Teacher-Advisor Manual

Introduction

The Waterloo-Wellington Science and Engineering Fair is a non-profit registered charity that operates the regional science fair. We are affiliated with Youth Science Canada and are entitled to send some of our best projects to the Canada-Wide Science Fair. Some of the best projects from the Canada-Wide Science Fair are given the opportunity to participate in the Intel International Science and Engineering Fair the following year. Over the past years, several of our students have been part of Team Canada at the ISEF.

This manual, we hope, will make life easier as you go through the process of creating scientific opportunities for your student(s).

Rules and regulations located in the “Fair Manual” should be read before beginning research.

If you find errors in this manual, please bring them to our attention.
Email Jim Forsyth *jimphyllis@sympatico.ca*

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NOTE: Other downloadable “Manuals” available on our website: - Project Creation Manual
- Fair Day Manual

Registration

Contacting the Registrar - William Proctor 519-570-2119, email: *wj.proctor@sympatico.ca*

General Information

- The school contact, usually the teacher involved, begins the registration procedure. (see below)
- Each exhibitor or group of exhibitors should read and/or print the registration procedures (see below) before beginning to register.
- Check the participant's eligibility (see the Fair Manual on the website) before beginning registration.
- Each entrant and any supervising teacher/parent must verify that the exhibit meets all the rules and regulations of the Fair. (see the Fair Manual on the website)
- Exhibits arriving at the Fair that do not meet rules and regulations may be disqualified.
- Each exhibitor or group of exhibitors (maximum of two) must fully complete the online registration form to participate in the Fair.

The completed application must be received by the registrar (see above) by the date shown on the online registration page.
Incomplete or late application forms may not be accepted.

School Sponsored Entries

Generally young researchers develop science fair projects as part of a school activity (class or science club) with teacher support and apply for the regional WWSEF through their school.

Individual Entries

Researchers working on science fair projects independently (i.e. home-schooled or attending schools with no science fair activity) may apply directly to the Registrar (see above) to participate in the fair.
Before beginning work on a research project these prospective participants should have contacted the Registrar **prior to February 1.**

Participation Formula

Schools of different sizes are allowed to apply for at least five (5), but no more than twenty (20), science fair entries depending upon their eligible population (number of grade 7 to 12 students) and the number of different grade categories covered by the school. See chart below.

Maximum Number of Projects by Number of Categories.			
Eligible Population	One Category	Two Categories	Three Categories
1-200	8	9	11
201-400	10	11	13
401-999	11	13	15
1000+	14	16	18

Maximum Number of Projects: Add two to the above quotas if the school holds some form of local fair or judging to select some of the projects for the WWSEF from all those created in the school

Note: "**Eligible Population**" refers to students in the **three WWSEF Categories:**

Junior	Grades seven and eight
Intermediate	Grades nine and ten
Senior	Above grade ten

For example - a three category school would have students in all grades from seven to twelve, while a one category school might only have students in grades seven, eight or both.

Registration Fee ---- $15.00 per entrant.

The registration fee of $15 per entrant must accompany the completed Signature Pages and is to be received by the Registrar no later than the date indicated on the registration web page.
The fee is non-refundable.
Cheques should be made payable to the ***"Waterloo-Wellington Science and Engineering Fair"***.

WWSEF reserves the right to further limit the number of exhibits that may be accepted from each school. In this instance only, will the registration fee be refunded for those entrants in excess of a revised limit.

Any questions regarding registration procedures should be directed to the Registrar (see Page 1)

Online Registration Procedure – Student Participants

Before completing the online registration application procedure for the Waterloo-Wellington Science & Engineering Fair (WWSEF) you need to have read and understand the rules and regulations of the Fair as provided in the Fair Manual on the WWSEF website.

In order to register you will need the Registration Number that was sent to you via email. If you are part of a team project you will share the registration number with your partner and should complete the online registration collaboratively.

1) If necessary, enter the WWSEF Registration website Home Page.
2) Click on *Participant Registration.*
3) Enter your email address (or name if it is being used in place of an email address) and your registration number.

A screen will appear with a number of Registration Items in a table. You must enter the required information in each section. All fields marked with a red asterisk are mandatory. Additional instructions for each section are provided below.

