Manitoba First Nations Education Resource Centre Inc.
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The Manitoba First Nations Education Resource Centre

is proud to announce the 15th Annual

Manitoba First Nations Science Fair

"Listeners of the Earth"

Information and Resource Package

Date of Fair: March 9 & 10, 2017

Location: University of Manitoba, Winnipeg

Deadline for School Entry:	**January 15, 2017**
Deadline for Project Registrations:	**February 20, 2017**

Welcome aboard! This resource package is provided to all First Nations Schools with encouragement to participate in the 15th Annual Manitoba First Nations Science Fair. It provides valuable information which can guide the development of science fair projects in the classroom as an integral part of the curriculum. It also provides details regarding time lines, format, and criteria for the fair.

Maximum Number of Projects Allowed: – 12 Projects per School.
For more information about the MFNSF please feel free to contact the individuals below.

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SPECIAL NOTE TO THE SCIENCE TEACHER

Notwithstanding any other directions or advice, this may be given regarding the development of science fair projects with students, please note:

1. Students without a lot of previous experience developing their own studies and experiments, who have not had repeated experience in experiment design, CANNOT on their own produce quality science fair projects in the short term.

2. Given the above, it is an expectation that the project is a joint effort between the teacher and the student, and as such.

3. The responsibility for completion is a shared one.

4. Because we see the science fair as part of the teaching and development process, the teacher must feel free to involve himself / herself to whatever extent is necessary to ensure the student completes a quality project utilizing Math, Language Arts, and Scientific Thinking skills *at or above* his grade level. Regardless of the extent of teacher involvement in design and decision-making, at the end of the process, we can still end up with a student who has done the learning and can present the project to judges and the public.

* THE TEACHER IS ADVISED, THEREFORE TO PROVIDE FOR YOUR STUDENTS' FIRST (AND POSSIBLY SECOND TIME AROUND), AS DETAILED PROJECT OUTLINES AS STUDENTS NEED TO CHOOSE FROM. ADDITIONALLY, YOU ARE ADVISED TO SELECT PROJECTS, WHICH USE SIMPLE EXPERIMENTS TO TEST ITEMS ACCESSIBLE IN THE STUDENTS' IMMEDIATE ENVIRONMENTS AND REAL WORLD.

ONCE YOU HAVE STUDENTS WHO HAVE BEEN THROUGH THAT PROCESS, IT IS IMPORTANT TO BEGIN DEVELOPING ORIGINAL STUDIES, JOINTLY ENVISIONED AND DESIGNED BY THE TEACHER AND STUDENT.

AFTER THAT LEVEL, STUDENTS WILL BE ABLE TO BEGIN INITIATING THEIR OWN IDEAS FOR PROJECTS FOCUSING ON PROBLEMS IN THEIR ENVIRONMENTS. AT THAT POINT YOUR ROLE BECOMES "MENTORSHIP" IN SCIENTIFIC THINKING, AS YOU HELP THEM DEVELOP THE METHODOLOGY, CARRY OUT THE RESEARCH, EXPERIMENTS, AND DEVELOP WRITE-UP AND PRESENTATION.

PART A: WHY THIS EVENT

Rationale

The MFNSF program is intended to:

1. Increase the awareness of, interest in, and attention to science in First Nations Schools.

2. Improve the amount and quality of science being experienced by First Nations students.

3. Demonstrate that: science is fun; science is all around us in everyday things; science includes all the other subjects; science can be understood by everyone.

4. Support the "networking" of our schools in the area of science, so that teachers and students can share ideas, and learn from each other's work through dialogue and the review of each other's work.

5. Encourage participation in science fairs by First Nations Schools – at the local, provincial, and national levels – and provide the opportunity for all First Nations schools to do so.

6. Lead to greater interest in, and commitment to developing competitive science fair programs in First Nations Schools, for the purpose of competing effectively with the province and country as a whole, thereby affording our students the many opportunities, which stem from such.

7. Provide an opportunity for teachers to build the skill set necessary to be able to develop and implement authentic, more engaging curriculum for students through the use of project based learning.

