Lambton County Science Fair 2017

Lambton College
Friday, April 7th and Saturday, April 8th

Information Booklet

2017 LAMBTON COUNTY SCIENCE FAIR

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INTRODUCTION

For over 43 years the Lambton County Science Fair (LCSF) has provided an opportunity for students in Lambton County to engage in inquiry-based science and technology projects.

The Lambton County Science Fair is an annual two-day fair for students from Grades 3 to 12.
Students in Grades 3 to 5 compete in the Exhibition Category, students in Grades 6 to 8 compete in the Junior Category, students in Grades 9 to 10 compete in the Intermediate Category, and students in Grades 11 and 12 compete in the Senior Category. Only students that are in Grade 7-12 are eligible to participate in the Canada Wide Science Fair in May. LCSF has been sending 5 finalists to the Canada Wide Science Fair due to the generous donations of our sponsors.

The Lambton County Science Fair is a non-profit, registered charitable organization. LCSF relies on local industries and businesses, Lambton College, the Lambton Kent District School Board, the St. Clair Catholic District School Board, as well as dedicated individuals, parents and teachers for support.

The 2017 Lambton County Science Fair will be held at Lambton College in Sarnia on April 7-8.

INFORMATION FOR TEACHERS

Parallels for the Science Fair entry categories and the Ontario Curricula for Grades 1-8 and Grades 9 and10 are indicated below.

The Ontario Curriculum Grades 1-8 states that a goal for students is:
- To develop the skills, strategies, and habits of mind required for scientific inquiry and technical design. In the Specific Expectations for grades 5 to 8 numerous references to the scientific methods embodied in the Science Fair project can be found in each of the 5 strands.

The Ontario Curriculum Grades 9 and 10 also states that a goal for a student is:
- To develop the skills, strategies, and habits of mind required for scientific inquiry. References also exist in the Specific Expectations for each of the 4 strands which support the Science Fair concept.

INFORMATION FOR STUDENTS

Eligibility

1. To be eligible to participate in the Lambton County Science Fair, a student must currently be registered and attending class in Grades 3 to 12 in a Public, Catholic, French Language, or private school. Home-schooled students living in Lambton County are also eligible.

2. Regional Science Fair entrants are NOT required to participate in a School Science Fair and may enter the Regional Science Fair independently.

3. There is a $5.00 entry fee per student that is due upon registration at the Science Fair on April 7.

   Note: ***Students in grades 3-6 do not have to pay the registration fee.***

Project Categories

Exhibition	- Grades 3 - 5 (Not eligible to compete in the Canada Wide Science Fair)
Junior	- Grades 6 – 8 (Grade 6 students are also not eligible to compete at CWSF)
Intermediate	- Grades 9 and 10
Senior	- Grades 11 and 12

Project Divisions

Engineering and Computing Sciences

a) An engineering or computing sciences project applies physical knowledge to solve a problem or achieve a purpose, or deals with computing or an innovative software or hardware design.

b) Although a complete engineering project will include an outline of the need, the development of the innovation and some work on introducing the innovation to the community, many projects focus on just the development phase.

c) Engineering projects normally focus on a new process, or a new product. A study of Bernoulli's principle would be Physical Science, while the application of such a principle to improved aerodynamics and wing design would be engineering.

d) Computing science projects are applied science and technology projects that concentrate primarily on the development of computer equipment or programs. They focus on computers, their languages, their software, databases and their function. Projects using computers to store and handle data are normally entered in the division suggested by the nature of the data. However, if the project is more focused on technique using the computer to accomplish this task and the data are of secondary significance, the project should be entered in this division

Physical and Mathematical Sciences

a) A physical and mathematical sciences project studies abiotic phenomenon to understand the relation between identified factors, perhaps including a cause and effect relationship, or the use of mathematical models or mathematics to solve theoretical problems.

