Mark Twain Elementary School 2011 Science Fair

Thursday, February 3, 2011 from 6:00-8:00 p.m.
Mark Twain Commons Area

The Mark Twain Elementary Science Fair is a PTSA-sponsored event.

Introduction

Dear parents and students,

The Mark Twain PTSA Science Fair Committee invites you to participate in this year's Science Fair. Hands-on experimentation is one of the best ways to teach critical thinking and problem solving skills, not only in science, but in all areas of learning. Below you will find information about preparing a project for the fair, which should be especially useful if this is your first time doing a project.

General Information

(Mark Twain PTSA website: http://schools.lwsd.org/twain/PTSA.htm)

- Students may arrive as early as 5:30 pm to begin setting up their projects. Electrical outlets are limited, so please note on your entry form if you need electrical access and bring your own extension cord. The fair will end at 8 pm.

- Exciting live science demonstrations and hands-on science activities will be provided for all to enjoy.

- One lucky family will win a door prize for a year-long membership to the Pacific Science Center!

- "Visiting scientists" will interview students about their projects. Every participant will receive a beautiful Mark Twain Science Fair award certificate to recognize the student's effort.

Mark Twain Elementary School
2011 Science Fair Entry Form
Thursday, February 3, 2011 from 6:00 to 8:00 pm
Mark Twain Commons Area

The Science Fair is a Mark Twain PTSA-sponsored event

Please give this form to the office or your teacher by Friday, January 14, 2011

Student (print) _____

Teacher _____

Grade (circle) **K 1 2 3 4 5 6 Parent**

Project Category

- ☐ **Experiment**
- ☐ **Collection**
- ☐ **Model**
- ☐ **Investigation**
- ☐ **Invention**

Project Title: _____

Project Description*:

_____

_____

_____

Parent Name (print) _____

Parent Signature _____

Phone _____

Email _____

***Sorry, no live animal displays or demonstrations are allowed.**

☐ I'll need access to an outlet and I'll bring my own electrical cord.

☐ OK to photo ☐ NOT OK to photo
Checking OK means granting permission to use photos that may include your student taken at the fair and published on the school website which is part of the internet, memory book and the school bulletin boards. Only first names will be used.

Contact Carol Susan Glynn 822-6175 (sglynn1231@yahoo.com) or Kate Heino 828-6329 (gkhlb@hotmail.com) for more information about the fair.

Frequently Asked Questions

How much time will we need?
Start as soon as possible and work on the project a little at a time until the fair. This approach gives the best chance for success and the least amount of stress on you and your student. This is a great opportunity to teach planning and build organizational skills.

Can my child work with another student on a project?
Yes, team projects are allowed. Parents can also enter their own projects.

How do we come up with a project idea?
Look below at the section titled "How to develop a project idea." This section coaches students by starting with a topic that interests them and then narrowing down the topic to a specific question. The project can be an experiment, collection, model, investigation or invention. See the section below titled "Categories" for more details.

Where do we get information on choosing a project?
The Science Fair Committee has researched kid-friendly, non-commercial elementary level resources from the internet and books from the King County Library system. See the Sections bellow titled "Websites" and "Books. " The school library also has an excellent collection of science books.

Will it be expensive?
No. There are many great science projects that can be done with materials found around the house or that require only curiosity (e.g., what types of clouds are there?). You can also purchase kits or buy materials.

What should the final project look like?
Refer to the section titled "Display" for details on presenting your project.

What if I have a question, suggestion or want to help?
Contact Susan Glynn 822-6175 (sglynn1231@yahoo.com) or Kate Heino 828-6329 (gkhlb@hotmail.com) for more information about the fair.

Guidelines for Parents

Guide your child and provide suggestions, but let the final project reflect your child's individual effort and design. The real measure of success is how much an individual learns.

Note: Projects should follow safety rules: no dangerous chemicals, open flames/explosions, sharp objects, etc. Anything that is or might be hazardous to others cannot be displayed at the fair. **No live** animal displays or demonstrations will be allowed. Models or pictures can be displayed instead.

1. Start early!

Take your time because hurried projects cause frustration and dampen enthusiasm. Help your child with time organization. Additional time may be needed to understand "unintended results" and retest.

2. Assist but do not do!

Assist in finding appropriate experiments using the source lists provided from the internet and libraries. Help provide materials and technical assistance, but let the child guide you.

3. Lead with questions!

Let your kids take the lead and direct them only when necessary. Don't give them the answer. Rather, lead them with questions such as, "What did you notice when you tried it this way?" or "Why do you think that happened?"

