STEM Fair

Science, Technology, Engineering and Math

Fireside Elementary

March 14, 2024

Important Dates!

Friday, January 26, 2024

Information packets available electronically. Note in Friday folders.

Friday, February 2, 2024

Project Applications are due! Turn in at the Front Office or on-line

Wednesday, March 13, 2024

Set up tables in the gym	2:30 - 3:30 pm
Early Registration	6:30 – 7:00 pm

Thursday, March 14, 2024

Registration	7:20 – 8:00 am
Judges' meeting	7:55 – 8:25 am
Science Fair & Judging	8:30 – 11:30 am
Awards Assembly	1:00 – 1:40 pm
Public Viewing	6:00 – 7:00 pm
Clean up & students take projects home	7:00 pm

We are in need of Volunteers for the STEM Fair!

Volunteers Sign up via this link: STEM Fair March 14, 2024 (helpatschools.com)

STEM FAIR OVERVIEW

All Fireside students are invited to participate in the STEM Fair where they will have fun learning about Science, Technology, Engineering, and Math. The Fair is a great time for students to explore and discover new ideas and then share their knowledge and enthusiasm with others.

Students will share their projects on Thursday, March 14, 2024, in the Fireside gym.

MATERIALS AND SAFETY

Please read the enclosed materials thoroughly as all projects will need to follow the attached BVSD rules and safety guidelines. Remember ***no liquid, organisms, or glass (including pyrex)*** are allowed at the STEM Fair. Pictures of these items on projects are acceptable. *All projects are subject to final approval upon delivery.*

PROJECT APPLICATION FORMS

Please complete the attached Project Application Form and return it to the office or on-line by ***Friday, February 2nd***. The STEM Fair Committee will review your project to be sure it meets all of the applicable school and district guidelines. If concerns with your project are noticed, you will be notified in a timely manner to alter or choose another project.

PROJECT CATEGORIES

Projects will be organized into two categories for review.

Non-Competitive Category: (All Grades) Projects can be done individually or with a partner. The project can be any STEM related project. Students may do these projects with minimal assistance from parents or the students and parents can participate equally in the process and development of the display. Judges will informally review these projects and everyone who enters a project will receive participation ribbons and certificates.

Competitive Category: (3^{rd} - 5^{th} Grades) Projects can be done individually or with a partner. The project *must* contain an investigation that **follows the Scientific Method or the Engineering Design Process**. This is a **student-led** project with minimal parental involvement and should meet all of the school and BVSD requirements included in this packet. These projects will be judged and the outstanding projects will be recognized with special awards. All projects will receive participation ribbons and certificates. Students should be prepared to present their project to judges at 3-4 specified time slots.

As we are now encouraging more technology, engineering and math in our fair, students can choose the Engineering Design Process **or** the Scientific Method to follow in their investigations.