Student Information

- NB! If you are part of a team project be sure to indicate that the number of students involved in the project is "2". When this is done a section for Student 2 Details will appear.
- Enter the personal information for each student.
- **Note**: In the Medical Alert field include any allergies, medical conditions or use of medical equipment such as epi-pens or inhalers of which the fair organizers should be aware. OHIP #?
- **Note**: In the Special Food Requirements field list any food allergies or restrictions.

Emergency Contact Information

- Enter the emergency contact information for each student.

Project Information

- Enter the details about your project in the appropriate fields.
- If you are unsure of the appropriate Division for your project review the information in the Project Creation Manual on the WWSEF website OR click on the Division Selector on the screen.
- Table Required – A standard display space on a table, sufficient to hold the maximum display size allowed for a project is provided for each project. In some cases exhibitors construct their display such that it sits on the floor; only in this case should you select "No" under Table Requirements.
- Electricity Required – If you require electricity for your project select "Yes" and one standard outlet will be provided.

• Summary/Written Report: This is an important part of your project and accounts for 5% of your overall mark. The first line of your report should be the title and the second line should be your name(s) and school. Leave one blank line and then enter your report. (It can be cut and pasted from MS Word.). The maximum number of words permitted is 600. Detailed requirements are provided on the WWSEF website in the Project Creation Manual.

Mentor Information

A mentor is generally an older person who provides significant guidance in the development of your project and/or the related experimentation. For example, a mentor may be a teacher, other than your regular teacher, graduate student, university professor, engineer, medical professional, etc. who helped you understand a challenging concept, supplied and gave instruction on the use of a specialized piece of equipment or provided access to a laboratory, and supervised work you did there. Your regular teacher who provided instruction, support and guidance as part of regular classroom work or a parent who provided materials and minor assistance would not be considered a mentor. Think of a mentor as a coach, someone with specialized skills or knowledge who assists you in developing your own abilities and/or extending your own knowledge and understanding.

• Indicate the number of mentors that assisted you. If you indicate one or more mentors additional fields will appear.
• Complete the required information for each mentor.

Safety Information

• Follow the on-screen instructions and respond to all statements.

Double Check Your Name

• Read and follow all of the on-screen instructions. If this is a team project it is important that your partner also check his or her name as instructed.

Signature Page

• This page is only accessible once all of the sections above are complete.
• Specific instructions are on the page.

Signature Page Received

• Once the signed signature page and registration fee has been received by the registrar this section will be set to complete.

Categories, Divisions & Types

FIRST **The Science fair projects are divided by Category into:**

Junior Category:	Grades 7 and 8.
Intermediate Category:	Grades 9 and 10.
Senior Category:	Grades 11 and 12

SECOND **The projects in each Category are put into one of five Divisions:**

Biotechnology:

Biotechnology is the application of knowledge of biological systems to solve a problem, create a product or provide a service. Biotechnology projects will fall into one of these three subject fields:

Crop Development projects deal with plants that are involved in agricultural, horticultural or silviculture (forestry production. Projects in this area may investigate problems of herbicide tolerance, spacing, cultivation, irrigation, effect of soil variation, hybridization, etc

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. All projects involving animals demand careful planning with respect to YSF Canada regulations.

Possible topics include enhancement of animal production, reproductive technologies, genetics and transgenics, animal health, housing, training and interactions

Microbial projects consider how microbials affect productivity in agriculture, horticulture and forestry. Possible topics include growth-promoting rhizobacteria, biological weed and fungal control, bio-fuels, etc

Earth and Environmental Science:

An Earth and Environmental Science Project examines properties of a planet, not necessarily Earth. Projects may also have aspects of life science or physical science. The distinguishing feature for Earth Science is the intention of the student(s) doing the project. Projects dealing with weather, geology, soil science, astronomy, oceanography, erosion, flooding, tectonics, and earthquakes should be entered in this division.

Engineering:

Any topic in applied science, using electricity and magnetism, robots, pulleys, gears, rocketry, solar energy, lasers, aeronautics, structures, chemical processes to achieve a purpose, development of computer hardware, software or applications, etc. are Engineering.

