St. Matthew's School

Science Fair Planning Guide

Saint Matthew's School Science Fair Rules and Requirements

1. Projects are to be done individually- there is no team category.

2. Parents are encouraged to help ONLY with photographs, display, etc. NOT doing the project- the work needs to be the student's

3. 4th, 5th graders may compete only at the school level, 6th 7th and 8th graders may qualify for the Flathead County Science Fair.

4. Displays must not be any larger than the following dimensions:

   - Maximum 48" high
   - 48" wide
   - 30"deep

5. Students must be at the project for judging. Projects without a student present will not be judged.

6. Students should dress appropriately for the science fair, best dress is recommended

7. Experiments may be in one of two categories: Biological, or Physical.

8. Items that may not be displayed: animals* bacterial cultures and/or pathogens, hazardous chemicals, explosives and/or explosive devices, and controlled substances. Organisms — no living creatures, including animals, plants, and microorganisms can be displayed. No type of cultured growth, spoiled food, or molds can be displayed.
   Tissue — no human or animal tissues can be displayed. Teeth, hair, nails, dried animal bones, histological sections and mounted slides are allowed. Specimen — no taxidermy parts, preserved animals, embryos, or dried plant material can be displayed.
   Photographs — no visual presentations of surgical techniques, dissections, necropsies or other lab techniques depicting vertebrate

animals or humans in other that everyday conditions can be displayed. Solid Waste — no solid waste, soil or other waste material may be displayed. Chemicals — no chemicals of any kind, including water, can be displayed. Foodstuff — no human or animal food can be displayed. Sharp items — no syringes, needles, pipettes or other sharp instruments can be displayed. Controlled Substances — poisons, drugs, controlled substances, explosives, hazardous devices or weapons cannot be displayed. Dry Ice — dry ice or other solids that vaporize will not be displayed. Fire — no open flames or highly combustible materials are allowed. Tanks — tanks, full or empty, used for storage of combustible gases or liquids are not to be displayed. Machinery — no unshielded belts, chains, pulleys or other hazardous moving parts shall be displayed. Lasers — only class II lasers with proper warning labels displayed are allowed. Class III and IV are not allowed. Heat Source — materials heated above 100 degree F are not allowed without adequate insulation.
Electric Current — no unshielded high voltage equipment, large vacuum tubes, ray-generating devices, bare wires and knife switches carrying current at more than 12 v, or exposed sparks will be allowed. Embellishments — awards, medals, business cards personal information and photographs are not allowed. Batteries — no open cell batteries may be displayed.

***Animal Disclaimer**

Because of the many issues involved with animal experimentation, a project involving the use of vertebrate animals is strongly discouraged.
No animals may be harmed or destroyed for your project. The captivity of wild animals is not permitted. No live animals will be displayed at the science fair.

Grade Level Expectations:

4TH GRADE: Official display board required. Students may create models, demonstration, or experiments for their project. Students should demonstrate a clear understanding of the science concept being discussed in their project.

5TH GRADE: Official display board required. Students may create models, demonstration, or experiments for their project. Students should demonstrate a clear understanding of the science concept being discussed in their project.

6TH GRADE: Official display board required. Final, typed report with an MLA formatted bibliography. Experiments only! Students must be able to define the variables in their experiment and discuss the scientific method. Students should demonstrate a clear understanding of the science concept being discussed in their project.

7TH GRADE: Official display board required. Final, typed report with an MLA formatted bibliography. Experiments only! Students must be able to define the variables in their experiment and discuss the scientific method. Students should demonstrate a clear understanding of the science concept being discussed in their project. Outstanding data analysis and graphing expected.

8TH GRADE: Official display board required. Final, typed report with an MLA formatted bibliography. Experiments only! Students must be able to define the variables in their experiment and discuss the scientific method. Students should demonstrate a clear understanding of the science concept being discussed in their project. Outstanding data analysis and graphing expected.

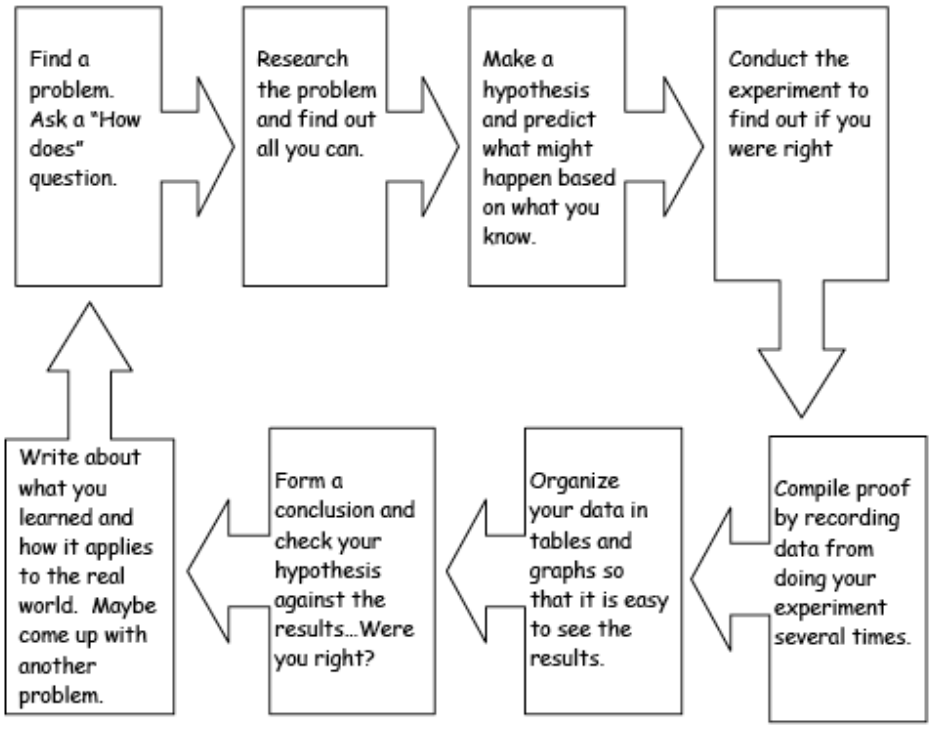
What is a Science Fair Project?