b) Physical science projects include fields such as physics, and chemistry and astronomy. Comparison testing of products is included in this division. Some projects entered as physical science may be more accurately entered as engineering. For example, experimenting to find "Which materials best absorb oil?" is physical science, though there is an implied application of the results. On the other hand, for a project investigating, "Which materials best absorb oil from an oil spill?" the emphasis is on an application and would normally be classified as engineering.

c) Mathematical science projects seek to demonstrate applications of mathematics (i.e. the search for a mathematical model) or to solve a theoretical problem. For example, in attempting to predict the shape of cacti, the use of mathematics would be central to the project. The problem provides a context for the exploration of pattern and the search for a mathematical model. Some areas of investigation in this category include algorithms, operational research (applications of mathematical and computing science to solve planning or operational problems), and statistics.

Earth and Environmental Sciences

a) An earth and environmental sciences project focuses on a topic relating to planetary processes, the relationship of organisms to those processes, or the relationships between or among organisms.

b) Projects in this division can include issues in any of the following scientific disciplines: geology, mineralogy, physiography, oceanography, limnology, climatology, seismology, geography, and ecology. Earth and environmental science includes the study of pollution, its sources and its control. It can also involve studies of biotic and/or abiotic factors in an environment, where such studies enhance our understanding of biological relationships and abiotic cycles.

c) Studies dealing with resource management or sustainable development would usually fall into this category. Examples of such studies might include capture/recapture studies for estimation of population densities, determination of bioproductivity in a specific ecosystem or niche, studies of plate tectonics and examination of mineral cycles (e.g., salt mills in the oceans).

Life Sciences

Note: At the Lambton County Science Fair, the Life Sciences category incorporates projects that would be classified by the Canada Wide Science Fair as part of Life Sciences, Health Sciences and/or Biotechnology projects.

a) A life science project examines some aspect of the life or lifestyle of a non-human organism.

b) Life science projects include botany and zoology, as well as psychology and kinesiology of non-human organisms. Examining plant growth or animal behaviour are examples of life science. Some phenomena, such as digestion, involve both life science and physical science. The selection of division will spend on whether the young scientist's intent was to study the chemistry of the process, or the role of the process in the life of the animal (eating, production of enzymes, handling of wastes, etc.)

c) A health sciences project examines some biomedical and/or clinical aspect of human life or lifestyle and its translation into improved health for humans, or more effective health services and products. Projects related to the health of specific populations, societal and cultural dimensions of health, and environmental influences on health are also included in this division.

d) Health sciences projects include those related to human aging, genetics, cancer research, musculoskeletal health, arthritis, circulatory and respiratory health, nutrition, neurosciences, mental health, psychology, metabolism, human development, infection and immunology.

e) Projects involving animal research that have a direct application to humans are included in this division.

f) A biotechnology project involves the application of knowledge of biological systems to solve a problem, create a product or provide a service. Biotechnology projects generally fall into one of four fields: crop development, animal science, genomics, and microbials.

(i) Crop development projects focus on plants that are involved in agricultural, horticultural or silvicultural (forestry) production. Projects in this area may investigate problems of herbicide tolerance, spacing, cultivation, irrigation, effect of soil variation, hybridization, etc.

(ii) Animal science projects pertain to animals involved in agriculture and aquaculture, those domesticated as pets, or for sport, as well as projects where humans are participating in wild animals' lives, perhaps through habitat revitalization, population management, or harvesting. Possible topics include enhancement of animal production, reproductive technologies, genetics and transgenics, animal health, housing, training and interactions. Most animal science projects will be of the study type. Experiments on vertebrates by pre-university students demand careful planning and pre-authorization and must satisfy the YSF Canada rules that govern the use of animals.

(iii) Genomics projects focus on deciphering and understanding the genetic information content of an organism. Genomics differs from classical biological research in its large scale, broad scope and intense reliance on data collection, analysis and information technology (bioinformatics). Proteomics, the study of proteins - their location, structure and function, is part of the wider study of genomics.

