January 10, 2014

Dear Cedar, Birch & Cypress Parents,

It's Science Fair time again! The success of a science fair can be attributed largely to early planning, students meeting project deadlines, and especially, to encouragement and support from parents. The WMS Science Fair has been scheduled for Friday afternoon, March 21st. Although it is weeks away, it is time now for your child to begin thinking about his/her topic of interest and to begin planning. Projects involving plants, animal behavior or growth often require many weeks to mature. **This year, students are expected to work individually rather than in pairs.**

The first step is obviously to select a project. Sometimes this may also be the most difficult step. A good selection will encourage a good project and a lasting interest and focus on the part of your child. Since you may be called upon to provide some materials and advice, you may wish to guide your child toward an area of interest.

Our goal is for the students to make all the projects truly scientific. This involves using the scientific method, which is a step-by-step procedure used to think about problems and solving them. We will review the scientific method in class, so your child will be familiar with the process. Below are lists of sciences to consider:

Physical Science	Biological Science
astronomy	botany
chemistry	zoology
geology	medical science
meteorology	biochemistry
physics	genetics
	ecology
	bacteriology
	aquatic biology

**** Animal research is acceptable but projects including live animals are not.**

Attached to this letter is a packet which will give you more details as well as the timeline, student checklist, and rubric for the project. The Project Proposal form needs to be filled out by your child and signed by you. The form should be brought back to school by Friday, January 27th. With this early planning our goal is to remain true to the Montessori principle of guiding the child and allowing him/her to do the work.

If you have questions or comments, please let us know. We appreciate your input and feedback.

Thank you,
Teresa, Patricia, Tammy, Caroline, Laila and Laura

Science Fair Project

You may choose from two types of science fair projects:

I. **Experimental:** The experimental project poses a problem or question and includes a hypothesis, experiment, observations and conclusion using the scientific method. Where appropriate, a control group and variable must be used.

II. **Research**: The research project is a non-experimental project which does not require the use of the scientific method. It may include models or demonstrations.

This year, science fair projects will be individual rather than partner work. Projects based on animal studies are accepted, however, live animals may not be used.

All students will be required to produce the following:

1. A bibliography that details where they got information and ideas
2. A written work.
   - If the student is doing an experimental project, the required written work will be a *formal write up* of the experiment, per the directions below. You will also be expected to have the *lab notebook* in which your experiments are written and recorded.
   - If the student is doing a research project, the required written work will be a *five paragraph essay* giving background information about the topic. If, for example, your experiment is on molds, your paper will be on the topic of molds. If you demonstrate the amount of power in fruit, your paper should be on electricity and/or conductivity. The length of the essay will depend upon the age of the student. In general, a fourth year will be expected to produce about 1 ½ pages, and a 5^{th} or 6^{th} year will need to produce about 2 pages.
3. A three-paneled visual display with:
   - A title and subtitles
   - A bibliography
   - Credits
   - Pictures (hopefully interesting ones)
   - Graphs, charts, or other informative data summaries

Experimental Projects Using the Scientific Method

1. Identify the problem or question you want to explore and write it down.

- You notice something and wonder why it happens or what causes it.
- You want to know why something works in a particular way.

Example - You notice that many recipes suggest adding salt to water before boiling it.

2. Check sources that provide information on your topic.

- Gather more information on what you want to learn.

- Check science books, science lab manuals, encyclopedias, science magazines or newspaper articles.

3. Determine the purpose of your experiment. This may lead to the title of your project.

- What do you want to find out?
- What do you want to do?

Example – The Effect of Salt on the Boiling Temperature of Water

4. Develop a hypothesis. (This must be stated in a way that can be tested by an experiment.)

- A hypothesis is a theory to explain phenomena, either accepted as a guide to future investigation or assumed for the sake of argument and testing.
- A statement describing what you will be attempting to find out experimentally and what you expect to find as a result of the experiment.

Example – Adding table salt to boiling water will cause the water to boil at a higher temperature.

5. Design an experiment to test your hypothesis.

- Select only one variable to change in your experiment. A variable is ONE thing that you change.
- Change something that will help you test your hypothesis.
- The procedure should include how you will change the one thing.
- Include how you will measure the change.
- Remember to include a "control" for comparison.

