Lakeview Science Fair
2012

Science Fair Handbook

Table of Contents

Section 1: Lakeview 2012 Science Fair Overview

For the latest information, check out our website at
http://lwsd.org/school/lakeview/Activities/Pages/ScienceFair.aspx

Early Registration Deadline is March 7th (you will get one extra ticket for the price raffle if you register by the early deadline).
Registration Deadline March 14th.
Students in 3rd and 4th grade will participate in the science fair as part of a long term homework assignment and will be registered by their teachers.

The event will take place on Thursday April 19th

Grades K-6 can present a project from any category

What is a Science Fair?

A Science Fair gives students of all ages an opportunity to express their interest in science. From collections to experiments, they choose a topic of interest, and prepare a project to share with the community.

A project of this type is an excellent method of using almost all of the educational techniques and information that students are being taught in school. These projects involve the use of reading, library skills, grammar, verbal communication skills, mathematics, logic, art, organizational skills, and science.

Benefits of a Science Fair

For the Students:
A. Increased knowledge
B. Improved speaking and writing abilities
C. Learn and use the Scientific Method
D. Self confidence building
E. Promote enthusiasm for science
F. Recognition

For the Parents:
A. Pride in their child's successfully completed project.
B. An opportunity to join their child in the study of science.
C. An opportunity to meet community members.

Entering the Science Fair

All Lakeview students may enter the Science Fair. Work is to be done at home by individual students or teams of two. Materials for projects need to be provided at home. Fill out the entry form (available at front desk or `http://www.lakeviewptsa.org/`) and return it to school by March 14th to guarantee a backboard.

The project must be the student's idea!

Parents may help a student scientist by:

1. Suggesting references and layout ideas for the project.
2. Helping construct the backboard that will display the project.
3. Providing mechanical help where it is obvious that a student needs help.
4. Reviewing the Scientific Method with the student scientist.

Certificates will be given to all participants.

Section 2: Planning the Project

Steps to Prepare a Science Fair Project

1. Select a Topic

See the project ideas list in the next section for suggestions. It can be incorporated into an Observation, a Collection, an Invention, a Research Report, or an Experiment. See categories below.

2. Gather Background Information

Gather information about your topic from books, magazines, the Internet, people and companies. Keep notes about where you got your information.

3. Scientific Method

State the Purpose of your experiment – What are you trying to find out? State your Hypothesis – your guess about what the answer will be. Describe how you will measure your results.

4. Run Experiment and Record Data

Do the experiment you have chosen. Keep notes in one place. Write down everything you might need to reference later.

5. Graphs and Charts

What happened? Put the results in graphs and charts. Answer the question posed in the Purpose of the experiment. Was your Hypothesis correct or not? Why?

6. Construct an Exhibit or Display

It should be neat. Make it fun, but be sure people can understand what you did.

7. Use the Scientific Method

Tell what you did and exactly how you did it by following the Scientific Method list on page 9.

8. Practice Presentation (Optional)

Practice explaining your project to someone (parent, friend, grandparent, etc.) This will help you on Science Fair day, when you stand by your project and explain it.

9. Have fun and remember … this handbook is a guideline. Use it as a resource, not a rule. Variations of these guidelines are encouraged and welcome!

Selection of the Project

There are five categories:

Note: The first two categories listed below, Experiments and Observations, follow the scientific method and are recommended for Science Fair projects. Any category, however, may be used.

A. Experiments: Test to illustrate scientific principles. Experiments should test the questions using the scientific method.

Examples: Observe and record bean seed growth, Demonstrate an electrical circuit.

B. Observations: Make observations of scientific data, record information, and organize the display.

Examples: Ant farm, Metamorphosis, Weather.

C. Collections: Display an organized collection using categorization and labels.

Examples: Leaves, Rocks, Seeds, Animal tracks.

D. Inventions: Develop a product or method. Make a job easier, Solve a problem.

Examples: Invent a machine to save time doing something, Develop a computer program to work out a problem.

E. Research: Investigate an area of interest and display a written report, giving credit to your sources.

Examples: Famous scientists, Recycling, Salmon runs.

Safety Note: No fire or vertebrates allowed as part of projects. No live animals may be displayed – photos may be used instead for display purposes.