It's an investigation that tries to answer a question or solve a problem. It's an orderly process that involves:

1. Asking a question.
2. Gathering data.
3. Drawing conclusions
4. Presenting your work.

- An experiment shows that something is being tested and data is being gathered.
- Example of experiments can be "The Effects of Detergent on the Growth of Plants", "Which Paper Towel is more Absorbent," or "Does Chewing Gum Affect Test Scores?"
- All experiments need to follow the SCIENTIFIC METHOD – which is the way real scientists investigate in real science labs. This is what the judges will be looking for!

So What is the SCIENTIFIC METHOD?



How to Choose a Project:

Step1: Choose a Category that Interests You

All great projects start with great questions, but before you get started on a great question you need to pick a subject or topic that interests you. Choosing a topic is often the most difficult part. To get started, try the Science Fair websites listed under Mrs. M's Science Page (go to www.stmattsaints.org, Students, Mrs. M's Science Page) *While you are there, notice the due dates for parts of your science fair project.*
Your choice needs to fit in one of the two categories: BIOLOGICAL or PHYSICAL. Make a list of ideas. Remember, the best idea is one that you come up with and focuses on things that interest you. Look on the internet or in books for ideas but make it your own!

Once you've decided what you want to do, ask yourself these questions:

1. How will my question best be answered?
2. How hard will it be? Is it reasonable for me to do?
3. Is it safe?
4. How much will it cost? (little to nothing is best)
5. Can I get all the equipment/materials I need?

Step 2: Come up with a Good Question

Now that you have a category and an idea, it's time to write a question or identify a problem. To give you an idea of where to start, choose one of the questions below and fill in the blanks:

1. The Effect Question:
   What is the effect of _____ on _____

2. The How Does Affect Question:
   How does the _____affect_____

3. The Which/What and Verb Question:
   Which/What _____ (verb) _____?

Step 3: Keep a Journal

Write down your Question, and start keeping track of your plans, notes from sources, and a record of what you do during your experiment.

Step 4: Do Some Research and Form a Hypothesis

Research your topic as much as possible. Read about it in books, magazines, and on the internet. Talk to people who are experts, like veterinarians, doctors, meteorologists, or other people who work with the things you are investigating. It is important that you have at least three resources, and two of these must be offline sources (book, encyclopedia, or person). Make sure you take good notes and write down a bibliography of where you got your information. Keep this information in your Journal, and write a research paper to display at the Science Fair.

When you think you have done enough research and have all the information you need, it's time to write a hypothesis. A hypothesis is what you think will happen – a possible answer to your question.

Step 5: Do the Experiment

Now you've come to the cool part! Designing an experiment is really cool because you get to use your imagination to come up with a test for your problem. You get the chance to prove (or disprove) your hypothesis.
As you prepare to start your experiment remember the following:

- Review the Science Fair Rules.
- Be Safe.
- Be Kind.
- Take plenty of pictures to document your work

1. Gather your materials.

2. Write your procedure. A procedure is a list of steps that you will do to perform an experiment. This should be written as a set of directions that someone could follow to do the exact same experiment as yours.

3. Identify your variables. There are three types of variables:

    - **Independent Variable** – What you are **changing** to see what happens. Make sure you only change one variable.