(iv) Microbial projects consider how microbials affect productivity in agriculture, horticulture and forestry. Possible topics include plant growth-promoting rhizobacteria, biological weed and fungal control, bio-fuel cells, etc.

(g) Projects that focus on the acquisition of knowledge about how something lives are categorized as Life Science, not Biotechnology. The distinction is similar to that between Physical Science projects and Engineering projects; in both cases projects in the latter division deal with an application of knowledge to solve a problem. Often the discriminating factor is in the finalist's conceptualization of the project. There will be situations where the choice is not clear.

Interdisciplinary Projects

Many projects are interdisciplinary and therefore, seem to fit into more than one division. The finalist(s) must choose only one of the divisions. This decision should be based on the subject area in which the finalist is most knowledgeable and best able to communicate their knowledge to the judge. Through the interview process, judges look for both depth and breadth in all projects and are encouraged to consult with other judges when a project incorporates another field outside their area of expertise.

At the LCSF, we try to respect the selection of the project division that was made by the student(s); however the final decision regarding the division placement rests with the Chief Judge. The Chief Judge and/or Registration Committee may recommend a change of division to allow for the fairest adjudication of the finalists' work.

Types of Projects

The judging of “scientific thought” requires special attention since a variety of different types of projects exist. The most common types of science fair projects are experiments, studies and innovations. Projects of each type are equally capable of winning top awards at the fair, providing they meet the necessary criteria.

Experiment:

- an investigation undertaken to test a specific hypothesis.

Study:

- a collection and analysis of data to reveal evidence of a fact, situation or pattern of scientific interest. It could include a study of cause and effect relationships or theoretical investigations of scientific data.

Innovation/Invention:

- the development and evaluation of innovative devices, models, techniques or approaches in technology, engineering, or computers.

GETTING STARTED

Here is what you should do once you have chosen your topic.

Step 1: Research your Topic
Read books from the library; observe related events; gather existing information; look for unexplained or unexpected results. Talk to professionals; write to companies; and obtain or construct needed equipment.

Step 2: Organize and Theorize
Organize your research. Narrow down your hypothesis by focusing on a particular idea.

Step 3: Make a Timetable
Choose a topic that can be done in the amount of time you have. Identify important dates. Allow plenty of time to experiment and collect data. Leave time to write a paper and put together an exhibit.

Step 4: Plan your Experiment, Study or Innovation
Write a research plan to explain how you will do your experiment.

Step 5: Consult your Teacher/Supervisor
Discuss your work with an adult supervisor on an ongoing basis.

Step 6: Conduct Your Experiments, Study or Innovation
Keep detailed notes of every experiment, measurement and observation. Change only one variable at a time when experimenting. Include control experiments in which none of the variables are changed. Include sufficient numbers of test subjects in both control and experimental groups.

Step 7: Examine Your Results
When you complete your experiments, examine and organize your findings. Did your experiment give you the expected results? Was your experiment performed with the exact same steps each time? Are there other causes that you had not considered or observed? Were there errors in your observations? If possible, analyze your data statistically.

Step 8: Draw Conclusions
Which variables are important? Did you collect enough data? Do you need to conduct more experimentation?

HELPFUL HINTS

- Your title should be simple and represent your research accurately.
- If elements of your project cannot be safely exhibited at the fair, incorporate photographs of important phases of your experiment to use in your display.
- Your display should be presented logically and be easy to read. When you arrange your display, imagine you are seeing it for the first time.
- Make your display stand out. Use neat, colourful headings, charts and graphs.
- Homemade equipment, construction paper and coloured markers are excellent for project displays. Pay special attention to the labelling of graphs, charts, diagrams and tables.
- Be sure to adhere to the size limitations and safety rules when displaying your project.
- Make sure your display is sturdy.

A project idea list can be found at www.lambtoncountysciencefair.ca.

NATURE OF THE PROJECT

There are three essential components to a good science fair project.