Example – If you are testing the effects of solutions on the growth of plants, you must include one plant that is given water in order to compare all of the plants at the end of the experiment

6. Organize and gather the materials and equipment required.

- Make a list of all of the materials you will need to conduct your experiment.
- Prepare them for use in the experiment.

Example – Table salt
Distilled water
Two quart cooking pot
Pint measuring cup
Teaspoon and tablespoon measuring spoons
Thermometer
Stirring spoon

7. Conduct the experiment or procedure

- Write up your procedure

Example – 1. Boil one quart of distilled water on a stove..

2. Measure the temperature of the boiling water. Record the highest

temperature reading.

3. Measure out table salt using a kitchen measuring spoon. Level the spoonful.
4. Add the measured salt to the boiling water and stir.
5. Measure the temperature of the boiling water with the salt in it. Record the highest temperature reading..
6. Repeat for other amounts of salt.

8. Record all observations and measurements taken through the course of the experiment

- Keep detailed records of your observations and results.
- Measurements may include the amount of change within a given timeframe, the amount of specific chemicals used, etc. Show metric and standard measurements.

Example—30 cm.(12 in.)

9. Summarize the results

- Write a brief description of what happened during the experiment.
- Include tables or graphs.

10. Develop a conclusion

- Was your hypothesis correct?
- If your hypothesis was not correct, explain what happened. Please note that it is ok for your experimental data not to support your hypothesis. Science is not necessarily about discovering what something is, but also about finding out what it is not. It is important to explain what did happen, and maybe to put in what your new hypothesis might be.
- You may want to also include the following information:
  - What you learned
  - Problems you encountered while conducting the experiment
  - What you would change if doing the experiment again
  - Other questions this procedure may have led you to

11. Prepare a visual presentation to be displayed at the open house on *Fri. March 21st.*

The visual display should be accompanied by a formal write up and a bibliography of sorces used.

Research Projects

You may choose from two ways to demonstrate a research project:

I. **A Model:** A simplified representation of something, often larger or smaller than the original, which shows how various parts work together to accomplish the purpose of that which is being modeled. For example, you might make a model of a pump, or of the solar system.

II. **A Demonstration**: A display that explains a principle or law found in the physical world. This may include topics such as why some objects float and others sink

Steps:

1. **Identify the process, structure, or invention you want to explore and make note of it.**
   - You notice something and wonder how it works.
   - You figure someone else has already studied the problem.

   Example - You notice that plants have to be watered regularly, and wonder how the water gets from the roots to the leaves.

2. **Check sources that provide information on your topic.**
   - Gather more information on what you want to learn.
   - Check science books, science lab manuals, encyclopedias, science magazines or newspaper articles.

   Example - You read about it in an Eyewitness book.

3. **Write a research paper complete with introduction, at least three body paragraphs, conclusion, and bibliography.**

4. **Build a model or design a demonstration that illustrates what you have learned.**
   - You may use suggestions from books, encyclopedias, etc.

   Example - The Eyewitness book has a suggested demonstration.

5. **Prepare a visual presentation to be displayed at the open house on *Fri. March 21st.***

Possible Ideas to Investigate

Experimental

- What is the effect of sunlight on plants?
- What are the effects of changing the weight and length of a pendulum?
- Do preservatives stop bread mold from growing?
- What is the effect of salt on the freezing point of water?
- What is the effect of color on plant growth?

Note: If you are doing an experiment using plants, be sure to choose a seed that grows quickly such as radish seeds.

Research

- How does water moves through a plant?
- How can electricity be made?
- Migration of birds
- Colorblindness
- Types of crystals and how crystals are formed

Schedule of Due Dates and Items **(in bold type)**

- WEEK I: **January 24**, **Friday**—A ***topic*** must be selected and approved by your advisory teacher AND your parents. Turn in the attached ***"Science Fair Project Proposal Form,"*** signed by your parent, to your advisory teacher.

  It is easier to choose a topic you feel comfortable with if you consider what you are interested in rather than what your friends are interested in. It would also be wise to discuss this with your parents and make a trip to the library to see what books and other resources are available to you. Note: We have a few resources in the WMS library, but they will be in high demand!

- WEEK II: **January 31**, **Friday—**Have in your possession at home, all necessary ***research books*** and ***reference materials***. At home, begin preliminary research and start taking notes for your project and begin planning the layout of your display.

