The Farmland Elementary PTA's
Science Fair Handbook
The Science Fair will take place
Thursday, February 23, 2012 from ***6:30 pm-8pm***
in Farmland's gym and multi-purpose room.

Dear Parents,

We are thrilled that your child has chosen to participate in Farmland's Science Fair. We feel that this is a valuable learning experience for our children. Science activities can help children think critically and gain confidence in their own ability to solve problems.

Projects will be completed at home, so it is important that your child have your support. Students may work alone, with a partner, or in a group. Projects will not be judged or graded. Everyone who completes a science project receives a ribbon.

Parents can drop off the completed science boards at the Farmland multi-purpose room from 3:15 to 4:15 p.m. or between 5 p.m. and 6 p.m. We need volunteers to stay and help us set up the room at 5.

During the science fair, scientists and engineers from the Farmland community will review and offer comments on the projects. Everyone is welcome to attend the fair, not just the participants!

If you (or your child) have any questions, please contact a member of the science fair committee.

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Amy Chang, amykchang@gmail.com
Caroline Cooksey, carolinecooksey@yahoo.com

Dear Students,

We hope you are excited about doing a science fair project! The most important things to remember are: This is *your* project. **Don't let your parents do it for you**. Choose a project that interests you but not one that is too big. Have fun!

This packet will tell you the rules of the science fair, give you project ideas, provide you with places to look for project ideas, help you organize your project, and suggest ways to organize your display board.

You may work alone, with a partner, or in a group. The information displayed on the board may be written by hand or you may use a computer. You may illustrate your project with photos, drawings, charts, stickers, or even objects. Be neat! Be creative!

Projects will be displayed at the fair, and a scientist or engineer will listen to you talk about your project and comment on it. Everyone who participates on a project will receive a ribbon at the science fair. (If you can't come the night of the fair, just make sure your board is at Farmland and we will display it for you.)

SAFETY RULES

1) DO NOT use poisons, dangerous chemicals, or open flames for the project display at the Science Fair. These may be used for the project at home with proper parental guidance, but they will not be allowed in the school.
2) Electrical circuits are usually NOT available for use during the science fair. If you need electricity to run your model, demonstration, etc., you must provide battery power.
3) Live animals will not be allowed at the fair. If you use live animals for your project, adults must closely supervise the project to ensure that the animals are treated humanely.

Parent Information

The Science Fair should be an enjoyable experience—for you and your child! Please assist with anything that becomes so challenging it is no longer fun, but try to avoid helping so much that you take over the project! You can assist your child in many ways:

- help your child explore different possibilities before choosing a topic
- help gather materials
- supervise dangerous activities
- ask questions
- encourage your child to work out problems without having you make the decisions

CHOOSING A PROJECT

Keep it simple, and help your child choose a project that:

- Is interesting to the child and relates to the child's own experiences
- Is realistic for the time available
- Is appropriate to the child's ability

You should also veto any project ideas that you feel will be too expensive, require equipment you don't have, or are too complicated.

The best project answers a question your child doesn't know the answer to already, and is tied to something he or she is learning in school.

Tips for a successful project:

- Narrow the topic to ONE SPECIFIC question or problem
- Design an experiment that tests only ONE VARIABLE
- REPEAT EXPERIMENTS a few times and use an average result

OTHER WAYS TO HELP

- ✓ Help your child understand that science is not just a subject; it is a way of looking at the world.
- ✓ Your child might not have been taught all the procedures for conducting an experiment yet. Offer guidance but allow your child to feel that this is his/her project.
- ✓ If your child does a demonstration or experiment, encourage your child to predict what will happen. Predicting gives the student more personal investment in the project.
- ✓ Help your child stay on a timeline to avoid a last-minute scramble to complete the display.
- ✓ Realize that a good project does NOT have to be elaborate or costly. A straightforward project that is *finished* and well executed is better than a complex one that can't be completed and leaves your child frustrated.
- ✓ **It's OK if your first-grader's display looks like it was done by a first-grader**.

Student Information

The Science Fair gives you a chance to share with others something you have learned about science. You will work on your project at home and display your results on the project board you received; **on the day of the fair, please bring the finished project board to Farmland between 3:15 p.m. and 4:15 p.m. or between 5 p.m. and 6 p.m.**

CHOOSING A TOPIC

You can choose from several types of projects:

- **A Collection** such as rocks, shells or other natural objects.
- **A Model** such as a model of the solar system or a clay model of an ant.
- **A Demonstration** showing how something works, or explain why something happens the way it does. For instance, you could demonstrate how a simple machine like a pulley works or construct an electric generator.
- **A Display (of illustrations)** about a science subject. For example, illustrations of animal homes or the lifecycle of a butterfly.
- **An Experiment** in which you ask a question and then design a procedure to test a hypothesis.
- **An Invention** that solves some problem.