4. Short and small is better.

Several short, small projects in one category are better than one big one – and bring them all to the science fair whether or not they worked. The important thing is what they learned and an "unintended result" is not a bad thing in science.

5. Volunteer.

Volunteers are needed to assist with preparations, set up, break down, supervision, and other activities. You do not need a science background to help. Please contact Susan Glynn 822-6175 (sglynn1231@yahoo.com) or Kate Heino 828-6329 (gkhlb@hotmail.com) for more information about the fair if you'd like to volunteer.

6. Supervise.

Adult supervision is required for students at the fair.

Guidelines for Students

(Parents, please print this out for your student to read.)

It may be hard to figure out what kind of project to do – there are so many and you don't know where to start. Here are the steps to take.

#1 Scratch your head!

Think of something that you want to know about the world. What are curious about? This is what scientists do – they begin with questions. Come up with lots of questions but don't make the questions too big. For example: Why does my sandwich get moldy if I leave it out for a couple of days? Where do rainbows come from? How do I make a curveball in baseball? Why are salt grains square? How does a straw work?

If you want to have fun doing a science project but can't seem to think of anything, ask your parents or teacher for help. Perhaps you can do a project that is an extension of a science topic you have studied in school.

#2 Make it fun!

Ask your classmates if they are interested in the same subject. Teamwork makes anything more fun – including science. Students are allowed to work in teams on projects.

#3 Hire an assistant!

Get at least one adult to join your team! (You are going to need stuff - and they have a car.)

#4 Act like you're the boss!

Tell your assistant to help you look up experiments about your ideas on the Internet or take you to a library to look at books.

#5 Scrunch your eyebrows!

Think hard. How do you want to test your idea, research your topic, build your model?

#6 Keep a journal!

Record your work. Write down where you found something for your collection, results of your experiments, books/websites you used for research, any thoughts you have about your topic, etc. You will want to have this journal at the fair to show all the work you have done.

Guidelines for Students (continued)

#7 Practice!

If you are doing an experiment, do it a bunch of times. When the results turn out the same over and over again you can be pretty sure it's not just luck.

If you are getting frustrated because your experiment did not work - you are a true scientist! This happens to scientists all the time, which is okay because when it happens they have just learned what doesn't work. Now they can change the experiment with what they learned. Scientists do not use the word "fail". They also share their experiment with other scientists whether or not it worked. Scientific accidents even lead to some great discoveries. For example, some guy spilled some ingredients from his own recipe onto a hot stove. Instead of throwing it away he tasted it and liked it. He called it corn flakes!

#8 Show!

Create a display and then show your project to your teacher, class, parents, and friends. Let them ask questions. This is a great way to practice presenting your project at the fair.

#9 Share at the fair!

By the time you get to the fair you will know your experiment like an expert. If you use the answers to the questions asked by others during practice then you will make a great presentation.

Be sure to bring your adult assistant to the fair so you can leave them with your experiment while you look at the other experiments. Tell your adult assistant they must be with you at the fair the entire time.

#10 Pat yourself on the back!

You worked hard and learned a lot. You are a true scientist if you now have even more questions you want to answer about your subject. Perhaps you can start thinking about your science fair project for next year!

How to Develop a Project Idea

Not sure where to begin? You will enjoy your project and learn more if you work on something you are really interested in. Below are some suggestions for finding a topic.

1. Think of general subjects you are curious about. Examples: People, animals, plants, rocks, space, weather, or electricity.

2. Narrow the topic. Examples: Why do people need to sleep? What is the best way to train a dog? What makes the weather change? How is electricity used?

3. Get specific. Think of detailed questions you would like to answer about your topic. Examples: How does the amount of sleep people get affect their mood the next day? Is training a dog twice a day better than once a day? What types of instruments do scientists use to measure wind speed? Can a dead battery still provide electricity?

Above adapted from Elmer's Science Fair Central website (http://school.discoveryeducation.com/sciencefaircentral/scifairstudio/handbook/stepstotopic.html) / *Janice VanCleave's Guide to the Best Science Fair Projects*, Janice VanCleave (John Wiley & Sons, Inc., 1997)

Another way to come up with a topic is to notice what you are already doing and then turn it in to a research question. For example:

If you like to collect rocks…
- Study what types of rocks there are and how geologists classify rocks.
- Research how different types of rocks break when dropped.

If you are crazy about pizza…
- Investigate what ingredients would make a really healthy pizza according to the nutrition pyramid.
- Conduct an experiment to see how much yeast is needed to make dough rise.

If you love basketball…
- Study the effect of the weight of a ball on the distance it travels.
- Investigate how basketballs are made.
- Research why toned muscles are less likely to be injured.

