Boulder Ridge Middle School
Science Fair

Information and Planning Packet 2011

Boulder Ridge Middle School Science Fair

What is a Science Project?

A "Science Project" is an active fun approach to science. It is something that you do on your own rather than something you only read about or watch someone else do. A science project is an investigation of a question about a science topic that interests you.

Important Dates:

Wednesday, February 9th	School Fair (grades 6-8)
Feb. 14th – March 4th	On-Line County Registration, Website TBD
Tuesday, April 5th	2011 Inland Science Fair

Time Line:

Present – February 8th

- Choose a problem to investigate
  - Do some background research
  - Develop a hypothesis
  - Decide on the methods you will use
  - Make out a list of materials that you will need
- Conduct an Investigation
  - Collect data
  - Organize your data
  - Draw conclusions
- Proofread Your Report
- Design Your Exhibit

Wednesday, February 9th, 2011

- Boulder Ridge Middle School Science Fair

Please Note: Individual teacher due dates may vary.

Steps to Prepare A Science Fair Project

1. **Select a Topic -** Choose a subject that you would like to know more about. Devise one specific thing you would like to find out and attempt to state that as a question. Remember the Science Fair Project is a test you do to find the answer to a question, not just showing what you know about something.
2. **Research -** Find out more about your topic by reading books and magazines, using the Internet and talking with experts.
3. **Scientific Method -** State the purpose of your experiment - What are you trying to find out? Select variables (something that will change/ varies) that will help you find your answer. State your hypothesis - Your guess about what your answer will be. Decide on and describe how you will change the thing you selected. Decide on and describe how you will measure your results. Gather and make a list of all the materials that you will need for the project.
4. **Run a Controlled Experiment and Record Data -** Do the experiment as described above. Keep your notes in one place. Write down everything that you can think of, you might just need it later!
5. **Graphs and Charts -** Put the results of your data in graphs and charts.
6. **Conclusions -** What did you find out? Write down what happened in your experiment and/or investigation. Was the answer to your question (the hypothesis) true or false?
7. **Make Your Display -** Follow the steps below:
   - The display should be neat, simple and easy to follow.
   - It must be free standing. Wall space will not be available. Use sideboards and backboards to display photographs, diagrams, and graphs and to support equipment and materials (size listed later in this packet).
   - The display must include the following:
     Your Question, Hypothesis, Materials, Procedures, Results & Conclusion.
   - Your exhibit must tell the viewer something meaningful. It should not be necessary for you to stand alongside, always explaining what it is supposed to be about.
8. **The Journal (optional)** – Careful record keeping is considered one of the marks of a good scientist. The journal should be attractive and neat, with a title on the front cover. It should also include all the topics of the scientific method (see attached sheet). At the 2011 Inland Science and Engineering Fair (county level) a journal is a necessary component of the project.

The Scientific Method

Define the Problem: A student cannot solve a problem unless they recognize that one exists. To define the problem one must ask a question. For example, "Will roots grow in the light?" or "What conditions favor the rusting of iron?"

Collect Information: Before scientists do anything they usually spend a lot of time reading. A scientist attempts to find out what other work has been done that relates to the problem. Reports of research conducted all over the world are published in a variety of journals, books, and magazines and on the Internet. Students should go to the library or find individuals who may have information that will help them fully understand the problem.

Form a Hypothesis: A hypothesis is a suggested or proposed answer to a question. Before the student begins the experiment he/she should develop a trial answer to his/her own question. The experiment is then designed to test the hypothesis and should prove or disprove it on the basis of the observations made during the experiment. The hypothesis is always justified, using the information collected from books and other resources. In summary, the students will predict what should happen in the experiment and why.

Experiment to Test the Hypothesis: The students must set up an experiment that will either support or disprove their hypothesis. Each step in the procedures should be written in such a way that someone else could do it exactly as it was done. The students should keep careful records of how much and what types of materials were used.

Experiments are usually designed with both a control group and experimental groups. For example, suppose a student wants to find out if plants grow better with fertilizer. The student should set up the experiment to include two groups of plants. One group of plants would be given the fertilizer. This group would be the experimental group because it tests the effects of fertilizer. The second group of plants would not be given any fertilizer. This group would be the control group. Having two groups allows comparisons to be made between what occurs under test conditions and what occurs under normal conditions. Each group should have several subjects that are tested.

Observe and Record Data: Throughout the experiment the students should keep accurate records of what occurred. This information is called data. The best observations or data are those that involve some kind of measurement, number or count. For example, measuring the heights of the plants growth with and without fertilizer. Students will often rely on descriptive observations only. "The plants in the control group are growing better", or "the mice in cage #1 are not very active". These observations, though important, can be a matter of opinion. Observations should always include some measurable data.

Organizing and Analyzing the Data: The data should be organized in a table or graph form for display on the project. Additionally, the student should have a written description summarizing what took place during the experiment. If errors were made, or some outside influence, which might have affected the experiment, occurred, then these should be identified in the analysis.

Results/Conclusions: When the experiment has been completed, the student should be able to reach some conclusion. Did you prove or disprove your hypothesis? Conclusions should be written based upon the data. Sometimes students may obtain data that contradicts the expectations. Some students will tend to ignore this data and will write a conclusion based on their expectations instead.

At the end of an experiment some students might still be unable to answer the question proposed. Sometimes the data might be inconclusive or not clear enough to draw a conclusion. Students should be aware that some experiments will be unsuccessful. Honesty and willingness to admit that the experiment was unsuccessful is a part of the scientific process.

Keeping a Journal: Students may keep a log or journal of everything they do for their science fair project. The log will include notes or information they collect, their experimental plans, materials, procedures, observations, mistakes, changes, basically everything. While the journal is an optional component for the Boulder Ridge Middle School Science Fair it is mandatory should the project be selected for the county level.

Science Fair Regulations

1. If live vertebrate animals, human subjects or tissue samples are used in an experiment, the student must complete a "Certificate of Compliance" before conducting the experiment. Students may not use pets at home or family members in any experiment without proper authorization. Parents may obtain the necessary consent forms for approval by contacting the Science Fair Coordinator.
2. The school will not accept projects which involve 1) surgery and/or sacrifice of live vertebrate animals. 2) Experiments involving toxicity, controlled substances (tobacco, alcohol, and prescription drugs), nutritional deficiencies, or physical/psychological stress.
3. Live vertebrate organisms may not be displayed.
4. Dangerous chemicals, drugs or open flame may not be displayed. All electrical equipment must conform to the standard electrical safety laws.
5. Viral, bacterial molds, or fungal materials may not be displayed.
6. The work on the project must be done by the student. If any outside help or assistance is given it should be described in the student journal (example: Advice from a local scientist, parental help with construction of the display, etc.).
7. Only one space will be provided for each exhibit. Exhibits should not exceed the following dimensions when on display: 4 feet wide X 2 1/2 feet deep X 5 feet high.
8. Exhibits must be freestanding and must be constructed of a durable material. If electrical hook-ups are needed, arrangements must be made at least one week in advance.
9. The school will not be responsible for lost, stolen or damaged items.
10. Projects must be removed by the designated date. They will be disposed of after that date.
11. The school reserves the right to reject projects that are unsuitable for display.