your project be applied in the real world?
2. What are the potential commercial applications of your project?
3. How could your findings benefit everyday life?
4. Could your project lead to improvements in any existing technologies or processes?
5. Is there a potential for your project to spark change in public policies or practices?
6. How do you see your project fitting into the current scientific or technological landscape?
7. What industries or fields could be most impacted by your work?
8. Can you give an example of how someone could use your research in a practical way?
9. Who would be the ideal audience or user for the applications of your project?
10. Have you considered any partnerships to help bring your project to market or practical use?
11. How does your project promote sustainability or environmental conservation?
12. Are there any ethical implications of applying your project findings?
13. How does your project align with current trends in science and technology?
14. In what ways does your project encourage future scientific exploration or advancement?
15. How could your findings influence educational methods or curriculum?
16. What steps would be necessary to take your project from concept to implementation?
17. Have you thought about any potential risks or negative outcomes if your project was applied in real-world scenarios?

18. How does your project connect with global issues or concerns?
19. What are the long-term implications of your project for society?
20. How easily could your project findings be scaled up from an experimental stage to widespread adoption?

Personal Experience and Learning Outcomes

1. What personal achievements have you accomplished through working on your project?
2. How has this project shaped your understanding of science and its relevance?
3. What skills have you developed or improved upon during this project?
4. How has your project influenced your future career or educational path?
5. Can you share an unexpected lesson you learned while working on your project?
6. In what ways has participating in the science fair changed your perception of research and invention?
7. How has collaboration with teachers, mentors, or peers contributed to your project?
8. What was the most exciting part of working on your project?
9. Has your project led you to consider new areas of interest or study?
10. How did you find the balance between the project demands and your other responsibilities?
11. What advice would you give to someone starting out on their own science fair project?
12. How have you grown as a scientist or researcher through this experience?
13. Looking back, is there anything you would have done differently in your project?
14. What was the most rewarding aspect of the entire science fair process?
15. How do you envision continuing your project or research beyond the science fair?
16. How have you communicated your project and findings to others, and what has the response been?
17. Has your project led to any new friendships, collaborations, or networking opportunities?
18. What impact did mentorship or guidance have on your project and personal growth?
19. How do you plan to build upon the knowledge you've gained through this project?
20. Looking into the future, how do you think this experience will influence your pursuits in the realm of science?

What should I keep in mind when asking questions to science fair participants?

- **Approach with Curiosity:** Be genuinely interested in their work and encourage them to share more about their projects.
- **Respect and Encouragement:** Remember these are students; frame your questions in a way that acknowledges their effort and motivates them.
- **Non-Technical Language:** If you're not well-versed in technical jargon, ask them to explain their project in layman's terms.

How can I ensure that the questions I ask are appropriate?

- **Avoid Personal Questions:** Stick to inquiries related to their project and avoid sensitive personal topics.
- Ensure questions are **open-ended** to allow the participant to share detailed answers.
- **Affirm their hard work,** regardless of how advanced or simple the project may seem.

What type of questions should I avoid asking?

- Steer clear of overly critical or negative questions that could discourage participants.
- Avoid asking **yes or no questions,** as they tend to stifle conversation.

EDMONTON REGIONAL SCIENCE FAIR

JUDGING RUBRIC

PROJECT # _____

Judge's Name: _____

_____

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

Judge the project in only one of the following categories:

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

If you have difficulty choosing a category Please contact the Division Coordinator

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 / CONCLUSION

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 errors and experimental limitations (e.g. the effect of variables that could not be controlled) were understood 0 1 2 3 4 5

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

PROBLEM / HYPOTHESIS

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 / CONCLUSION

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

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 / HYPOTHESIS

1. Existing knowledge and background research were integrated into the formation of the problem/objective 0 1 2 3 4 5
2. An objective was clearly identified 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 / CONCLUSION

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 than 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

10. The oral presentation was clear, logical and concise 0 1 2 3 4 5
11. Answers to questions were clear and showed significant depth of understanding 0 1 2 3 4 5
12. All required written information including credits, citations and applicable ethics/consent forms were presented 0 1 2 3 4 5
13. 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

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

SECTION 4 TOTAL / 10 _____

5. TOTAL SCORE Add the total scores from Section 1 through 4 and record the final mark here. **TOTAL SCORE / 100 _____**

Words or Phrases for Positive Comments

- Acted confident
- Animation
- Appeared at ease
- Articulate
- Clear
- Coherent
- Colorful
- Communicative
- Confident
- Conversational
- Creative
- Descriptive
- Desire to tell
- Eager to share
- Effective
- Enjoyable
- Enjoyed speaking
- Entertaining
- Enthusiastic
- Exciting
- Expression
- Eye Catching
- Forceful
- Friendly manner
- Gestured
- Humorous
- Impressive
- Informative
- Inspiring
- Instructive
- Interesting
- Lively
- Memorable
- Not memorized
- Original
- Outstanding
- Sincere
- Smiled
- Sparkling
- Stimulating
- Stirring
- Striking
- Think on feet
- Thoughtful
- Thought provoking
- Unique
- Unusual
- Variety of resources
- Vivid
- Well illustrated
- Well informed
- Well organized
- Well planned
- Well prepared
- Well researched

Ways to Say "Very Good"

- You really learned a great deal
- You are an expert on your topic
- Nothing can stop you now.
- You really make this fun.
- That's what I call a great job.
- You must have practiced!
- Right on!
- Fantastic!
- You haven't missed a thing!
- I have learned something today.
- I appreciated that you didn't read your material
- Way to go!
- That's great!
- Sensational!
- Congratulations!
- Excellent research!
- You made history come alive!
- Superb!
- Fabulous
- Obvious that you took great pride in your work!