If you are concerned about the environment…
- Investigate what are some of the best ways to reduce energy use at school.
- Design a model of an energy-efficient house or invent a solar water heater.
- Find out what happens to our trash after it is collected.

If you think bugs are cool…
- Make a model of the life stages of a ladybug.
- Conduct an experiment to see if ants prefer sugar or rotting fruit.

Category Descriptions

Experiment

Test a hypothesis using the scientific method. More details on the Scientific Method are provided in a separate section below. Examples: Do kidney beans grow faster with florescent or incandescent light? Do pushups improve your short term memory? Do students complete mazes faster when rewarded with stickers or verbal praise? How does wing size affect the performance of a paper airplane?

Collection

Display and label a set of items on a specific subject. Organize your collection in some way such as by shape or color. If actual items are not available, use drawings, photographs, or printouts. Examples: shells, rocks, bird calls, clouds.

Model

Show and explain how something works using a model or demonstrate a scientific principle. Examples: the water cycle, the eye, levers, the solar system.

Investigation

Research and collect data on a subject. Examples: How do police use fingerprints to catch a thief? How do different musical instruments make sounds? What do most students eat for breakfast?

Invention

Come up with an original solution to a problem or make something work better. Examples: A doorbell for dogs, a paper airplane catapult, a locator for lost backpacks.

The Scientific Method

(Adapted in part from *Not Just Another Science Fair* by Laura Vazquez, David, et al, 1994. GoodYearBooks: Glenview, IL.)

The Scientific Method is the step-by-step procedure scientists use when doing an experiment. A true experiment means a controlled test of a hypothesis. Controlled means only one thing is changed while everything else is kept the same.

Definitions:

Variables – the things that could change during an experiment. There are three types:

1. The Independent (or Manipulated) Variable is one that is changed intentionally by the researcher. This might be the amount of light provided to a plant, the type of food provided to ants, etc.

2. The Dependent (or Responding) Variable is the one that changes in response to the changes made by the independent variable. This might be the rate of plant growth, the behavior of the ants, etc.

3. Control Variables are the other conditions that the researcher tries to keep from changing during the experiment. If other variables change in addition to the independent variable, it will be difficult to know which variables were responsible for the results.

- For example, you are studying the effect of types of music on how fast someone can clean up a room. You would play different types of music, but there would need to be the same amount of things to clean up for each test. You would also want to make sure it was the same time of day and that other things such as being more hungry or tired hadn't changed.

- For another example, let's say you were measuring the effect of types of light on how tall beans grow in two weeks. The variable you are manipulating is the type of light. The variable you are measuring is height of the beans at two weeks. Some variables you would need to control would be the type of bean, the type of soil, the location of the beans, the distance of the light from the soil, the amount of water the beans get, etc.

- In these kinds of experiments, it can be tricky to keep everything the same except for what you are testing. Scientists deal with this by repeating the experiment over and over, so that if other factors weren't perfectly controlled their effect hopefully will be spread out over the conditions. It is also best to have a fairly simple question to test so that control variables are more easily handled.

The Scientific Method (continued)

Measurements – the change in the responding variable must be measured in some way to see the effect of the manipulated variable. There may be many ways to measure this change and you may need help from an adult to decide what will be the best way. For example, in the bean study, you might decide to measure the height in millimeters of the sprouts, how many days it took for the first sprouts to appear, or how many seeds sprouted in each condition after two weeks. Good measurements are objective and factual, such as time, length, weight, and temperature. Subjective measurements or opinions, such as visual inspection or taste can make the results less reliable. Scientists often come up with creative ways to measure effects. For example, instead of saying your family likes low-fat pizza better than regular pizza (an opinion), you would count how many pieces they eat of each kind of pizza (a measureable behavior).

Hypothesis – the hypothesis is your best guess about what the results will be of your experiment. It does not have to be too detailed. For example, "Listening to rock music will result in faster clean up times" or "The pinto beans grown under florescent light will grow faster."

Experimentation – this is the way the experiment will test your hypothesis.

Procedure - this is the exact steps you will take to do your experiment. Scientists provide detailed information so that others can repeat a study in the same way.

Materials – these are the items you use to do your research.

Repetition – if possible, an experiment should be run several times. Your results will probably change a little, but if there is a large change each time you repeat the test, it means something is happening that you are not controlling.

The Scientific Method (continued)

Data - this means the measurements you took of the responding variable in the various conditions of the manipulated variable.

Results – the data are organized in a meaningful way. Typically, graphs, tables, and charts are used to show the data. Often statistical analysis is done to make the results more meaningful, such as averaging the numbers for each condition.