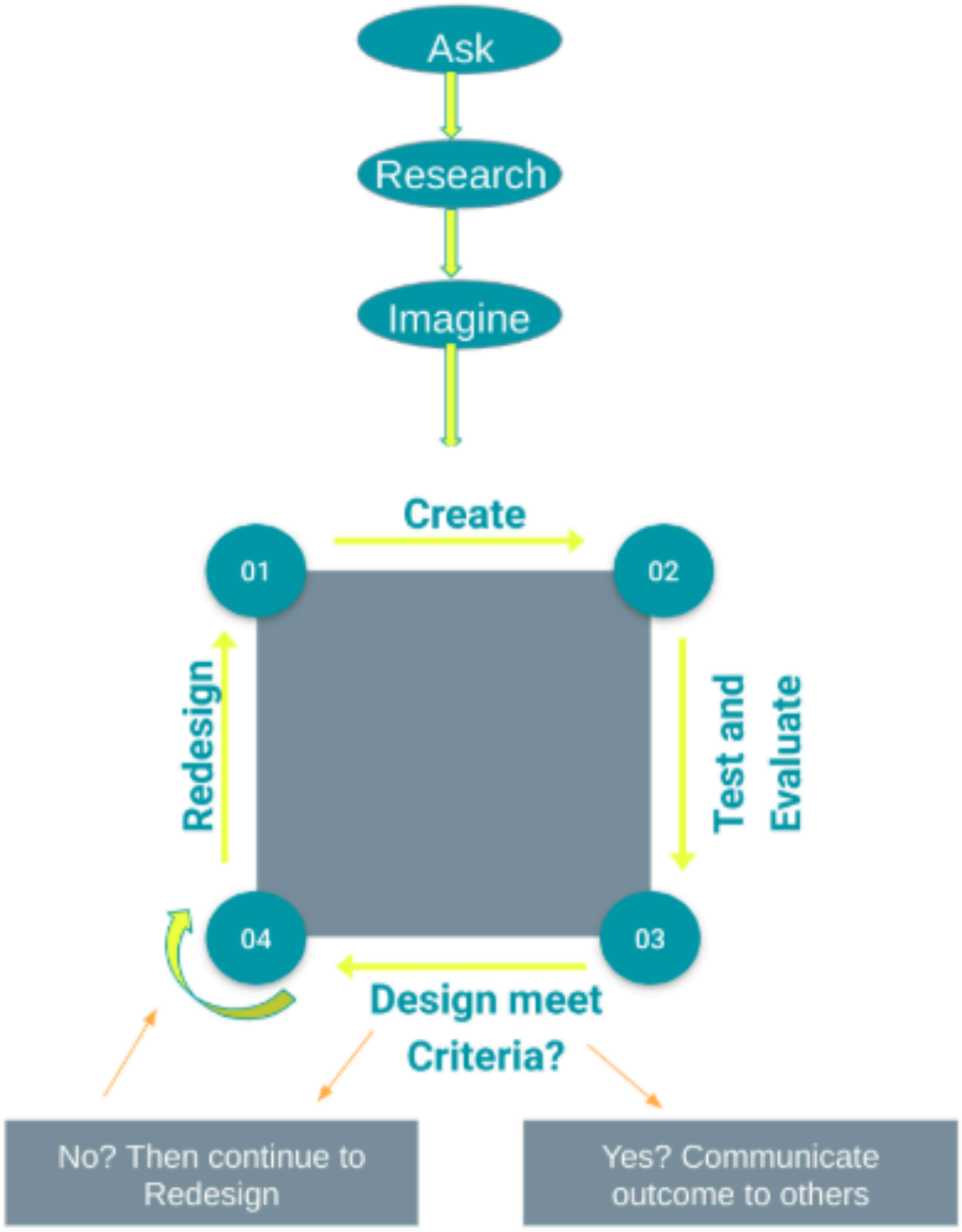
Scientific Method or Engineering Design Process?

Students will have the choice of using the Engineering Design Process or the Scientific Method for their Fair projects. So, what is the difference?

While scientists study how nature works, engineers create new things, such as products, websites, environments, and experiences. Because engineers and scientists have different objectives, they follow different processes in their work. Scientists perform experiments using the **scientific method**; whereas, engineers follow the creativity-based **engineering design process**. Engineers use the engineering design process to create solutions to problems. An engineer identifies a specific need: **Who** need(s) **what** because **why**? And then, he or she creates a solution that meets the need. Both processes can be broken down into a series of steps, as seen in the diagram and table below.

The Scientific Method	The Engineering Design Process
State your question	ASK what needs to change
Do background research	RESEARCH what has already been done
Formulate your hypothesis, identify variables	IMAGINE various solutions
Design experiment & establish your procedure	Choose a solution and PLAN a way to develop it
Test your hypothesis by doing an experiment	CREATE a prototype
Analyze your results and draw conclusions	TEST and redesign/ improve as necessary
Communicate results	Communicate results
Steps of The Scientific Method	Steps of The Engineering Design Process

Engineering Design Process



Which process should I follow for my project?

In real life, the distinction between science and engineering is not always clear. Scientists often do some engineering work, and engineers frequently apply scientific principles, including the scientific method. Much of what we often call "computer science" is actually engineering— programmers creating new products. Your project may fall in the gray area between science and engineering, and that's OK. Many projects, even if related to engineering, can and should use the scientific method.

However, **if the objective of your project is to invent a new product, computer program, experience, or environment, then it makes sense to follow the Engineering Design Process**.

TYPES OF PROJECTS:

1. *Investigation:* Observe nature (plants, animals, people) and report what you observe. Your purpose is to find out how your specimens behave or function. **This type of project should follow the scientific method.**

- EXAMPLE: Observe plants growing under different conditions; record their growth; make graphs or charts of their growth and take photographs; write a report about what makes plants grow (better).

Simple Experiment: The purpose is to change something, and you will observe what happens as a result of changes. This option is good for younger students.

- EXAMPLES: melt an ice cube, incubate an egg, or inflate a balloon.

Controlled Experiment: This is a more complex investigation where all factors except one are kept constant, with one factor being a variable.

- EXAMPLE: in a group of identical plants kept in identical conditions, different amounts of water (the independent variable) are used to water plants; the differences in growth (dependent variable) are observed, recorded, and photographed.

Comparative Surveys: Identify two or more groups or subjects that are generally alike but might show a difference in one important factor. Express the difference as a hypothesis, then observe, measure, and report it.

- EXAMPLE: hearts beat faster in boys than in girls.

2. *Model or Collection:* Construct a kit or model, or exhibit a collection. The purpose is to provide a visual model of a scientific system you are exploring. You must be able to explain your model or collection.