8. Develop teachers' understanding of, and ability to use curriculum integration, and project based learning to develop more engaging curriculum based in students own environments – thereby increasing student engagement, and accelerating student achievement.

Philosophy and Goals of the MFNERC Science Fair

- The annual Manitoba First Nations Science Fair is a non-competitive, celebration of science done by our students and teachers.

- ***All projects are recognized*** with one of three awards.

- The opportunity to share and view work completed by other schools, students and teachers will enhance the idea and skill base of each of us, leading to growth in the area of science education and increases in the science fair performance levels of all participants in ensuing years.

- This fair will function as a catalyst to encourage greater participation by more schools in future years.

During the year between fairs, teachers can build on what was achieved in the previous cycle, when planning for and implementing the program for the next year.

They can do so by:

a) Further reflection on what they experienced at the previous MFNSF.

b) Discussions and joint planning with colleagues.

c) Reading, research, and further professional development.

d) Accessing consultation, help, and mentorship from the MFNERC science facilitators.

e) Developing more advanced projects by building upon and expanding the same projects completed the previous year.

BENEFITS OF SCIENCE FAIR PARTICIPATION

BENEFITS TO THE STUDENT

Science fair participation offers the student the opportunity to:

- pursue areas of special interest.
- develop new areas of interest.
- develop higher than normal levels of knowledge and skill in science, mathematics, and language arts.
- explore potential career fields.
- gain recognition and sense of belonging.
- experience the concept that the real world offers great rewards for academic and scientific excellence.
- develop rapport with a peer group of academic, scientific, and technological interests.
- develop contacts with role models in technological fields.

BENEFITS TO THE SCHOOL

Science fairs provide the school with the opportunity to:

- provide a forum for the display of academic and scientific excellence.
- promote and reinforce interest in science and technology.
- provide chances for students to meet and interact with those from other schools while engaging in an academic enterprise.
- play a leadership role in the acceleration of science education.
- increases public relations and rapport.

BENEFITS TO THE TEACHER

Leading students in science fair preparation and participation provides the teacher with:

- opportunity to use a project approach, which facilitates integration of outcomes from all core areas.
- opportunity to lead students to academic levels well beyond grade level.
- opportunity to lead students in an integrated activity which develops both cooperation and competition.
- opportunity to experience the joy of teaching in an environment of highly motivated students.
- opportunity to expand your repertoire of skills by engaging in an increasingly more open ended and integrated environment.
- opportunity to showcase student achievement and gain job fulfillment and recognition.

PART B: ORGANIZATION

Format of the Fair

1. Each school may enter a maximum of **12 projects**.

2. Each project may be completed by an individual ***or*** a pair of students.

3. Projects will be classified in four levels: Gr. 4-6; 7-8; 9-10; 11-12.

4. At each level, projects are divided into three categories: Life; Physical; and General Science.

5. All projects / exhibitors will be engaged in the full judging process. *(Judging form and criteria are enclosed as part of this package).*

6. Teachers bringing students to the fair will be asked to participate in the judging process. This is to provide everyone with the opportunity to develop a greater understanding of a quality science project. This will in turn enhance the overall level of projects completed in ensuing years.

PART C: PROJECT DESIGN

** It is ***very important*** that ***you, the teacher***, study this section until a full and clear understanding of the fundamentals of project design is gained. While it is fully acceptable for students to take "canned" projects from books or web sites and repeat them when they are starting out, it is imperative that they, and you, reach a point where original projects are generated within your classroom. It is only then that the full benefit of using Project Based Learning and a full grasp of the central skills of the science curriculum are realized. This section provides Descriptions and Examples of Sample Projects.

Levels of Projects

In the above classification, the higher the number, the more difficult the level of science is assumed when projects are judged.

An explanation of the difference between these types, and *examples* of each, follow.

Level 1 - Research and Display

The student researches a topic, organizes the information and presents it using text, pictures, diagrams, and oral presentation, and possibly simple models to show what things 'look like'.