Conclusions – this is where you think about what the results mean and how they apply to your original questions about your topic. You should also think about what you might do next time to improve your study or make your results more clear.

WEBSITES

Mark Twain Science Fair Information

http://schools.lwsd.org/twain/PTSA.htm
http://www.kodakgallery.com/mfox/marktwain/mark_twain_science_fair_2007
http://www.kodakgallery.com/mfox/marktwain/mark_twain_science_fair_2006

Internet Project Resources

KidSpace at The Internet Public Library – science fair project resource guide
http://www.ipl.org/div/kidspace/projectguide/

Elmer's Science Fair Central – Comprehensive guide to science fair projects
http://school.discoveryeducation.com/sciencefaircentral/

Cool Science Projects – good advice on topic selection and step by step information on the scientific method.
http://www.cool-science-projects.com/index.html

PBS Zoom – fun science activities
http://pbskids.org/zoom/activities/sci/

Dragonfly TV (PBS kids) – Science fair ideas
http://pbskids.org/dragonflytv/scifair/index.html

Energy Quest Science Fair Projects - Great K-12 energy projects
http://www.energyquest.ca.gov/projects/index.html#chemical

NASA projects for kids
http://spaceplace.jpl.nasa.gov/en/kids/projects.shtml

The Franklin Institute - kid activities by category
http://sln.fi.edu/tfi/activity/act-summ.html

Yahoo - Directory > Science > Education > K-12 – Has many links to science fair web sites
http://dir.yahoo.com/Science/Education/K_12/Fairs_and_Competitions/Projects_and_Ideas/

Neuroscience for Kids by University of Washington – Short article on successful science fair projects.
http://faculty.washington.edu/chudler/fair.html

Science Buddies – Free science fair project ideas and resources (including topic selection wizard)
http://www.sciencebuddies.org/

Science Fairs - a very long list of project titles for primary and elementary grades.
http://www.cdli.ca/sciencefairs/

Science Project Ideas – lists ideas by category such as plants, animals, earth science, etc.
http://www.rossarts.org/naples/ideas.htm

BOOKS

MARK TWAIN LIBRARY
The school library has an excellent selection of basic science books and science project books. Our school library is online through the school's website at http://schools.lwsd.org/Twain/. Look under "Our Library" link then choose "visual search" then "Science".

PUBLIC LIBRARIES
For quick reference to the hours and locations of all libraries in the area go to www.kcls.org. You can also search the catalog online. Reference librarians are always around and love to help--be sure to ask. Bellevue has an extensive children's section and is worth the trip. The Bellevue library phone number is 425-450-1775.

BOOK LIST - Some classics to start with:

- Dorling Kindersley (DK) books (e.g. 101 Great Science Experiments by Neil Ardley has science activities or experiments you can do with household items) also DK Eyewitness series covers a wide variety of science topics.

- Any of Janice VanCleave's science books (e.g., Biology for Every Kid: 101 Easy Experiments that Really Work)

- Any of Vicki Cobb's science books (e.g. Don't Try This At Home! : Science Fun for Kids on the Go)

- Usborne series on science (e.g., Usborne Internet-Linked Mysteries & Marvels of Science)

- The New Way Things Work by David Macaulay. Follow the woolly mammoth through this book as he investigates how things work.

The Display

The display shows all of your hard work on your science project. It usually includes a display board with a description of your project, your science journal, and any models, samples, photographs or other related items.

Often a three-sided backboard (available at office supply stores) is used but poster board or cardboard can also work well. Use large print for your title and headings so they can be read easily. Rather than writing directly onto the backboard it is better to use letters cut out from construction paper or use a word processor to print out information and attach it with a glue stick.

The typical headings for a display board are: Problem, Hypothesis, Experiment (materials and procedure), Data, Results, Conclusion, and Next Time. Position your project title at the top and center. Experiment with arrangements of your text before you attach them.

Make sure you put your name on the display---you deserve credit for your hard work!

Below is an example of a good display from Janice VanCleave. You can also see examples from the 2007 and 2006 Mark Twain Elementary Science Fairs at http://www.kodakgallery.com/mfox/marktwain/mark_twain_science_fair_2007 and http://www.kodakgallery.com/mfox/marktwain/mark_twain_science_fair_2006.

Material adapted from Elmer's Science Fair Central website, http://school.discoveryeducation.com/sciencefaircentral and *Janice VanCleave's Guide to the Best Science Fair Projects*, Janice VanCleave (John Wiley & Sons, Inc., 1997)