Life Science:

Projects dealing with living organisms, factors affecting growth, etc., whether biology or social science, are Life Science. These projects are more general in scope than biotechnology. Projects, which focus on the acquisition of knowledge about how something lives, should be registered as Life Science, not Biotechnology.

Physical and Mathematical Science:

Studies of chemical or physical phenomena, optics, colour and sound, radiation, comparison of similar products, corrosion, and studies in mathematics are examples of projects in this division. These projects are more general than engineering.

Note : Many projects contain elements of two or more divisions. The stated purpose or hypothesis of the project may be the best indicator of the exhibitor's thinking, and indicate into which division a project should be registered.

THIRD: For each division there are three different types of project

An Experiment:
This is the most common type of project. A gold award project of this type should involve an original scientific experiment that recognizes and controls all significant variables and demonstrates excellent collection, analysis, and presentation of data. Significant positive findings are not essential to achieve a successful experiment. Design is more important than results

An Innovation:
This type of project would involve the development and evaluation of new devices, models, techniques or approaches in fields such as technology, engineering, and computers. A computer innovation may involve software or hardware. A gold award project should integrate several technologies, innovations, or designs; or construct an original system that will have commercial application or benefit society. It must demonstrate development and design based on sound understanding of scientific, engineering, or technological principles.

A Study:
This type of project involves the collection and analysis of data from other sources. Its intent is to reveal evidence of a fact or a situation of scientific interest. This could include cause and effect relationships, in-depth studies, or theoretical investigations of scientific data. A gold award exhibit in this area must demonstrate sound scientific techniques for data collection and show evidences of analysis with insight.

Note: If the exhibitor classifies the project as the wrong Type, no penalty will be assessed. The judges will assess the proper project Type so that the project will receive the fairest possible judging.

Notes on the distinctions between divisions:

Physical Science, Earth Science or Life Science?
A project examining the formation of acid rain would be Physical Science. One that studies its effects on soil nutrients, perhaps using plants or micro-organisms as indicators of leaching, would be Earth Science, but one that investigates the consequential effect on micro-organisms and plants would be Life Science.

Earth Science or Life Science?
A project dealing with the meteorological features of a Chinook would be placed in Earth Science, but one studying the effects of a Chinook on living organisms would be placed in Life Science.

Physical Science or Life Science?
A project investigating the factors affecting bubble gum bubble size (time, brand, etc.) would be a Physical Science project, even though some factors to be considered (chewing and enzymes in saliva) are biotic. If the focus was on the effect of chewing and saliva as a digestive process, using gum as an indicator, it would be a Life Science project.

Physical Science or Engineering?

A project examining the variables involved in Bernoulli's Principle would be entered as Physical Science. Designing wings, sails or other devices, which use the principle, would be Engineering.

Measuring solar energy would be Physical Science whereas using it would be Engineering. Similarly, comparing the effectiveness of sunscreens would be a Physical Science project while formulating a new one would be Engineering.

Comparing the properties of papers, even home-made, would be Physical Science while attempting to design a particular paper, or a new method for making the paper, would be Engineering.

Physical Science, Engineering or Life Science?

A project, which examines and/or compares the physical properties of materials, which absorb oil, would be placed in Physical Science.

A project, which developed a new material or a method, to clean up oil spills would be Engineering.

A project dealing with the effect of an oil spill on flora or fauna would be a Life Science project.

Biotechnology or Life Science?

Determining the optimum conditions for raising earthworms would be Life Science but designing a vermicarium would be Biotechnology.

A project, which examines the growth of weeds in a garden, would be Life Science, while one that measures the effects of weeding a garden, versus not weeding, would be Biotechnology.

Observing your dog's reaction to doorbell rings, telephone rings or smoke detector alarms would be Life Science, while training a dog to respond to the telephone to help a hard-of-hearing person, would be Biotechnology.