Project Idea List

The following are display type projects suitable for beginners. Students should be encouraged to make personal observations rather than taking material out of a book or magazine.

Care and Feeding of Birds

Butterflies

Growing Trees

Human Eye

Inside Fruit

Leaf Characteristics

Migration of Birds

How Plants Reproduce

Nutrition

Insects: Bad Guys or Good Guys?

Parts of a Bird

The Solar System

Parts of a Flower

Parts of the Eye

Parts of a Hen's Egg

Parts of a Horse

Plants Grow Toward Light

Prehistoric Animals

Ants

Project Idea List (cont)

The following projects are a little more extensive. As you can see, the project possibilities are endless!

Cross-section of a volcano

A chemical change

Types of fuels

A crystal radio set

Action of a solenoid

A door chime

How electricity is made

Air currents

Climate

Electromagnetism

A Projector

Fluorescent lights

Functions of a camera

Glass and its uses

Model airplanes

How to develop a picture

Parts of an electric motor

Light

Water finds its own level

Snowflakes

Heat can produce electricity

Expansion and contraction of liquids

Which metals conduct heat?

Sending messages by electricity

Inside a cave

Operation of a doorbell

Solar Energy

A weather station

Our solar system

Phases of the moon

Salt and its uses

Weather and man

Rotation of planets

The telephone

Simple machines

Sound

Fingerprinting

The telegraph key

Man's natural resources

Cross-section of the Earth

Subject Area Expansion

ELECTRICITY

· Demonstration of principles; how is current affected by type of conductor, temperature, filament, etc.
· Compare electromagnets for strength, wires for conductivity.
· Principles of fluorescent lights; how do they compare with filament bulbs in effectiveness and cost.

PHYSICS

· How metals compare in conducting heat.
· How metals compare in density and buoyancy.
· Efficiency of different types of steam engines
· How does the amount of oxygen affect the rate of burning?
· Does temperature affect solubility?
· Are some substances more soluble than others?
· How do airplanes fly? What is the best wing shape?
· How do waves carry energy?
· How do magnets work? How are they made?
· Compare densities of different gases.
· How is light affected when passing through water, e.g. viewing objects under water, formation of rainbows?

CHEMISTRY

· Chemical change and the factors that affect the rate such as heat, light and catalysts.
· Acidic and basic solutions, how are they produced, how can they be modified, practical considerations in soil, lakes, food; acid or basic solutions around the house.
· Factors affecting the making of glass.
· The effects of salts on the freezing point of water and other liquids.

METEOROLOGY

· Day Length – record length of days and nights over a period of time; what effects do the changes have on things like household plants, pets, etc.
· Air Movement – is air in your house the same temperature at floor level and near the ceiling?
· How could you spread heat more evenly through the house?

· Dew: Does it form on clear or cloudy nights? What other frost factors increase the amount of dew? Can you measure how much dew is formed in a square meter?
· Temperature – How does the temperature change during the day? What time is usually the warmest? Can you construct your own thermometer to keep your own records?
· Rain – How does a rain gauge work? Measure the rainfall over a period of time and compare it with the daily weather reports. Principles of cloud seeding and other weather modifications.

BIOLOGY

· Insects – personal observations on life cycle, feeding habitats, population, flies, bees, butterflies.
· Nutrition – plants and fertilizer.
· Studies – how pet mice respond to different types of food (pellets, crushed, solid). How do plants get nitrogen?
· Plants – Why do plants grow towards light? The effects of gravity on seed germination. How water moves through a plant. How plants reproduce and factors that affect the process. Why do plants move?
· Soil – the importance of earthworms to soil and plants. The effect of soil components and organic matter on growth of plants.
· Field Studies – plant and animal life on the school grounds, a creek or stream, a grassy field, a tree, a home garden, a balanced aquarium, during winter. Diets of various animals.

Other Miscellaneous Projects

· The effect of using different rising agents in baked bread on taste and appearance.
· What toilet paper is safest to use in a septic system.
· What strategy/motion results in the fastest pitch of a baseball (or kick of a soccer ball).
· How does cafeteria food preference differ by grade level?
· Which liquid would make a plant grow the fastest--water, orange juice, soda, beer or apple juice?
· Which cheese will mold first between ricotta, cheddar, mozzarella and Monterey jack cheese?
· Will a rotten banana create CO_2 and blow up a balloon?
· Which do dogs like most, no broccoli, cooked broccoli or raw broccoli?

