Redeemer Classical Christian School

SCIENCE AND ARTS FAIR

Science Project Information

"If you enjoy studying the world around you to learn about what God has created and how it works, or what people have created with the amazing minds God has given us, then you should prepare a science project and compete in the Science and Arts Fair."

WHAT IS THE SCIENCE AND ARTS FAIR?

The Fair is an event where students gather to display and present their Science projects. It's an opportunity to learn science and present information – all in one project. Judges will evaluate your complete project, including your topic, your methods, your data, and your display. You should also expect to be asked a few questions about your project.

WHEN IS THE RCCS SCIENCE AND ART FAIR?

The Fair will be held after school at RCCS on **Friday, March 16, 2012**.

HOW DO I CHOOSE A TOPIC?

You should choose a topic about something that interests you. See **Project Types and Ideas** for some ideas.

WHAT ARE THE RULES?

All projects should meet the **Science Project Guidelines**
Experimental projects should meet the **Guidelines for Using the Scientific Method**
Students in grades 6-12 should know an **Important Rule for Students in Grades 6-12**

HOW WILL THE PROJECTS BE JUDGED?

An independent panel of judges will score the projects. See the **Science Project Judging Guidelines** to see how your project will be scored. As you develop your project you should try to make sure it will score well in each of the criteria.

HOW DO I SIGN UP?

If you would like to submit a science project, please complete the **Science Project Registration Form** and submit it to your teacher. You will be given extra credit in your science class for your participation. Registration forms are due to your teacher by **January 31, 2012**.

Questions? Call Science Department Chair, Mr. John Cicone at 410-529-3070, or ask your teacher.

Project Types and Ideas

The best way to choose a science fair project idea is to think about what interests you. Science can be found in practically any interest or activity people do. As you develop your idea, you will need to decide which of the five main types of science fair projects will be best for your project. When you choose your topic and type you should get approval from your teacher to ensure you meet his/her requirements.

Here are the five project types and some project ideas that you can use or adapt. Libraries, book stores, and the internet are other sources of ideas for science fair projects.

1. Experimental

In this type of project, you use the scientific method to propose and test a hypothesis. After you conduct the experiment and draw a conclusion, you accept or reject the hypothesis.

Sample project ideas:

what materials make good insulators • what materials reduce friction • what is the best playground material • the effectiveness of antiseptics and soaps on household bacteria • the effect of sunlight (or water, or soil, or fertilizer, or sound) on plants • the effect of temperature on electrical resistance • is there an ideal pressure for a soccer ball • can eggs withstand a greater force from one direction than from another • what factors improve the flight of a paper airplane • what factors affect the bounce of a dropped ball.

2. Demonstration

A demonstration usually involves re-testing an experiment that already has been done by someone else.

Sample project ideas:

construct a clay model with sections showing the layers of the earth (or human skin, or ocean floor, etc.) • create “fossils” using plaster casts • construct a model of the heart or ear • show where different flavors are tasted on the tongue • what does a magnetic field look like • measure volume and density of several objects • test minerals for various properties • make an indoor compost bin using red worms • how water moves in plants • how do charged objects act toward one another • how are crystals formed • how can salt be removed from water • which foods contain starch • do preservatives prevent mold from growing • the strongest types of fasteners • what is friction • a chemical clock.

3. Research

In this project, you collect information about a topic and present your findings.

Sample project ideas:

The life cycle of non-seed plants • use food webs to show how members in a community get their energy • prepare a nature guide to the plants and trees on the school grounds or in your neighborhood • types of bird beaks and their function • examples of potential and kinetic energy • the wind chill factor • compare predicted weather with actual weather • how the body reacts to exercise • consumption of fruits and vegetables or fat by your classmates or adults with dietary recommendations • what is a shooting star • how much does it cost to operate a light bulb • everything you always wanted to know about your favorite planet, animal, etc.

4. Model

This type of project involves building a model to illustrate a concept or principle.

Sample project ideas:

make weather instruments • make a musical instrument • construct a working thermometer • generate electricity • make a working model of muscles and bones • build a solar heater • make an electro-magnetic crane

5. Collection

This type of project involves displaying a collection to illustrate your understanding of a concept.

Sample project ideas:

categories of plants • casts of animal tracks • bird nests with building materials • monocot or dicot seeds or flowers • simple machines used in everyday life • items that show different forms of energy (chemical, light, sound, heat, electrical, mechanical) • common minerals or rocks • animal population pictures (herds, colonies, schools, etc.) • different types of animal teeth • recyclable materials and their uses • insects and arthropods • match plants with their seeds

Science Project Guidelines

Scientists try to learn more about God's physical world by posing questions which can be answered by research or experimenting with objects or ideas to solve a problem. Even junior scientists can ask and answer interesting questions about the world in which we live.

These are the guidelines:

1. A project may be submitted by an individual, a team of up to 3 students, a class, or a club.

2. Projects involving human subject studies must have prior approval from the Fair Committee.

3. A project may not allow inhumane treatment of live animals. You may do a study of live animals as long as they are not mistreated. They may **not** be brought to the Fair. Approval of the project by the Fair Committee is required **before** starting the study of live animals.

4. No harmful chemicals, explosives, or other potentially dangerous materials are allowed at the Fair. Chemistry studies should have parental supervision. Results can be recorded with a photograph instead of bringing chemicals to the Fair.

5. If electrical power is required, please use a battery. However, a few electrical outlets may be available with prior notification.

6. Experimental projects should comply with the *Guidelines for the Scientific Method* contained in this packet. Other projects should have a title, a question that the project attempts to answer, the research / demonstration / collection / mechanism, and an answer to the original question.