- All students must turn in a list of books and reference materials in ***bibliography*** format. Students conducting the scientific method must have a ***hypothesis, materials, and procedures written in your lab books.*** Students conducting a research project must have **a science notebook for writing research on topic.**

  WEEK III: **February 7, Friday**—Bring ***lab notebook*** with either ***research notes or data*** and check in with your advisory teacher.

  WEEK IV: **February 17-21.** There is no school this week due to Mid-Winter Break.

  WEEK V: **February 14, Friday**—Those who are doing a research project should turn in a ***rough draft*** of your research paper. For those doing an experiment, bring a rough draft of your formal science write up.

- WEEK VI: **February 28, Friday**—Students doing an experiment should wrap up experiment observations, collecting data, and begin formulating a conclusion and thinking about how best to display their data (pie graph, bar graph, line graph, pictograph, chart illustrations, photographs etc.). Students working on a research project should begin making revision to their rough draft. All students should purchase materials and begin designing their final display.

- WEEK VI: **March 7, Friday**—Turn in ***final research paper*** or ***final data*** in ***formal science write up.*** Complete all information for your project and display. Written information on your display may be cut and pasted from your research paper or formal science write up, but you will need to adjust the font in order for people to read your writing. Take time to put together a neat and attractive display. Insure that you have done your best lettering and that paragraphs, photos, drawings and pictures are straight and completely attached, etc. Remember to include a bibliography and list of credits (people who helped you).

  March 17, Monday—Bring in completed science fair project and display. We will be rehearsing for the Science Fair by giving presentations to fellow students.

- **March 21, Friday afternoon – Science Fair & Grandparents/Special Friends Day**

Name(s) _____

Science Fair Project Proposal Form

Type of project you intend to complete. (Check one.)

Experiment _____ Research _____

Topic of project: (Give a brief description or example.)

General description of how you plan to fulfill the requirements for this project. Use the back of this form if you need more space.

Parent's signature indicating approval of the project:

Science Fair Student Checklist: March 21, 2014

Research Projects

- ☐ Science Fair Project Proposal Form signed by parent and approved by teacher
- ☐ Bibliography with sited research materials
- ☐ Science notebook complete with the following items:
  - ☐ Detailed research on your subject
  - ☐ List of materials and procedure for demonstration **OR** procedure on how to build your model for your visual display
- ☐ Rough draft of research paper complete with introduction, body paragraphs and conclusion
- ☐ Final draft of research paper complete with introduction, body paragraphs and conclusion
- ☐ Visual display complete with the following items:
  - ☐ Three paneled poster board
  - ☐ Large and beautifully written title of project located in the center panel of the poster board
  - ☐ Typed or neatly written list of materials and procedure for demonstration **OR** typed or neatly written steps for designing your model
  - ☐ Typed or neatly written information relevant to your research (these may be cut and pasted from you research paper, but you may need to adjust the font size so people can read it on your display)
  - ☐ Beautiful illustrations or photographs relating to topic of research
- ☐ Three dimensional model **OR** demonstration relating to your topic of research

Science Fair Student Checklist: March 21, 2014

Experimental Projects Using the Scientific Method

- ☐ Science Fair Project Proposal Form signed by parent and approved by teacher
- ☐ Bibliography with sited research materials
- ☐ Lab notebook complete with the following items:
  - ☐ Notes on your subject
  - ☐ Stated problem with one variable
  - ☐ Hypothesis
  - ☐ Materials and procedure
  - ☐ Observations or data collected
  - ☐ Conclusion
- ☐ Typed formal science write up of information from lab book.
- ☐ Visual display complete with the following items:
  - ☐ Three paneled poster board
  - ☐ Large and beautifully written title of project located in the center panel of the poster board
  - ☐ Typed or neatly written question or problem with one variable
  - ☐ Typed or neatly written hypothesis (may be cut and pasted from write up)
  - ☐ Typed or neatly written list of materials (may be cut and pasted from write up)
  - ☐ Typed or neatly written steps of your procedure--variable should be clearly defined (may be cut and pasted from write up
  - ☐ Photographs or illustrations to show procedure
  - ☐ Neat display of data collected using pictures or graphs (pie, bar, line, or pictograph)
  - ☐ Typed or neatly written paragraph concluding your project--conclusion must address whether your hypothesis was correct, and why or why not (may be cut and pasted from write-up)
  - ☐ Optional: any models or apparatus you would like to bring in to sit in front of your display or to demonstrate your experiment during your oral presentation