Level 2 - Modeling

The student does all the things listed in the above description, but in addition constructs an accurate, more complicated model to demonstrate 'how something works.' The model in this case is of much greater significance in enhancing the understanding of the concepts being studied.

Level 3- Study / Investigation

The student conducts a study to gather his or her own data about the topic, technology, or phenomenon being studied. This data is used to draw conclusions about some aspect of the topic, and add to the body of knowledge available. The type of data collected can vary greatly from project to project. It depends only on what is appropriate for the question being answered.

Level 4 – Experimentation

In this project, the student is employing all the skills used in an investigation plus more. In an experimentation project the student is running a controlled test using treatment and control groups. Variables are manipulated by the experimenter, and other variables are measured for resulting change.

Level 5 - Innovation / Invention

In this project, the student seeks to develop an improvement to some existing system or technology, or to add to the available body of scientific knowledge by conducting original experiments using novel methods.

An Example

The following example demonstrates how the same topic can be studied to different depths as we move up through the different levels of project. As you read through these, note how each level actually includes all the types of work involved in the earlier levels as part of the project. In other words, these "levels" represent a "Progression" in scientific thinking and

scientific work. Each level by necessity includes the types of thinking and activities required at the preceding levels, PLUS SOMETHING MORE.

Example Set: The Greenhouse

Level 1. The Greenhouse - Research and Display

- Collect information on growing plants.
- Collect information on greenhouses and how they work.
- Write a research paper on greenhouses.
- Obtain, or build a simple model to show what a greenhouse looks like with plants growing in it.
- Prepare a display board to share the information and pictures collected.
- Include the model(s) in your display.

Level 2. The Greenhouse – Modeling

- Collect information on what plants need to grow.
- Research one or a few particular plant(s) in greater detail if you wish.
- Research the design and construction of a greenhouse in detail.
- Diagram and explain each part of the greenhouse and its function.
- Build a detailed model of the greenhouse showing its parts. Explain their functions. (The model can be a working prototype).
- Prepare a display of your work.

Level 3. The Greenhouse – Investigation

- Research greenhouses.
- Write the important information discovered.
- Come up with a question of your own not answered in the research. (Example: How fast is the heat collected during the day lost during the night? Or In what temperature range, outside can the greenhouse continue to be effective for growing plants?)
- Build a small greenhouse or go to an existing one and get permission to make and record observations for your study.

- Collect data over time.
- Analyze the data and use it to attempt to answer your question.

Level 4 - The Greenhouse – Experimentation

- Conduct research.
- Record information discovered.
- From the knowledge gained, or which you previously had, ask a question about greenhouses or some aspect of their operation for which you do not already have the answer. The question should be about the relationship between two things. It should imply a possible cause and effect relationship. For example, How does the color (or type) of plastic used affect the temperature inside a greenhouse?
- Set up a test where you have the two (or whatever number of) different conditions. Collect data over time.
- Compare the data from the different conditions and use it to answer your question. * The most important element in designing experimental projects is the identification and control of all important variables. The second most important is accurate and careful measurement and collection of data. Third is logical and accurate interpretation of the data collected in drawing conclusions (answering your original question).

Level 5 - The Greenhouse – Innovation

After you have done all the types of things listed in the levels above and are somewhat of an expert on greenhouses or one aspect of their operation, design an improvement to an existing design of some part of the technology. Set up experiments to test your design and compare its performance with what is presently being used.

* It is important here that your experiments are well controlled, fair tests.

PART D: JUDGING CRITERIA AND GUIDELINES

SCIENTIFIC THOUGHT

(THE PRIMARY ELEMENT - WORTH 40 TO 50 PERCENT OF THE MARKS ON THE JUDGES SCORE SHEET, DEPENDING ON THE GRADE LEVEL)

1. The hypothesis was stated clearly and reflected the background readings.
2. There was an effective plan for obtaining a solution or answer to a question.
3. The project carried out its purpose to completion.
4. The project shows an understanding of existing knowledge, use of adequate scientific vocabulary and demonstrates an understanding of terms gleaned from reliable sources of information.
5. Experimental design demonstrated understanding of the scientific methods.
6. The student has an idea of what further research is indicated by the project.
7. There is adequate data to support the conclusions. The experimental errors inherent in measurements made and in the materials used were recognized. *(The variability inherent in living material is often not recognized by students).*
8. The experiment was repeated several times to establish validity of results and/or statistically validated.
9. The variables are clearly defined and recognized. If controls were necessary, there was recognition of their need and they were correctly used.