- EXAMPLE: The purpose of a model of a solar home could be to determine the use of solar energy in lowering heating costs. Read, talk to experts, find answers.

3. *Demonstration of a Scientific Principle:* Find a scientific rule or law that interests you, and demonstrate it in an experiment, survey, or model.

- EXAMPLE: Demonstrate Newton's Third Law of Motion and the concept of thrust by building a balloon rocket. Thrust is created when matter is pushed out—as air leaves the balloon, it creates energy that pushes the balloon rocket forward.

4. *Invention:* Perhaps you have an idea for an invention that solves a problem. **This project should use the engineering design process**. All inventions have been created to make life easier, better, or to create a tool to enrich our work or private life.

- EXAMPLE: Students have created everything from tools to clean gutters, or even a device that holds a book up while you eat. The possibilities are endless! Start by thinking of a real world problem in your everyday life -- then see if you can come up with a solution!

A NON-COMPETITIVE project may perform any of the above project types.

However, a COMPETITIVE project *must* perform an Experiment/ Investigation (#1) following the Scientific Method or an Invention (#4) following the Engineering Design Process.

WAYS TO FIND A STEM FAIR PROJECT IDEA

1. Look at lists of **science categories** and pick one that you are interested in, and then narrow that down to a project. (Example, say you pick water science, then narrow it to Testing the pH levels of water from different sources (bottled, tap, river, rain, snow, etc)." (Several websites are listed below to generate ideas.)
2. Use **your experiences.** Remember a time you noticed something and thought, "I wonder how that works?" or "I wonder what would happen if..." then turn that into a project. Check the science section of the school **library**. Browse and look at book titles, then look inside the ones that look interesting to you. Also thumb through encyclopedias and magazines. Good magazines for ideas are: National Geographic, Discover, Omni, Popular Science, Popular Mechanics, Mother Earth News, High Technology, Prevention, and Garbage. Perhaps go to the downtown Library.
3. Think about **current events**. Look at the newspaper. People are hungry in Africa because of droughts - a project on growing plants without much rain, which types grow OK with little water? Or the ozone hole over Antarctica - how can we reduce ozone? -a project on non-aerosol ways to spray things. Or oil spills - how can we clean them up? -a project on how to clean oil out of water.
4. Watch **commercials** on TV. Test their claims. Does that anti-perspirant really stop wetness better than other ones? What are the real differences between Barbie and imitation Barbie dolls? Can kids tell the difference between cola drinks if they don't know which they are drinking?

You can also try these websites for ideas and tips on creating a science fair project:

http://www.sciencebuddies.org/	http://school.discoveryeducation.com/sciencefaircentral/
http://www.ipl.org/div/projectguide/	http://mathforum.org/teachers/mathproject.html
hhttp://www.carolina.com (for science supplies)	http://www.education.com/science-fair/elementary-school https://www.icanteachmychild.com/science-fair-projects/
http://www.sciencefair-projects.org/	http://www.sciencekids.co.nz/projects.html

BVSD RULES & SAFETY DISPLAY GUIDELINES

Please remember that no liquid or organisms of any kind, ***including water and plants*** may be displayed at the Science Fair. Anything which could be hazardous to the public, the exhibitor, or other exhibitors is PROHIBITED.

Organisms**: No organisms may be displayed. For example:**

Vertebrates-

- No owl pellets
- No mice, live or dead
- No skeletons
- No fish, live or dead

Microbial cultures-

- No fungi, live or dead
- No bread molds, bacteria, viruses, viroids, prions, rickettsia, live or dead
- No parasites, human or other, live or dead

Invertebrates-

- No worms, live or dead
- No insects, live or dead

Plants- No plants

Chemicals: **No chemicals may be displayed. For example:**

- No acids, dilute or strong
- No bases, dilute or strong
- No salt solutions
- No insecticides
- No repellents
- No mercury

Flammable substances: **No flammable substances may be displayed. For example:**

- No gases
- No solid rocket fuel
- No flammable liquids
- No fumes

An alternative solution to displaying the above items: **Take photographs** of the substances that were used or use a digital camera and create large pictures with a computer printer for display on your board.

Electricity Projects require:

- Electrical connections using voltage over 12 volts must be soldered or fixed with approved connectors and all connecting wires must be properly insulated. Nails, tacks or un-insulated staples must not be used to fasten wire. All switches and metal parts must be located out of reach of observers and be designed with adequate overload protection. Bare wiring and exposed knife switches may be used on circuits of 12 volts or less only.

Electricity: If your project requires an electrical outlet, you MUST indicate it on your proposal and you MUST bring your own extension cord.

Visual Display

Sometimes it is the little things that capture the audience's eye. Follow these tips to make your project extra special.