7. The project display must
   a. include a title, hypothesis, results, conclusion (for Experimental projects), and student name(s).
   b. be free-standing, durable, and safe.
   c. not exceed table space of 48" wide by 30" deep
   d. be self-explanatory.

8. All projects must be student-made (not parent-constructed). **Commercial ready-to-assemble models are not allowed**.

9. Most any resource or help is permissible as long as the student understands the work and credits the resource.

Guidelines for Using the Scientific Method

Courtesy of sciencebuddies.com

The scientific method is a process for experimentation that is used to explore observations and answer questions. Scientists use the scientific method to search for cause-and-effect relationships in science and nature. In other words, they design an experiment so that changes to one item cause something else to vary in a predictable way.

The scientific method is usually described as a series of steps. The steps may differ slightly among teachers, scientists, publications, and web sites. But they generally look like this:

1. Ask a Question	The process starts when you ask a question about something you observe. Who, What, When, Where, Why, Which, or How?
2. Do Background Research	Rather than starting from scratch in putting together a plan to answer your question, you want to be a savvy scientist using library and internet research to help you find the best way to do things and ensure you don't repeat mistakes from the past.
3. Construct a Hypothesis	A hypothesis is an educated guess about how things will work. It should be written in a way that answers your original question and should be something you can easily test.
4. Do the Experiment	Your experiment tests whether your hypothesis is true or false. It is important for your experiment to be a fair test. You conduct a fair test by making sure you change only one factor at a time while keeping all other conditions the same. You should repeat your experiment several times to ensure your test results are valid.
5. Analyze the Data	Carefully review all of the data collected from your experiment. Use charts and graphs to help you analyze the data and patterns. Describe the meaning of the results.
6. Draw a Conclusion	Discuss whether or not your results support your hypothesis and if there is a relationship between the independent and dependent variables. You may want to include key facts from your background research to help explain your results.
7. Communicate Your Results	To complete your science project you will communicate your results to others on a display board and/or final report. Professional scientists do almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster at a scientific meeting.

"*What if my hypothesis is false*?"

If you conduct your experiments and discover your hypothesis is false, don't worry. And don't change your results to fit your hypothesis. Simply explain why you think things did not go as expected. Professional scientists commonly find that results do not support their hypothesis and they use those unexpected results as the first step in constructing a new hypothesis. If you think future experimentation is needed, describe what you think should happen next. Scientific research is an ongoing process, and by discovering that your hypothesis is not true, you have made huge advances in your learning that will lead you to ask more questions that lead to new experiments. Science fair judges do not care about whether you prove or disprove your hypothesis; <u>they care how much you learned</u>!

Important Rule for Students in Grades 6-12

If your teacher has no specific project requirements you should meet one of the 2 requirements described below to get full credit for your project:

Submit an **Experimental** type project

-or-

Submit another type project (demonstration, research, model, or collection) that goes beyond the basics of that project type. For example:

DEMONSTRATION: Instead of just building and describing an oscillating clock chemical reaction, predict and test how temperature would affect the rate of the clock reaction.

RESEARCH: Instead of just researching and describing how a solar energy system works, conduct additional research of regional fuel prices, economics, and/or weather patterns to predict where the systems would best be marketed.

MODEL: Instead of just making an electro-magnetic crane, predict and test the mass that can be lifted at different voltages. Or use the crane to test the performance of different types of batteries.

COLLECTION: Instead of just displaying your insect collection, observe how the wing lengths of the insects differed from year to year and look into possible explanations for the phenomenon such as pesticide use, temperature, or precipitation.

Science Project Judging Guidelines

These are the guidelines the judges will use to evaluate projects that use the scientific method. As you develop your project you should try to make sure it will score well in each category. For other project types, similar guidelines will be used but will not include references to the scientific method.

SCIENTIFIC INVESTIGATION (35 points)
The project focused on a single, clear problem.
Sufficient research was performed and presented.
A logical hypothesis was developed.
Scientific procedures were sufficient and accurately executed.
Variables and controls were clearly recognized and defined.
The data collected were sufficient to reach a conclusion.
The conclusion was limited to the results obtained and addressed the hypothesis.
Limitations of data and sources of error were identified.

THOROUGHNESS (20 points)
The project covers the topic completely.
The project reveals a full understanding of the topic.
The project describes other approaches and theories.
Replication and duplication were utilized.
An adequate amount of data was collected and thoroughly analyzed.
The project acknowledges God's part in the science of the project.

SKILL (15 points)
The experiments were designed with care and anticipation.
The experimental procedures were well conducted.
Data collection was done with precision.
Technical problems were overcome and not merely avoided.

CLARITY (15 points)
The student understands the research and can explain what was done.
The student understands the meaning of the results.
The student can describe how this study can be improved.
The student understands whether or not the data support the hypothesis.

CREATIVITY (15 points)
The topic was original and the result was not known in advance.
The approach to conducting the experiment was original.
The display is creative.

Science Project Registration Form

Choose a topic you would like to investigate. Think about what interests you. Form your thought into a question and submit your topic to your teacher **no later than January 31, 2012** using this form.

Student's Name _____ Grade ____ Phone # _____

Teacher's Name _____

Names of Student Partner(s), if any:

Name of 2nd student: _____ Grade _____

Name of 3rd student: _____ Grade _____

Type of Project (check one):

□ Experimental
Hypothesis (if known): _____

_____

□ Demonstration
□ Research
□ Model
□ Collection

Description of project:

Title of your project (if known): _____

_____

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no later than January 31, 2012.

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