Science Fair Resources

Many Science Fair project books can be found in the school library.

Many more books are available through the King County Library system.

You can check listings at http://www.kcls.org/.

Some titles included:

1. 100 amazing first prize science fair projects, Glen Vecchione, Sterling Pub. Co., 2005,

2. Environmental science fair projects using water, feathers, sunlight, balloons, and more, Thomas R. Rybolt and Robert C. Mebane, Enslow Publishers, c2005,

3. Genetics and evolution science fair projects using skeletons, cereal, earthworms, and more, Robert Gardner, Enslow Pub., c2005,

4. Ecosystem science fair projects : using worms, leaves, crickets, and other stuff, Pam Walker and Elaine Wood, Enslow Publishers, c2005,

5. First place science fair projects for inquisitive kids, Elizabeth Snoke Harris, Lark Books, c2005,

Useful websites:

http://school.discovery.com/sciencefaircentral/index.html

http://www.sciencebuddies.org/index.htm

http://www.ipl.org/div/projectguide/

http://www.cdli.ca/sciencefairs/

http://www.scifair.org/

http://www.all-science-fair-projects.com/

http://homeworkspot.com/sciencefair/

http://www.cyberbee.com/

Guide for Planning

Check off each step as you complete it in the order below.

___ 1. Select an area of science interesting to YOU!

___ 2. State what you will show or prove and title project.

___ 3. Type or write up your HYPOTHESIS.

___ 4. Continue research. Locate MATERIALS. Read reference books and carefully outline and keep notes. Interview adults and peers, discussing your projects with them.

___ 5. Plan PROCEDURE.

___ 6. Plan your model and diagram on paper. Refer back to illustrations you found in reference books. (Your model is the experiment used to describe your project.)

___ 7. List MATERIALS needed and carefully
CONSTRUCT YOUR MODEL. Be neat.
GATHER INFORMATION.

___ 8. Make a diagram of your model on firm cardboard. Accurately label the diagram to clearly tell what your model shows. See Section 3 for more information about displaying your project. Write CONCLUSION.

Remember to keep all your notes together. A bound notebook is recommended.

The Scientific Method

Use the following method to prepare your project.

Explore a Question

QUESTION: What is the question I want to answer?

Make a Hypothesis

HYPOTHESIS: What do I guess will be the answer to my question?

Organize Materials

MATERIALS: What materials will I need to complete my experiment?

Test or Experiment using a Procedure

PROCEDURE: What steps do I need to take to carry out this experiment?

Gather Data

GATHERING INFORMATION: What happened during the experiment? What did I observe?

Draw a Conclusion

CONCLUSION: What did I learn?

Section 3: Preparing the project for presentation

Projects should be no larger than 4 feet wide, 3 feet high and 2.0 feet deep. They should be capable of standing on their backboard. Students need to provide their own materials. They also need to have the following information written on their board.

1. Name

2. Title of project

3. Grade

4. Teacher

Suggested Backboards

1. The PTSA will be purchasing project boards for all participants signed up by March 14th.

If you prefer to get your own display board, remember that exhibits should be durable. Use stiff, triple-thick corrugated cardboard, project board, foam core board, masonite, pressed wood, particle board or material that is rigid and withstands use. Use hinges, tape, or v-grooved, triple-thick, corrugated cardboard for the wings. You can also purchase project board at stores such as Office Depot, Michaels, or Ben Franklin.

