TOP TEN WAYS TO IMPROVE YOUR SCIENCE PROJECT FOR THE CALGARY YOUTH SCIENCE FAIR

1) Read the Judging Form and use it as a guideline when preparing/revising your project.

- Get a copy of the elementary and/or secondary judging forms from our website (www.cysf.org) at the bottom of the **Project Tips** page (http://cysf.org/science-fair-project-tips.htm). Review them to see what the judges will be looking for when they come and evaluate your project and presentation.
- Evaluate your performance, or have a friend, teacher, or parent evaluate your performance while you do a practice project presentation. This will show you where you need to improve the most**.** Note: A perfect score is not a possible outcome of this evaluation!
- If your project is an experiment, it is important to understand responding (or dependent) versus controlled (or independent) variables. Responding or dependent variables are the things that change (they depend on the conditions at which you run the experiment). Controlled or independent variables do not change; you control them. It is not uncommon for experimenters to realize that what they thought would be a controlled variable is in fact a responding variable. This may make a change of procedure necessary to ensure that a controlled variable is, in fact, controlled. There should be a control sample that is not manipulated in the experiment to serve as a point of reference.
- Sample size should be big enough to ensure the results are valid. The exact sample size depends on the experiment. The experiment should be repeated a minimum of three times to get full marks for number of trials. Variations in results between trials should be thoroughly discussed.
- Summarize your results on graphs. There will likely be one graph that relates most to your hypothesis. This should be emphasized on your backboard and referred to in your presentation.

2) Be sure to include some new ideas/original thought/conclusions that you have come up with as a result of your experimenting, research or study.

- For a project to score well at the science fair, whether it is experimental or non-experimental/research, it must demonstrate that you have done some creative thinking on your own.
- Original experiments, by definition, are creative because you have designed a procedure for testing your hypothesis, and when you have your results, you interpret them and come up with an explanation.

- It is a bit trickier to come up with a non-experimental/research project that includes some creative, new ideas. It is VERY IMPORTANT to include some original scientific ideas in your non-experimental/research project if it is going to be the best it can be for the science fair.
- **Here is an example of how you can make your non-experimental/research project more creative**. Let's say you love cats and you want to research cats. The easy way to do this project is to read some books about cats, do some research on the internet, and then report all of the facts that you learned about cats in your project. Although this is good, a better way to do a non-experimental/research project about cats would be to choose one aspect of cats, such as how fast they run (your question could be: What is the fastest cat in the world?), then choose 10 or 20 different cats from around the world, research how cats run and what the factors are that influence how fast a cat runs, find out how fast each different cat runs, determine which one runs the fastest, and then see if you can come up with your own idea about why the "winner" runs faster than all of the other cats in the world.
- Another creative approach to a non-experimental/research project is to get permission to use the experimental data collected by someone else and then do your own interpretation of the data.
- Non-experimental/research projects are more open ended, and often more difficult to judge than experimental projects. The more you know about your subject, the more you have thought about the relevance of your research, and the more you include your own ideas and interpretations in your project, the easier it will be for the judge to evaluate what you have done.
- You could present your findings in a new and creative way. This might involve the application of your new ideas or using a small experiment to show an aspect of your research project.

3) Review your school fair judges' suggestions and make revisions, if appropriate, to strengthen your project, backboard, or presentation.

- Every project can be improved.
- If your school judges did not indicate any areas for improvement, ask your teacher or science fair co-ordinator for suggestions.
- Make sure that your backboard is self-explanatory, yet contains all of the props that you will need for your presentation.
- The most common problem with backboards is that they contain too much information, in too small a type size. The backboard should not contain all of the text you would print in a written report. Rather, it should contain brief summaries of your concept/question, hypothesis, background, procedure, observations (including graphs), conclusions, and implications. The text should be printed in a large type size that is easy for the judges to read.

- Focus your backboard and your presentation on the portion of the subject matter that relates directly to your hypothesis.

4) Practice making your presentation to your friends, parents, or other relatives so that you are confident on fair day.

- You have from ten to fifteen minutes to make a great impression on a judge.
- The more you practice in advance, the better your presentation will be.
- Most judging teams report that student confidence and presentation quality improves as judging proceeds. Preparation and practise before the fair will increase your self-confidence and improve all of your presentations.

5) Bring your logbook.