Sample Time Line for A School Science Fair (and students preparing for the WWSEF)

	School Fair Organization	Student(s) Project Development
Six to five Months Prior	1. Get administrative permission and support. 2. Get a few teachers to help support your efforts. 3. Get support of English, Art, P.E., Math Teachers and Librarian. 4. Set dates for school fair. Remember if you wish to enter the regional fair, your process must be completed prior to the March break. 5. Prepare a student information booklet. It might include material such as: time lines, how to choose a topic, rules and regulations, evaluation criteria, project check points, project levels, plus additional material as needed. 6. Reserve space for school fair. (Gymnasium, Library, etc.) 7. Order extra tables and/or chairs. 8. Investigate sources for judges (professionals, parents, secondary school science teachers and/or students.)	1. Inform students of school science fair and WWSEF dates. 2. Encourage students to think about possible areas of investigation. (Topics) 3. Inform students of evaluation criteria and how projects will enter into term assessment. 4. Inform students of due dates. 5. Distribute the student information booklet. Students working on their own can find information on time lines, how to choose a topic, rules and regulations, evaluation criteria, and project levels in this website.

	School Fair Organization	Student(s) Project Development
Four to Three Months Prior	1. Obtain slides, videotapes, etc., of previous school Science Fair Projects. The WWSEF website has pictures and reports from students who have been to the Canada-Wide Science Fair in the past. There may be other information available from the General Inquiries person on the website contact page. 2. Reserve library and teacher-librarian for topic research and information gathering. 3. Assist students with equipment needs and supplies. 4. Send out letters to judges outlining date, time, location, task, scoring information. Judges may have to cancel at the last minute.	1. Describe typical science fair projects: o display - collection o demonstration (demo of scientific principle) o experimental (slides and video tapes of previous science fair projects) o innovation o study (field study) 2. Review rules and point system for judging. 3. Review maximum dimensions allowed. Show how a typical display is set up. 4. Since judges expect students to understand and explain their project, emphasize that most of the work in the project must be their own, and that judges are looking for what the students have done.

	School Fair Organization	Student(s) Project Development
Three to one Month Prior	1. Continue to monitor the development of plans for the fair: arrangements for the fair location, acquisitions of tables and chairs, volunteers to assist with set up and take down, recruitment of judges, etc.	1. Assist students with the ongoing development of their projects. 2. Continue to remind students of the importance of maintaining a notebook or logbook, detailing all steps in the project development, including things that didn't work. 3. Continue to monitor student understanding and adherence to all rules and regulations.

	School Fair Organization	Student(s) Project Development
One Month Prior	1. Create a floor plan of the exhibit area (note electrical outlets and table locations). 2. Send invitations to parents, other schools and the public to visit the Science Fair (school newsletter). 3. Reserve a location for judges to meet. 4. Invite those who have assisted you or the students to visit the Fair.	1. Ensure students are progressing so that projects will be completed on time. 2. Work on project summary and display should have begun. 3. Provide sample student Science Fair project summaries, review and discuss summary and display guidelines, provide assistance as needed.

	School Fair Organization	Student(s) Project Development
One Week Prior	1. Inform staff of expected timetable interruptions. 2. Finalize organization re assistance of others to help with set- up, supervision, etc. 3. Confirmation of judges. 4. Arrange for coffee, tea, snacks, etc. for judges. 5. Assign students their Science Fair project numbers and make a list of project titles and other details. (i.e. electrical, special requirements). 6. Review the process for set-up, judging, viewing and clean up.	1. Check status of students' projects. 2. Some schools have the project summary due a week or so prior to the school fair. These are then judged separately by the teacher or one of the volunteer judges. 3. Assist students with project display details. 4. Review techniques, skills needed for interview process during judging.

	School Fair Organization	Student(s) Project Development
Day of the School Fair	1. Assist students with project set up. 2. Perform Safety Rules check and allow for final project adjustments. 3. Meet with judges about a half hour prior judging. Review judging criteria. 4. Assist judges as needed during judging process. 5. Oversee selection of students for participation in regional fair. 6. Gather judging sheets to assist with project assessment for term mark. 7. Announce results of judging of the projects. The regional WWSEF reverses steps 7 and 8 so that spectators don't just look at the "best" projects. 8. Oversee open house or parent/public viewing time of projects. 9. Supervise dismantling of projects and clean up of display area	1. Have students carefully set up projects then make any necessary adjustments as a result of Safety and Rules check. 2. Encourage students to observe other projects to get ideas for future projects or displays. 3. Have students participate in a self-evaluation and/or peer- evaluation of the Science Fair projects. 4. Oversee students during judging process. 5. Assist students during dismantling of projects and clean up. Ensure project and display materials for projects selected for regional fair are not damaged.