3. Titles should be large, clearly written, and neat.

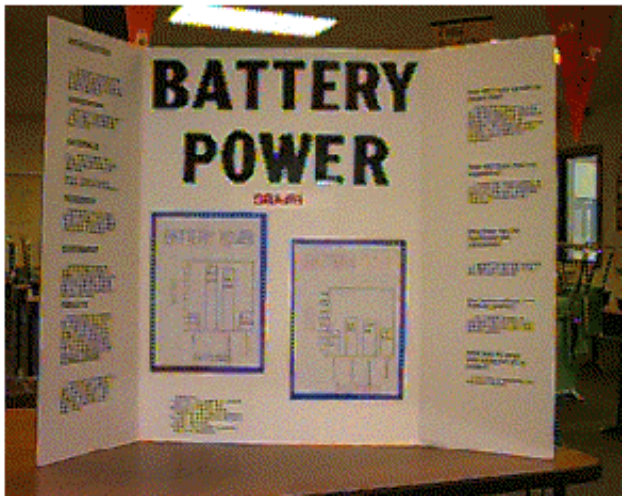
4. Write clear explanations using charts, graphs, tables, and photographs.

5. Use the subtitles to make your project tell a story e.g. Question, Hypothesis, Materials, Procedure, Gathering Information, and Conclusion.

6. Be sure to use the scientific method. You can also use a logbook of information (journal, notes, etc.), the date your observations were collected, when you performed the experiment, and the equipment available at the exhibit.

**** These project boards are reusable.**

The following presentation was taken from the Internet. It was done by Jenny, a 5th grade student in Minnesota.



Title: Battery Power

Introduction
In my project I was trying to find out what battery lasts the longest. I will also try to determine if the cost of the battery has anything to do with the power it has.

Hypothesis
I think the Duracell battery will last the longest. I also believe that the more expensive the battery the longer it will last.

Materials
Paper, wires, stopwatch, battery holders, metal connectors, computer, light bulbs, and graph paper. Batteries – Duracell, Eveready, Energizer, and BA 30 "Army batteries"

Research/Sources of Information
I researched on how a battery produces electricity. The battery is a dry cell. A chemical reaction between the electrolyte and the zinc electrode helps produce electricity.

Vocabulary
Electrodes – The negative or positive part of an electric cell.
Electrolyte – A liquid or moist substance that conducts electricity.
Dry Cell – An electrical cell that has a moist electrolyte.
Terminal – The negative or positive end of an electrolyte.

Experiment

I experimented by testing the power of four different brands of batteries. I did this by hooking up the batteries to a light bulb. I then kept track of the length of time each bulb stayed lit. I tested two batteries from each of the four brands.

Results

After the testing was completed the following results were recorded: The Duracell battery lasted the longest, 101 hours and 20 minutes; Energizer battery, second, 99 hours and 17 minutes; Eveready battery, third, 28 hours and 30 minutes, and last but not least was the BA 30 batteries, 25 hours and 58 minutes.

Conclusion

I thought the Duracell battery would last the longest. I guessed right! It was two hours and 3 minutes longer than the Energizer. I also determined that the cost of the battery does relate to the amount of battery power.

Optional

· *How did I come up with my project idea?* My dad and I were getting ready to go on a canoe trip and we were debating on what kind of batteries to purchase for our flashlights. We wanted ones with a lot of power. So I thought that would be a good science fair experiment.

· *What did I learn from my experiment?* I learned that science fair projects are a lot of hard work. The most powerful battery of the four I tested was Duracell. It was also the most expensive.

· *How close were my hypothesis and conclusion?*

I guessed that Duracell would last the longest and I was right. It was also the most expensive.

· *Did I learn anything new from my project?* Yes, I learned through this experiment that if you buy a more expensive battery you get a more powerful battery.

· *What was the most interesting part of my project?* It was when my hypothesis and conclusion matched.

Jenny
Grade 5
Mr. Lawrence
Eagle Lake Elementary School
Eagle Lake, Minnesota

Section 4: Presenting at the Science Fair

Where, When, and How?

Location: Lakeview Elementary School

Date: April 19th 2011

The schedule for the event is posted on the website.

There will be volunteers ready to help students set up their displays. The students will be expected to stand by their projects to discuss their work with a Science Mentor, as well as with classmates and the public. Students are not expected to stand by their projects for the duration of the Fair – they will be given time to explore the many other projects being displayed.

Section 5: Frequently Asked Questions

Q: What is the first stage of starting a project?