On the next pages you will find 1) guidelines for doing a project and suggestions for arranging your display board, 2) more detailed descriptions of how to do the different types of projects, and 3) some sample projects ideas, and resources for finding even more project ideas.

Steps to Help You Do a Science Fair Project

1) **List possible topics**. Think of things that interest you and activities you like to do. It helps to make a list of things you want to know.
2) For each of your ideas, **ask yourself questions** like, 'what can I count or measure with my idea?' or 'how many different groups of objects can I make?' or 'what can I build to show how this idea works?' You might want to make a list of questions for each topic you are considering.
3) **Choose your project**. Which idea do you like best? Which project will be the most fun to do? Ask your parents or other grownups if they agree.
4) **Plan your project**. Gather background materials to learn more about your topic. Take notes!
    a) Make a list of all the *materials* you will need to do your project.
    b) Make a list of the *steps* you will take to do your project (your *procedure*), whether it's sorting objects in a collection, performing an experiment, or making a model.
5) **Do your project!** Gather your collection, make your model, build your demonstration, choose your illustrations, or conduct your experiment. If you are doing an experiment, be sure that you are only changing one thing at a time. You will need to record your results--the changes you observe or measure.
6) **Prepare your results.**
    a) Write the "purpose" of your project: why you chose this topic. Or you may have written a "hypothesis" (what you thought would happen).
    b) You will already have written the "procedures" (the steps you took to do this project) and the "materials" (the things you used to do this project).
    c) Organize your observations: you may want to write down captions for your illustrations or photos; you may want to turn your experiment results into charts, graphs, lists, or some other way to show what you discovered. You may want to write a paragraph that summarizes your "Results."
    d) Write a "conclusion." This is a paragraph that tells what you learned. It answers the question that you asked when you first started your science fair project.
7) **Make your display.** Include the purpose or hypothesis, materials, procedures, results, and conclusion on your board. Add photos, charts, illustrations, etc.
8) **Come to the Science Fair!** Bring your board to Farmland from 3:15 p.m. to 4:15 p.m. on Thursday, February 23rd or from 5 p.m. to 6 p.m. Any objects or displays that will go on the table can be brought with you the evening of the science fair when you will show off your project!

REMINDER: If you are bringing in a model or other objects to be placed on the table in front of your board, please be sure they are **LABELED** with your name and the title of your project!

THE PROJECT DISPLAY

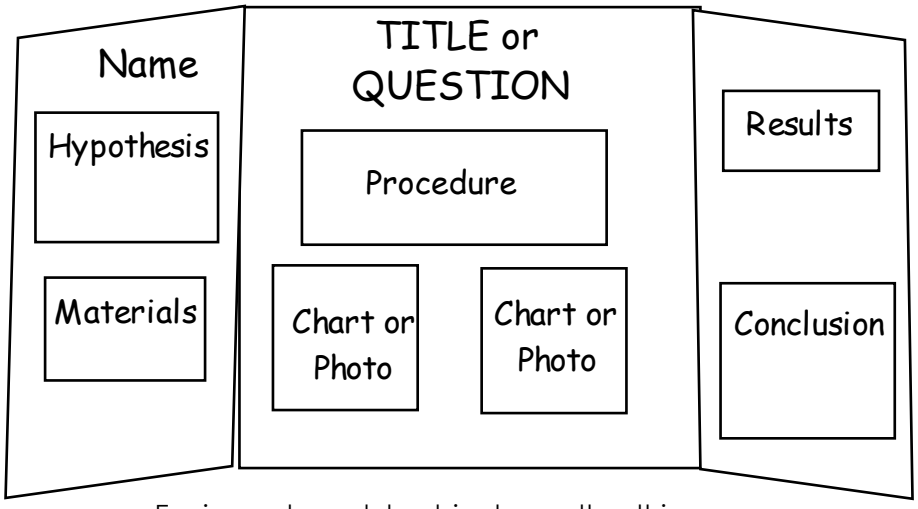
Your display is your chance to show everyone what you learned.

- Write clearly so that people can read your display (or you can type it)
- Make your drawings, graphs, and diagrams easy to understand
- Add extra touches like lines of color, borders, and so on, to make the display attractive

Here are some guidelines for displaying your project on the board. These are only suggestions, but your board must include a title and the name(s) of the student(s) doing the project.