- It is best to use a bound notebook for your logbook, although printouts of rough notes from a computer are also acceptable.
- Your logbook should be like a diary: it should include entries for every day you worked on your science fair project.
- Judges will know if your logbook is authentic. Creating a logbook after you have done your work is not good science and is not acceptable.
- The types of information to record in a logbook include: background research, hypothesis, procedure, data collection sheets, tables and graphs summarizing data, observations, conclusions, acknowledgements—in other words, everything a person needs to know to do your experiment the same way you did. In addition, conditions such as temperature, atmospheric pressure, and humidity can affect the results of many experiments. If you think they could affect your results between trials, or your overall result, record them in your logbook.
- Your immediate reactions and observations are important to help reconstruct what you actually did and to keep things clear in your mind. If you jump to a conclusion, write it down, but be prepared to reassess it and even change it, as you gain more knowledge and experience through experimenting.
- Remember to bring your logbook to the fair for the judges to review.

6) Discuss your project with an "expert."

- If you did not discuss your project with an expert before your school fair, make sure you do it before the city fair. The more you know about your subject, the more impressed the judges will be.
- An expert does not have to be a specialist in the exact field of your study. He or she may be a parent with a strong science background, a teacher with a keen interest in science, or a neighbour or family friend who works in the broad discipline of your study. An expert may suggest that you investigate related topics that you didn't think of yourself.

- We encourage parents to be involved in students' science fair projects, but students should do the work themselves where it is safe and practical to do so. Sometimes by looking at a project, judges think there may have been too much hands-on parental input. We encourage judges to have an open mind and not to pre-judge projects—the work of many students is truly amazing. Judges will use a student's depth of knowledge of the subject and intimate details of the experiment to assess whether there was too much parental involvement.

7) Be curious and think about where your project fits into the "big picture."

- To really impress the judges, demonstrate a thorough knowledge of your subject matter by relating your project to recent world events, the context or history of the experiment (if it is a classic experiment with a minor change), or how it might change life on earth in the next millennium.
- You can also impress the judges by talking about what industrial or academic research/experimentation is presently happening in your field in Canada, the USA, or other countries.
- How well you relate your project to the "big picture" really sticks in the judges' minds when they are discussing and marking your project later.

8) Remember to relate your conclusions to your hypothesis.

- Your hypothesis should provide the focus for all of the activities surrounding your project. This will help you to stay on topic.
- In an experimental project, your controlled and manipulated variables, procedures, observations, and graphs should all be related to your hypothesis.
- **For example**, when testing growth rates of sunflowers, a student predicts that plants receiving the most hours of light per day will grow fastest, the conclusion will relate to the hypothesis if it reads something like: "My experiment shows that sunflowers receiving the most hours of light per day grew the fastest. Sunflowers receiving 10 hours of sunlight per day grew twice as fast as those receiving only 5 hours of sunlight per day." If, using the same example, a student concludes that "The plant grown hydroponically grew the fastest," a judge will see immediately that the conclusion does not relate directly to the hypothesis and that the student likely manipulated more than one variable. In this example it would seem that in addition to testing how the number of daylight hours affects the growth rate in sunflowers, the student has also tested how the medium for growing sunflowers (hydroponics vs. no hydroponics) affects the growth rate. These two experiments should have been conducted separately and the results reported separately, and then contrasted. There would be two hypotheses presented and two conclusions. The hypotheses could have read, "The plants receiving the most hours of light will grow fastest." and "The plants grown hydroponically will grow fastest." And the

conclusions might have been: “The plants grown hydroponically grow faster than those grown using a traditional soil medium.”, AND “The plants receiving the most hours of sunlight a day grow the fastest.”

9) Focus on your subject and on the judge to whom you are presenting.

- You will make your presentation to at least three individual judges.
- Use good presentation skills when explaining your project to the judges. This results in good communication that will impress the judges and help them do a better job of evaluating your project.
- Be polite; introduce yourself and your partner (if appropriate). Speak with confidence—you are the expert on your project. Use a pointer. Don’t fidget with the pointer or anything else.
- Try and use your backboard as a cue card for your presentation; a well-organized and clear backboard will provide the cues you need so you can more fully explain each aspect of your project in a logical order.
- There will be a lot of activity around your project area. Do not be distracted or act as if you would rather be somewhere else.

10) Smile and relax.

- We want you to have a fun, memorable day at the Calgary Youth Science Fair.