1. Investigation and Design

Having selected your topic, follow the eight steps out-lined in the Getting Started section of this booklet. For entry into the science fair, determine how to best classify your project based on project category and project division. Consult with your teacher and the chair of your regional fair and follow the information from pages 5 to 8 of this booklet to make these decisions.

2. Written Materials

A science fair project requires the following written materials.

Abstract:

An abstract is written once your research and experimentation are complete. It should include a statement of the problem/purpose of the experiment, the procedures used, your data and your conclusions. For the Lambton County Science Fair, your abstract must not exceed 150 words. Abstracts are distributed to the judges to familiarize them with the project.

Project Data Book:

A project data book should contain accurate and detailed notes to demonstrate consistency and thoroughness to the judges and to assist you with your research paper.

Project Report:

A project report is typed. The text shall be in 12 point Times, Arial or equivalent type, double-spaced with margins of 1 inch all around. The Project Report has a maximum of five letter-sized (8.5” x 11” pages). Appendices may be used to include charts, diagrams, etc.) The Project Report includes the following:

1. **Title Page:**
   Centre the project title and put your name, address, school and grade at the bottom right.

2. **Table of Contents:**
   Include a page number for the beginning of each section.

3. **Introduction:**
   An explanation of what prompted your research and what you hoped to achieve.

4. **Purpose, Questions, Problem:**
   Make a brief statement about your investigation. This can be written as a question.

5. **Hypothesis**:
Write the hypothesis. Remember this is your "educated guess," based on your previous knowledge and the research you completed.

6. **Materials:**
Make a detail list of the materials used. These include consumables (e.g., water, paper towels). Be specific about the sizes and quantities. These also include non-consumables (e.g., test tube, beaker)

7. **Procedure:**
Describe in detail the methodology used to collect your data. Include enough information for someone to repeat the experiment. Remember to write this in numbered steps, past tense, and passive voice.

8. **Observations / Results:**
Present your observations and results in a form that is easily understood. The data should be in tables, graphs, or illustrations, each with a title. Include any calculations that are used. The results of the calculations can be shown in a table. Include detailed photographs or drawings.

9. **Discussion**:
Thoroughly discuss exactly what you did in your project. Your results should be compared with theoretical values, published data, commonly held beliefs and/or expected results. A discussion of possible errors should be included as well as how the data varied between repeated observations, how your results were affected by uncontrolled events, what you would do differently if you repeated the project and what other experiments should be conducted.

10. **Conclusion:**
A summary of your results.

11. **Acknowledgements:**
Credit individuals, businesses and educational or research institutions which assisted you. Identify financial support or in-kind donations.

11. **References:**
Always cite your resources. List any documentation that is not your own (i.e., books, journal, articles). Failing to do so is considered plagiarism. It is unethical and illegal.

3. Display

The project should attract and inform, be easy to assess the study and results and make the most use of space with clear and concise displays. Displays must conform to the official Canada-Wide Science Fair maximum-size restrictions: 1.2 metres wide; 0.8 metres deep; 3.5 metres high from the floor. The display should include headings that stand out, posters containing written material and charts, clearly drawn and correctly labelled graphs and diagrams and some of the apparatus used so that key aspects of the project can be demonstrated.

Backboard
Backboards are an essential element for display of projects. They can be purchased or constructed. They must be self-supporting, light weight, and easy to assemble and disassemble.