- Put the **title** or the question that you asked at the top of the middle panel
- Put your **name(s)** at the top of the left panel.
- Left Panel: **Hypothesis** (what you thought would happen) or **purpose**. List of materials.
- Middle panel: **Procedure or description of project**.
- Right panel: **Results** and **conclusion**.
- Most illustrations, drawings, photos, etc. go in the middle panel.
- Charts, graphs, tables, etc. can be put on either the middle or right panel
- Any equipment, models, or objects you use should be set up on the table in front of your display board (but should not be bigger than the space enclosed by the display board)

This is an example of how you might organize your display board



Equipment, models, objects, or other things that you used and you want displayed will be set up on the table in front of your exhibit

More help for doing different types of science fair projects

Collections, models, demonstrations, and displays:

1) Choose a subject that interests you
2) Gather information (read books or magazines, or search the internet with a grownup)
3) Decide what you want to put in your display
    a. For a **collection**, gather the items and sort them, or collect or draw pictures of the items you want to show. Be sure to label them neatly on your display board.
    b. For a **model**, collect the materials you will use to make your model. Be sure you have a picture or plan to help you. You may want to include illustrations of parts of the model that you can label and put on the display board.
    c. For a **demonstration**, decide if you want to make a model of the scientific principle you are demonstrating, or use some kind of illustrations. Be sure to include a description and labels.
    d. For a **display** of illustrations, collect and organize the illustrations you want to use (they can be from any source: photos, drawings, magazine pictures, etc.). Mount the illustrations on the project board and label them.

You can combine aspects of these four types of projects:

Example: Let's say you want to do a project about animal houses. You might want to read about different kinds of animals, where they live, and how they build their homes. Then decide which animals you want to include in your project. You could draw some of the homes, cut pictures out of magazines, or take photographs of animal homes you see in your neighborhood. Mount the illustrations on your board and include the name of each animal by the picture of the home it built. You could even include a model of an animal home. For instance, you could gather materials outside that a bird might use and build your own bird's nest.

Experiments

1) Select a topic.
2) State the question you want your experiment to answer.
3) Form a hypothesis. A hypothesis is what you think the answer to your question will be.
4) Plan the experiment.
    a. Make a list of all the materials you need for your experiment.
    b. Make a list of the procedures or steps you will follow.

c. Decide how you will measure changes that occur during your experiment (such as changes in temperature, weight, length, or other physical features).

5) Perform the experiment. Make changes to your plan as you do your experiment to make it better. It may be necessary to start over after you make any changes, so start your work early. You may want to do the experiment more than once to see if you get the same results each time.
6) Prepare the results.
    a. Organize your observations and the results of the measurements you made to show what happened.
    b. Use photographs, tables, graphs, charts, or other illustrations to show your results.
7) Write a conclusion. Was your hypothesis correct? If not, why do you think your hypothesis was incorrect? If you can, answer your original question or explain why your experiment didn't provide a definite answer. (Remember, lots of scientists find their hypothesis was wrong or their experiment didn't answer the question they'd hoped to answer. That doesn't make it a bad experiment. As long as the experiment teaches you something, it's a success!)

Inventions

1) What could you invent?
    a. Make a list of problems you encounter at home or at school that might be solved by inventing something. For example—can you think of a way to make pencils that don't break? Hula hoops that are easier to use? Shoestrings that never come untied?
    b. If you get stuck, try this: Find ten or more objects in your room and think of a way to make each object better. What could you add or subtract from each object to improve it? Or take two objects and compare them. Could you make something useful by combining the two objects?
    c. Pick one problem to solve. Look for products that might already address the problem. Can you create something better?
2) Design and build your invention.
    a. Brainstorm a list of ways you could solve your problem. List the materials needed for each of the solutions. Write down how each of the solutions will work. Consider the obstacles you might have to overcome.
    b. Choose the solution that makes the most sense.
    c. Create a working model of your invention. Keep good notes about the materials and procedure you use to construct your model.
3) Evaluate your model.
    a. What is your invention supposed to do?
    b. How well does your invention work?
    c. What are some of the problems with your invention?

d. What could be changed to make it better?
e. Let others try it. What advice do they give?

4) Make changes to your invention to make it better. Most inventions are evaluated and revised many times before they are sold to people.