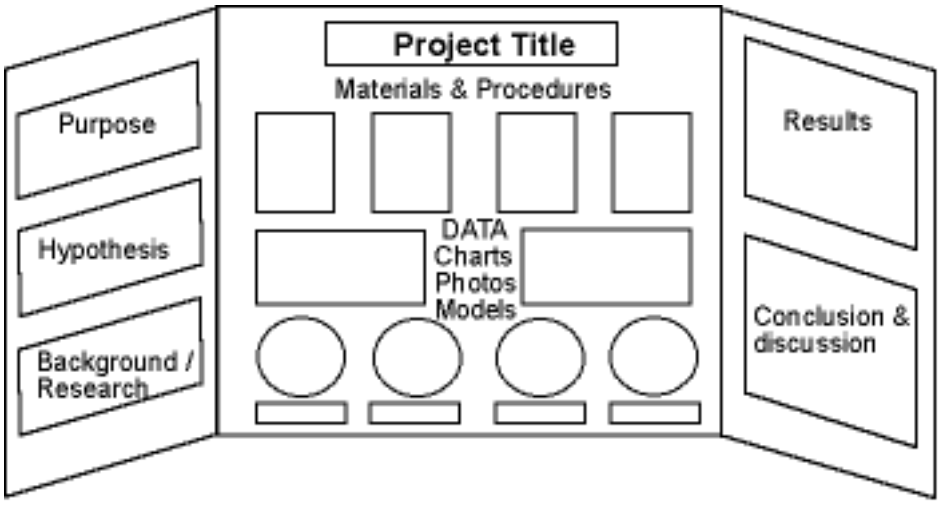
- **Dependent Variable**: What you are **measuring.** This is your data. This is what happens as a result of your test. Make sure you record all measurements.
- **Controlled Variables**: Everything that stays the same. Make sure you control all conditions and materials so that the independent variable is the only thing affecting the outcome.

4. Test, test test! Do the experiment more than once. Five times or more is recommended.
5. Have a large sample of data. Record all trial results, and then get an average for each trial. If you are using a group of things, then have five or more things in each group. If you are doing a survey or looking at behavior, then you need a very large sample (100 or more is great).
6. Organize your data in a way that makes it easy to read the results. Organizing your data makes it easier to identify patterns that might be occurring. Use tables, graphs, and charts to present your data- but make sure it makes sense. There is nothing worse than having graphs, tables and charts that have nothing to do with answering the question you are asking.

Step 6: Write a Conclusion

Tell what happened. Was your hypothesis right, wrong, or neither? Were you successful? What would you change about the experiment? Did the experiment make you curious about something else? What did you learn? How can this information be used in real life? Why was it important?

Step 7: Setting up your Display



Make it neat, make it interesting, make sure everything is there, and make it fit!

What to include on the display board:

- Title
- Problem (your question)
- Hypothesis
- List of materials
- Resources (a list of the books you read and the websites you used)
- Procedures (the steps you followed)
- Variables
- Results
- Conclusion
- Applications
- Pictures, pictures, pictures!

Beauty secrets of a great display:

- Use a computer to print out your information (NEATNESS COUNTS BIG!)
- Make sure the fonts are easy to read, and stick to one or two types.
- Mount white paper, pictures, graphs, and tables on colored paper to help them stand out.
- Use double stick tape or spray adhesive if possible. Glue sticks don't hold up well and liquid glue can make a mess.

What to put on the table:

- Any models or displays that will help explain your experiment.
- Your Journal
- Your Report

Step 8: The Research Paper

The purpose of your **research paper** is to give you the information to understand why your experiment turns out the way it does. The research paper should include:

- The history of similar experiments or inventions
- Definitions of all important words and concepts that describe your experiment
- Answers to all your background research plan questions
- Mathematical formulas, if any, that you will need to describe the results of your experiment

- For every fact or picture in your research paper you should follow it with a citation telling the reader where you found the information. A

citation is just the name of the author and the date of the publication placed in parentheses like this: (Author, date). Its purpose is to document a source briefly, clearly, and accurately.

- If you copy text from one of your sources, then place it in quotation marks in addition to following it with a citation. Be sure you understand and avoid plagiarism! Do not copy another person's work and call it your own. Always give credit where credit is due!
- Your research paper is to have these sections, in order:
    - Title page (with the title of your project, your name, and the date)
    - Your report
    - Bibliography

Overview

Year after year, students find that the report called the research paper is the part of the science fair project where they learn the most. So, take it from those who preceded you, the research paper you are preparing to write is super valuable.

What Is a Research Paper?

The research paper summarizes the theory behind your experiment. Science fair judges like to see that you understand why your experiment turns out the way it does. You do library and Internet research so that you can make a prediction of what will occur in your experiment, and then whether that prediction is right or wrong, you will have the knowledge to understand what caused the behavior you observed.

From a practical perspective, the research paper also discusses the techniques and equipment that are appropriate for investigating your topic. Some methods and techniques are more reliable because they have been used many times. Can you use a procedure for your science fair project that is similar to an experiment that has been done before? If you can obtain this information, your project will be more successful. As they say, you don't want to reinvent the wheel!

Special Information to Include in Your Research Paper

Many science experiments can be explained using mathematics. As you write your research paper, you'll want to make sure that you include as much relevant math as you understand. If a simple equation describes aspects of your science fair project, include it.

Step 9: Impressing the Judges

- Dress nice, smile, be polite, and speak clearly.
- Introduce yourself and your project
- State your Title, and tell the judge why you chose this experiment.
- State your problem and your hypothesis.
- Tell them about the experiment. Be sure to include you materials, and steps.
- Point out your variables
- Let the judge know if your hypothesis was correct
- State real life connections and applications.
- If you get nervous, look at your display board and go through everything piece by piece. Nothing makes a judge feel worse than to make a kid so nervous that they forget something or repeat themselves
- When you are done, shake hands with the judge, and thank them for their time.
- Finally, practice at home with your parents.