A: All projects start with topic ideas. These ideas can be developed into research and experimentally tested questions. Some possible ideas will be or have been discussed in your son/daughter's class. Other ideas can come from television, hobbies, magazines, newspapers, books and other people. The most important aspect of a project topic is that the student is interested in the subject! Any activity where your child may say "I wonder why this works?" or "I wonder what would happen if …" are very likely good project topic ideas.

Q: Are there any topics that should not be considered?

A: Any topic which is considered dangerous must be omitted. Experiments involving animals and human beings are very difficult, especially for beginners. Cruelty to test subjects will not be permitted. There will be no FIRE or LIFE ANIMALS allowed at the Fair for safety reasons.

Q: Why should I encourage my son/daughter to participate?

A: As was discussed earlier, this activity requires the use and learning of many skills and information. As a parent of staff member, you are aware that children need to be as well educated as possible. This activity is a very important opportunity for practical application of education. Students involved in science fairs have gained knowledge as well as college scholarships, occupational goals, other awards, and many other benefits.

Q: OK, the Science Fair is coming. I don't know anything about science! What do I need to do?

A: First and probably most important is to be encouraging to your child! Sit down and listen to the ideas that he/she has and then discuss the ideas with them.

If your child does not have any ideas for a project, please ask if they have been to the school or public library. Do not be surprised if they say "Yes" to this question. They may have looked for "ready-made" projects and found none to their liking.

An interest or idea has to be worked into a topic. Before a topic is finalized, the student needs to research the proposed topic. They need to learn what has already been found, what books are available on the subject, and if they believe that the topic is reasonable for their level of education.

When the student is researching, he/she should start asking some questions like: "What has not been solved"; "What would be the effect of XXX on this?" and "Is this the only way to do this? These questions should be written, as they are the start of the project's topic. The list of questions needs to be looked at and reduced to just one question that the student would like to study.

The student then needs to look at the researched information and predict a possible answer to the selected study question. This proposed answer is the project HYPOTHESIS.

Now, ask your child how they are going to experiment on this topic. This will give you an idea of possible costs and any unexpected requirements.

The planning of the experimental activity, also known as the PROCEDURE, is very important. The procedure must be a detailed step-by-step set of actions or activities to be performed during the experiment. Your child must be careful in designing the procedure because they must not change more than one variable in the experiment. An example of changing more than one variable is: if testing fertilizers on tomatoes you have different pots, different soils, and different amounts of water. This experiment would be called an uncontrolled experiment because we would not know what variable might have caused a change in the tomatoes. Was it the pots? Soil? Water? Or a combination of all?

After all of the above has been done, the student should review the Scientific Method included in this handbook. This step allows the student to write out their exploration question, the hypothesis, the materials needed, the procedure, and data gathering and a conclusion. Bring this information to the Science Fair along with the project.

Q: How much experimentation should my child do?

A: There is no limit on the amount of experimentation that can be done. The better experiment has more test subjects. The more test subjects improves the validity of the results.

If you only test one thing, the experiment could end quickly and with inaccurate results. After an experiment is completed, some students will repeat or continue the experiment for more information. Some students will set up two or three experiments to run at the same time. Students also need to obtain as much data as possible. Data is any information that the student can observe, measure, and then record. It is used to determine if the hypothesis is valid or invalid.

Q: What size of space can the project occupy at the Science Fair?

A: The approximate size requirement for the science fair is that the project should fit inside a 3 foot x 1.5 foot area.

Q: How much help can I give my son/daughter?

A: You are encouraged to assist your student scientist as long as they are the major planner, experimenter, report writer, and display developer. The key roles of a parent in these projects are: morale booster, logic testers, extra sets of hands and eyes, possible treasurers, and possible transportation directors.
Please avoid the situation where your child claims that they are too busy, sick, etc. to do their project and they ask you to do their project for them. Parents need to guide their child's work and assist them … not do it for them!
With younger children, parents should give extra help. If your child is just beginning to write it may be an ordeal for them, rather than a constructive exercise, to write down their thoughts. Parents can type or write the child's words.

Q: How is my child's project evaluated at the Science Fair?

A: The student's project is shared and enjoyed by all who visit. Mentors will give feedback on each project. Each participant will receive a ribbon of recognition.

Contact Information
If you have questions concerning the Science Fair, please send an email to lakptsascience@gmail.com.