Resources

Internet sites:

(This is just a partial list; a search will turn up more sites than you could ever find time to visit! If you need more references or project ideas, try searching for 'science fair' or 'science fair projects elementary' and go from there.)

http://school.discoveryeducation.com/sciencefaircentral/ (project ideas)
http://www.all-science-fair-projects.com/ (project ideas)
http://www.cdli.ca/sciencefairs/ (project ideas)
http://www.madsci.org/experiments/ (includes some edible projects!)
http://chemistry.about.com/od/sciencefairprojects/a/sciproelem.htm
http://www.free-science-fair-projects.com/elementary-school-free-science-fair-projects.aspx
http://www.scienceproject.com/
http://www.education.com/science-fair/elementary-school/
http://www.sciencefaircenter.com/
http://www.sciencebuddies.org/

Books in the Media Center:

Mrs. Zimmerman has put books that will be useful resources for science fair projects in one location. Please ask her to show you where they are.

Books from the Public Library: (includes call number)

Amato, Carol. *50 Nifty Science Fair Projects.* **J 507 AMA**

Bonnet. Robert L. *Computers: 49 Science Fair Projects*. **J 507 BON**
(Bonnet has written a series of books about science fair projects, all with the same call #)

Churchill, Richard E.. *Amazing Science Experiments with Everyday Materials*. **J 530.028 CHU**

Leontovich, M. *Force of Course!: Force and Motion.* **J 530 LEO**

Levine, Shar. *Shocking Science: Fun & Fascinating Electrical Experiments* **J 537 LEV**

Pearce, Q. L. *Kitchen Science Experiments* **J 507 PEA**

Pearce, Q. L. *Backyard Science Experiments* **J 507 PEA**

Rainis, Kenneth G. *Crime-Solving Science Projects: Forensic Science* **363.25 RAI**

Rudy, Lisa Jo, ed. *The Ben Franklin Book of Easy and Incredible Experiments* **J 507 BEN**

Tocci, Salvatore. *Experiments with Soap* **J 541.33 TOC**

Wood, Robert W. *What? Experiments for the Young Scientist* **J 507 WOO**

Wood, Robert W. *When? Experiments for the Young Scientist* **J 507 WOO**

Farndon, John. Series on Science Experiments:

Time **J 529.7 FAR**
Gravity. **J 531 FAR**
Energy **J 531.6 FAR**
Sound and Hearing. **J 534 FAR**
Color. **J 535.6 FAR**
Magnetism. **J 538 FAR**
Water. **J 546.22 FAR**
Rocks and Minerals. **J 549 FAR**
The Human Body **J 612 FAR**
Flight. **J 629.13 FAR**
Solids, Liquids and Gases. **J 530.4 FAR**
Motion. **J 531.11 FAR**
Buoyancy. **J 532 FAR**
Light and Optics. **J 535 FAR**
Electricity. **J 537 FAR**
Chemicals. **J 540.7 FAR**
Aluminum. **J 546.673 FAR**
Weather. **J 551.5 FAR**
Levers, Wheels and Pulleys. **J 621.8 FAR**

VanCleave, Janice Pratt. Series of Books (some of these are also available in the media center)

201 Awesome. Magical, Bizarre & Incredible Experiments J **507 VAN**
203 Icy, Freezing, Frosty, Cool & Wild Experiments **J 507 VAN**
Janice VanCleave's Guide to More of the Best Science Fair Projects **507 VAN**
Solar System: Mind-Boggling Experiments… **J 523.2 VAN**
Electricity: Mind-Boggling Experiments… **J 537 VAN**
Volcanoes: Mind-Boggling Experiments J **551.21 VAN**
Weather: Mind-Boggling Experiments… **J 551.5 VAN**

Sample projects and Ideas

Observations:

Fingerprints	Objects that block or pass light
Crystals	The moon
Planets you can see	Our sun
Animal tracks	Spider webs
Trees near my home	Local weather
Clouds	All about horses (or any animal)
Leaf prints	Parts of a flower
Teeth	Shadows
Roots of different plants	Splat—a study in droplet patterns

Collections:

Fossils	Bones
Rocks	Different types of soil
Leaves	Seeds
Bark rubbings	Insects
Feathers	Shells

Models and Demonstrations:

How a bicycle works	A periscope
How a generator (or motor) works	Kaleidoscopes
Simple machines: levers, pulleys, etc.	How a microscope works
Optical illusions	Lenses and what they do
Open and closed circuits	How a camera works
How a flashlight works	How a prism works
Inside our earth (model)	Hydroelectric power
An electromagnet	How rockets fly
How thermometers work	How looping rollercoasters work
Eclipses	How a geyser works
Features of the sea floor (model)	Walter filtration
Our solar system (model)	Acids, bases, and pH
How seeds travel	Capillary action
Evaporation	How cheese is made
How sounds are produced	How a barometer works
Why things float	Model of a bodily organ
How things move on movie film	Glass recycling
Why the wind blows	Volcanoes (model)
What causes hail	The submarine
Photosynthesis	How air exerts pressure
Mixing colors	Friction

Experiments: Physical Science

Which magnet is strongest?	Do liquids cool as they evaporate?
Which metal conducts heat best?	Does a ball roll faster on grass or dirt?
How does temperature affect the height at which balls bounce?	Which color of liquid (or container) absorbs the most heat?
What holds two boards together better—a nail or a screw?	How can you measure the strength of a magnet?
How far can a person lean without falling?	Which materials conduct electricity best?
Which material makes the best heat insulator?	Do coins corrode more in salt or fresh water?
Does the length of a vibrating object affect sound?	Which liquids have a greater density?
Do all objects fall to the ground at the same speed?	Does sound travel best through solids, liquids or gases?

Experiments: Engineering

Can the design of a paper airplane make it fly farther?	Using a lever, can one student lift another student who is bigger?
Do wheels reduce friction?	How does the tail affect the flight of a kite?
Which toy car rolls farther?	Which door lock works best?

Experiments: Earth Science

Do different types of soil hold different amounts of water?	How much moisture falls on your lawn in a month?
Can feathers clean up oil spills?	How clean is our air?
What is the effect of water on different types of wood?	What is the effect of wave action on different rocks? (using a rock tumbler)
How does terracing affect erosion?	What type of soil filters water best?

Experiments: Consumer

Which paper towel absorbs the most water?	Which light bulb is most efficient?
Which type of battery makes a toy run longest?	What type of baseball bat hits a ball the farthest?
How much does a leaky faucet cost over time?	What type of skateboard wheels are the best?
Which toothpaste is most abrasive?	Which brand of popcorn pops the most?
What brand of cereal has the most raisins?	Which kind of cleaner removes ink stains best?
Which brand of diaper holds the most water?	Which paint protects the wood best?
Does one brand of shampoo get hair cleaner than another brand?	Do parking meters give the correct amount of time for the money?
Does borax help get clothes cleaner?	Which dish soap makes the most bubbles?
Which uses more water, a shower or a bath?	Which intersections have longer yellow lights?

Experiments: Life Sciences

Do living plants give off moisture?	Do mirrors affect the way plants grow?
Does magnetic field affect the growth of beans?	How do detergents affect the growth of plants?
How do plants react to different types of music?	Under which color cellophane do plants grow best?
Do plants grow better with tap water or distilled water?	How does gravity affect the growth of seeds?
Do plants grow better with natural or artificial light?	Do snails travel faster on dirt or concrete?
Do seeds sprout better in hot or cold climates?	Do avocados ripen more easily with the stems left on?
Does acid rain affect the germination of seeds?	Can you give a plant too much fertilizer?
Does aspirin prolong the life of cut flowers?	How do teeth react to different liquids?
How does temperature affect plant growth?	Do ants like cheese or sugar better?
Does a blindfolded person walk in a circle?	Can plants grow without soil?
Do taste buds grow weaker as you get older?	What color of birdseed do birds like best?
How does age affect lung power?	Does the human tongue have definite areas for certain tastes?
Do bigger seeds produce bigger plants?	How much of an apple is water?
Will bananas brown faster on the counter or in the refrigerator?	Does it matter in which direction seeds are planted?
Do mint leaves repel ants?	How do plants react to different types of music?
Do children's heart rates increase as they grow older?	Does a plant grow bigger if given water or milk?

Experiments: Kitchen Science

Which materials dissolve in water?	How much salt does it take to float an egg?
How constant is the temperature in my refrigerator?	How accurate is the temperature knob on my oven?
How does yeast work?	Does warm or cool water freeze faster?
Which grows molds faster—moist bread or dry bread?	Can things be identified just by their smell?
Which type of oil has the greatest density?	What keeps things colder—plastic wrap or aluminum foil?
Does water with salt boil faster than plain water?	Do sugar crystals grow faster in tap water or distilled water?
How does omitting an ingredient affect the taste of a cookie?	Does an ice cube melt faster in air or water?

How long will it take a drop of food dye to color a glass of still water?	Can you separate salt from water by freezing the saltwater?