	School Fair Organization	Student(s) Project Development
Days/Weeks Following the School Fair	1. Write appreciation notes to staff, judges, others. 2. Return all material borrowed. 3. Evaluate process, note revisions and changes. Set up a file for next year. 4. Provide WWSEF information to parent/guardian; obtain parent/guardian permission for inclusion in the WWSEF. 5. Register online for projects to be in the WWSEF. (see website for info, or download the Fair Operation Manual from the website. 6. Encourage staff, parents, judges, etc. to visit the WWSEF. 7. Announce science fair results in school newsletter. The local newspapers are often interested in science fair results. The more publicity the better.	1. Have students write appreciation notes to those who have assisted with their projects. 2. Students should evaluate the process they followed in developing their projects. 3. Students selected for the regional fair should continue to refine and modify their project based on feedback from the school fair judging. Some students do very extensive revision and up grading.

INSERT SCHOOL LETTERHEAD

INSERT DATE

Dear Parent or Guardian,

Your son or daughter has been selected to participate in the INSERT YEAR Waterloo-Wellington Science and Engineering Fair (WWSEF). The WWSEF is one of over 100 regional science fairs affiliated with the Youth Science Canada. The fair this year will be held at INSERT LOCATION & DATE. *(Please see over for location maps.)* Inclusion of a map and Fair Day information, which can be downloaded from the web site, depends on whether you think it is needed.

Please note that the transportation to and from the fair site is the responsibility of the student and his or her parents or guardians. The registration fee for the WWSEF is $15 per student. At the fair students from public, separate and private schools in Waterloo Region and Wellington County will display their projects. During the fair the students will have their projects judged by local scientists, engineers and educators. In addition to the valuable feedback the students receive from the judges, they will participate in a scientific educational program and will have the opportunity to explain their research and project to the general public during an open house. Over 100 gold, silver, bronze, honourable mention and special awards will be presented to the student participants. Some of the best students will be awarded with an all-expense paid trip to represent our region, this May, at the Canada-Wide Science Fair in INSERT CWSF LOCATION & DATE for this year. Please see the enclosed Fair Schedule. (Copy the Fair Day Manual found on the Teacher/Advisor page of the website and stress that students are to provide their own lunch and drinking water. Bingeman's does not have water fountains but drink and confectionery vending machines may be available. Supper for students will be provided by the Fair.)

---------- (cut off & return to school) ----------

Please Complete and Return to (insert a suitable name) by INSERT DATE

My child _____, in class _____, has permission to participate in the Waterloo-Wellington Science and Engineering Fair as outlined in the above letter. I am aware that we, as parents/guardians are responsible for transportation to and from the fair site.

My child has the following special health or dietary concerns:

Signature of Parent or Guardian _____ Date _____

WATERLOO-WELLINGTON SCIENCE AND ENGINEERING FAIR JUDGE'S TALLY SHEET

Student Name(s)

- -

- -

Project Number ☐

PART B: DISPLAY

(Maximum 20 marks)

1. Skill (Maximum 10 marks)
   - Is the work neat and carefully done?
   - Is the lettering legible and well done?
   - Are the grammar and spelling appropriate?
   - Are the colours attractive and suitable?
   - Is the layout logical and self-explanatory?
   - Is the content clearly and logically presented?
   - Was the level of adult assistance appropriate?

1 2 3 4 5 6 7 8 9 10
(circle one)

2. Dramatic Value (Maximum 10 marks)
   - Is the display visually balanced and uncluttered?
   - Does the display capture attention?
   - Is there good balance and use of contrast?
   - Does it have an impact?
   - Are the background, table and display well integrated?
   - Are acknowledgements and bibliography included?