OTHER SCORING CRITERIA / RUBRICS

- **ORIGINALITY**
- **VISUAL DISPLAY**
- **WRITTEN REPORT**
- **ORAL PRESENTATION**
- **PROJECT LOG BOOK**
- **DRAMATIC VALUE**

PART E: RESOURCES

The Science Buddies web site offers students, teachers, and parents creative project ideas distributed into three levels of complexity (Beginners, Intermediate, and Advanced).
http://www.sciencebuddies.org/

Below is another recommended site to look for project ideas.
http://www.all-science-fair-projects.com/

Manitoba First Nations Science Fair
Judging Rubric - Grade 4 to 6 Projects

Judging Group _____
Project Number_____
Title _____
Student Names _____ _____

This Judging Rubric is based on the student's ability to show and understanding of the scientific method both orally and visually. The understanding is based on the demonstrated understanding and correct use of six scientific method terminology:
Purpose, Hypothesis, Materials, Procedure, Results and Conclusion

Rubric scoring (4) Above expectation (3) Acceptable understanding
(2) Some understanding with help (1) Needs additional work

Oral Presentation: Using the Scientific Method Terminology

Explains all 6 topics easily, shows understanding of conclusion. ____4 pt

Explains at least 5 topics easily, shows understanding. ____3 pt

Explains most topics with help from the board. ____2 pt

Tries to answer questions asked by the judge. ____1 pt

Oral Presentation: Speaking Quality

Student is enthusiastic about the project and readily talks about it. ____4 pt

Student is pleasant and shares information. ____3 pt

Student with prompting talks about the project. ____2 pt

Student answers some questions about the project. ____1 pt

Project Knowledge: Understanding and Research Knowledge

Student readily talks with many details of the experimentation. ____4 pt

Student shows understanding of the project. ____3 pt

Student knows what the project is, giving minimal explanation. ____2 pt

Student can answer questions when prompted. ____1 pt

Display: Showing application of Scientific Method in a well-organized, visually appealing display

Board shows data in clear tables, charts, or pictures with headings. ____4 pt

Board is neat and attractive, limited table, chart or pictures. ____3 pt

Board has headings, using information stated. ____2 pt

Board has headings and limited information. ____1 pt

Written Reports

Shows written evidence of research, experimentation and analysis:

Has both Log book and Research Report completed. ____4 pt

Has both but not much detail. ____3 pt

Has one written report either Log book or Report. ____2 pt

Has report which is minimal or nonexistent. ____1 pt

TOTAL SCORE _____ **/20 points**

Two positive comments:

One positive suggestion:

MANITOBA FIRST NATIONS SCIENCE FAIR
March 9 & 10, 2017

ADVANCE SCHOOL REGISTRATION FORM

TO ENTER YOUR SCHOOL IN THE 2017 MFNSF

Please complete this form and return to the MFNERC by Fax no later than January 15, 2017.

Once this form is received you will receive a spreadsheet to complete detailed information on EACH project being entered and return by e-mail. The completed spreadsheet will then have to be submitted in February to complete the registration process for your school.

SCHOOL INFORMATION

NAME OF SCHOOL: _____

NAME OF FIRST NATION: _____

CONTACT TEACHER: _____

CONTACT PHONE #: _____

CONTACT E-MAIL: _____

PROJECT INFORMATION

Number of Projects your school intends to bring to the fair (Max 12): _____

Number of Students your school intends to bring to the fair (Max 24): _____

Is your school having a school science fair? _____

If **Yes**, please provide date of your fair: _____

Please Return Completed Form by fax, no later than January 15, 2017

To:
Fax Number: 204 942 2490
Attention: Sharon Sutherland