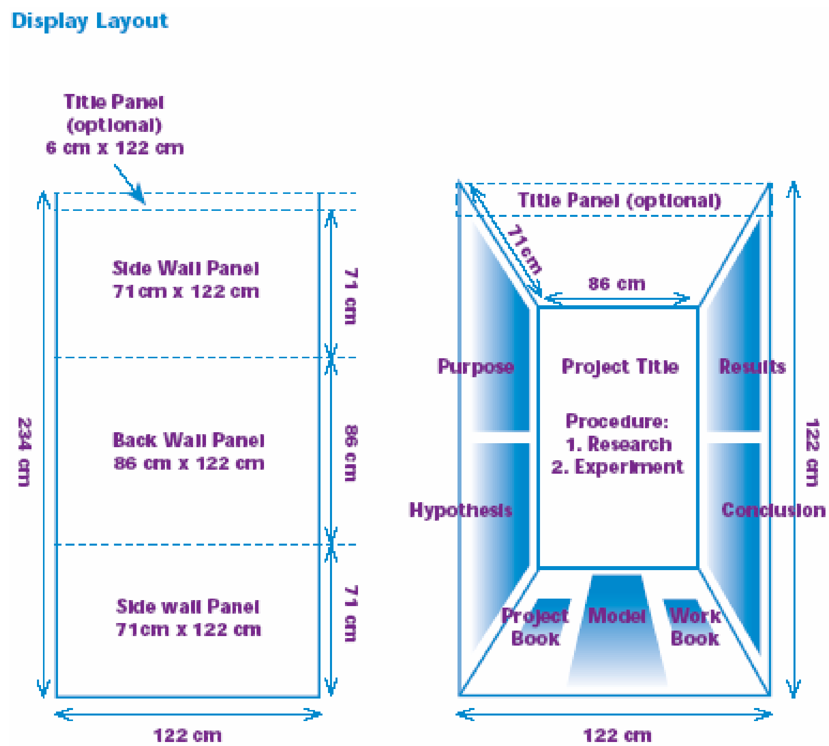
Additional backboard suggestions:
• Avoid overlapping sheets of paper.

A display cannot…

- Display live vertebrates, live or dead plant life, flammable, corrosive, caustic, radioactive or toxic substances
- Display dangerous biological materials or unsealed biological samples, petri dishes, etc.
- Have open liquids
- Display gases under pressure without release valves
- Have open flames
- Have uncovered drive belts
- Have uninsulated electrical wires, cables or uncovered electrical circuits
- Be constructed of unapproved materials or use unapproved electrical equipment
- Be larger than the dimensions shown or unstable
- Contain photographs of people unless written consent has been obtained.

Important!!!

- If hazardous materials or vertebrates were used, then a qualified person must have supervised the experiments
- No procedures can cause harm or distress to animals
- Power cords must have 3 wire grounded connections
- No lasers are operated during public display
- X-ray or other high energy radiation sources must be registered and approved by provincial authorities
- No manipulation of recombinant DNA or animal viruses



Maximum Dimension for Projects at the Canada Wide Science Fair:

Front to Back:	80 cm
Side to Side:	120 cm (4 feet)
Height from Floor:	350 cm (10 feet)

SAFETY REGULATONS

There are strict safety requirements that must be adhered to at all times. Safety requirements are constantly being reviewed and updated. Please refer to the Lambton County Science Fair 2017 Project Display and Safety Regulations at **www.lambtoncountysciencefair.ca** for complete and up-to-date safety information and regulations.

All participants must pass a safety inspection. Component(s) of a project or project in violation of safety regulations will be removed.

Projects that create the risk of harm for the student or others must be appropriately supervised ie.projects using firearms, ammunition, explosives, flammables or projectiles.

ETHICAL REQUIREMENTS

Projects involving the participation of humans or the use of animals and where there is non-trivial risk require ethical approval from the project supervisor before experimentation is started. All projects under consideration for Canada Wide Science Fair must comply with ethical standards Youth Science Foundation of Canada.

AWARDS

See www.lambtoncountysciencefair.ca for a detailed list of awards.

FOR MORE INFORMATION CONTACT:

Registration Liaison: **Ashley Murray**
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ENTRY FORMS AND DEADLINES

Information packages will be sent to all schools in November and January.

All students are to register on-line at www.lambtoncountysciencefair.ca.

Entry deadline is Monday, April 3th, 2017 by 5p.m.