1 2 3 4 5 6 7 8 9 10
(circle one)

PART C: INTERVIEW (Maximum 20 marks)

Understanding / Presentation, Logic, Confidence, Poise, Fluency, Enthusiasm

State 1: The student is unsure of the material or the process of the project and has difficulty answering questions about the project. The vocabulary may be inappropriate and project may not be the student's own work.	**4 6** **8 10**
State 2: The student can summarize the project adequately and can answer the majority of questions about the project. Appropriate vocabulary is used.	**10 12** **14 16**
State 3: The student explains the project well and can answer all questions about the project clearly and logically. Shows evidence of background reading in the area and is aware of project extensions.	**14 16** **18 20**

PART D: NOTEBOOK / REPORT

(Maximum 10 marks)

1. The Notebook or Work Journal (Maximum 5 marks)
   - Is it summarizing both failures and successes?
   - Is it neat, clear, and concise?
   - Is it different from the backboard display?
   - Is it well organized?

1 2 3 4 5
(circle one)

2. Pre-submitted Report (Maximum 5 marks)
   Pre-marked for the judges. See posting.

1 2 3 4 5
(circle one)

Return completed form to your Division Chairperson

JUDGE'S SUMMARY

Part A:	Thought/Creativity (Maximum 50)	
Part B: Display	Skill (Maximum 10)	
	Dramatic Value (Maximum 10)	
Part C:	Interview (Maximum 20)	
Part D:	Notebook: (Maximum 5)	
	Pre-submitted Report: (Maximum 5)	
	Total of all above =	

JUDGE'S COMMENTS

PART A: SCIENTIFIC THOUGHT - CREATIVE ABILITY (Maximum: 50 marks)						
SCIENTIFIC THOUGHT			**CREATIVITY**			
EXPERIMENT	INNOVATION	STUDY	LEVEL 1 (poor)	LEVEL 2 (fair)	LEVEL 3 (good)	LEVEL 4 (excellent)
Definition: An investigation undertaken to test a scientific hypothesis using experiments. Experimental variables, if identified, are controlled to some extent.	**Definition**: The development and evaluation of innovative devices, models, or techniques or approaches in technology, engineering, or computers (hard/ software)	**Definition:** A 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.	Little imagination shown, Project design is simple with minimal student input. A textbook or magazine type project.	Some creativity shown in a project of fair to good design. Standard approach using common resources or equipment. Topic is a current or common one.	Imaginative project. Good use of available resources. Well thought out above ordinary approach. Creativity in design and or use of materials.	A highly original project or a novel approach. Shows resourcefulness, creativity in design, use of equipment and/or construction of a project.
Level 1 (poor) Duplication of a known experiment to confirm a totally predictable hypothesis.	Level 1 (poor) Build models (devices) to duplicate existing technology.	Level 1 (poor) Study existing printed material related to a basic issue.	20 21 22 23	24 25 26 27	28 29 30 31	32 33 34 35
Level 2 (fair) Extend a known experiment through modification of procedures, data gathering, and application.	Level 2 (fair) Make improvements to, or demonstrate new applications for existing technological systems or equipment and justify them.	Level 2 (fair) Study material collected through compilation of existing data and through personal observations. The display attempts to address a specific issue.	25 26 27 28	29 30 31 32	33 34 35 36	37 38 39 40
Level 3 (good) Devise/carry-out an original experiment with controls. Variables are identified and some significant variables are controlled. Analysis with graphs or simple statistics.	Level 3 (good) Designing and building innovative technology or providing adaptations to existing technology that will have economic applications and or human benefit.	Level 3 (good) Study based on observations and literary research illustrating various options for dealing with a relevant issue. Appropriate analysis (arithmetical, statistical, or graphical) of some significant variable(s).	30 31 32 33	34 35 36 37	38 39 40 41	42 43 44 45
Level 4 (excellent) Devise and carry out original experimental research, which attempts to control or investigate most significant variables. Data analysis includes statistical analysis.	Level 4 (excellent) Integrate several technologies, inventions or designs and construct an innovative technological system that will have commercial and/or human benefit.	Level 4 (excellent) Study correlating information from a variety of significant sources that may illustrate cause and effect or original solutions to current problems through synthesis. Significant variable(s) are identified with in-depth statistical analysis of data	35 36 37 38	39 40 41 42	43 44 45 46	47 48 49 50