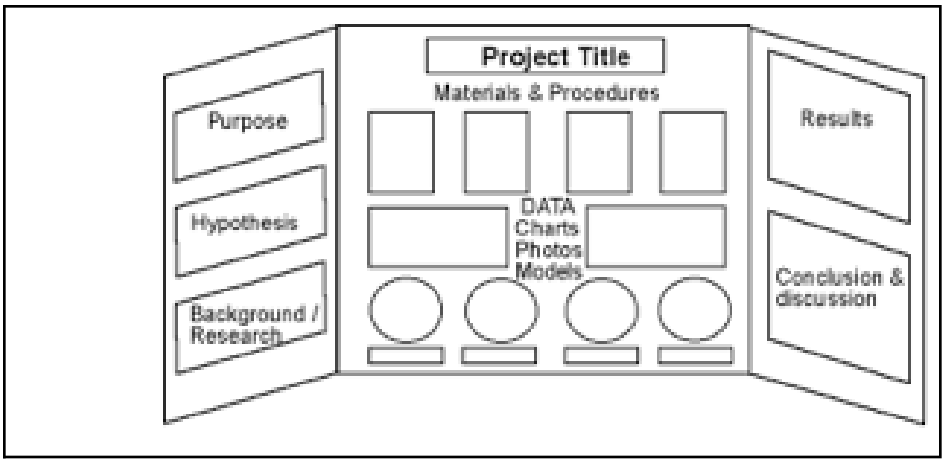
- Make sure you can see your project from a distance by making the lettering for your various headings large enough to be read from a distance. Perhaps you can make your titles on a computer. Use simple, easy to read fonts. If you print your titles by hand, do it neatly so everyone can read them.

- Choose your pictures carefully. Use tables, charts, graphs, and photos whenever possible.

- Make colored backgrounds for your pages. Use colored paper as a background frame for each page of your report. Make sure you have no misspelled words or mistakes. Lay it all out on the floor before you glue anything to your display board. Neatness counts.

- Include a folder with all of your notes or data collected and calculations. You should be able to show all of your work even if it is not on your display board.

- Be sure to include the following items on your display board:
    - Title, name, grade, and teacher
    - Question, prediction (hypothesis) and data
    - Materials and procedure
    - Results and conclusion
    - Show off all the great learning you have done!



Sample Display Board Dimensions: 36” * 48” (Maximum)

Oral Presentation:

Students who are required to make an oral presentation to their class will find this good practice as they prepare to present to the interviewers at the science fair.

- Practice by presenting your project to your family. Speak clearly and slowly.

- Give the title of your project; explain your hypothesis and why you were curious in the first place. Explain the procedure of your experiments and how you obtained the data. Briefly discuss your results and give a conclusion to your presentation.

- Be prepared to answer some questions about your project such as:

    - What things did you find out by doing this project?
    - How did you get interested in your topic?
    - What kinds of difficulties did you have to deal with? Did anything go wrong?
    - Were you surprised by anything that happened?
    - If you had it to do all over again, what might you do differently?
    - Are there areas of this topic that you'd like to learn more about?
    - If you had more time how might you continue to explore or expand your project?
    - What do you think is the best thing about your project?

Submit Form via link below or print out 2 pages & return to front office.

Non-Competitive STEM Fair Project Application (all grades)

Due Wednesday February 2nd, 2024 ~ Return to Front Office

Student(s) Name _____

Grade(s) _____ Teacher(s) _____

Project Title _____

Indicate project type. Circle one:

Experiment Model Survey Demonstration Invention

Research Question: What do you want to know? Or What problem do you want to solve?

Prediction/ Hypothesis: What do you think will happen?

Materials: What materials will you use to test your hypothesis or solve or problem?

Procedure: What steps do you need to take to answer your question or solve your problem?

Any special display requirements (such as electrical outlet)? _____

Parents: Please sign to indicate that you have *read* the entire Fireside STEM Fair Packet including the BVSD Safety Display Guidelines, and that you will help your child follow the guidelines and oversee the safety of their project.

Parent Signature _____ Email/Phone _____

_____ This project is approved by the STEM Fair Committee.

All projects are subject to final approval upon delivery.

Submit Form via link below or print out page & return to front office.

Competitive STEM Fair Project Application (Grades 3-5)

Due Friday, February 2nd, 2024 ~ Return to Front Office

Student(s) Name _____

Grade(s) _____ Teacher(s) _____

Project Title _____

Indicate project type. Circle one:

Investigation (using Scientific Method) or Invention (using Engineering Design Process)

Research Question: What do you want to know? Or What problem do you want to solve?

If using the Scientific Method describe your Variables: Independent, Dependent, Controlled

If using the Engineering Design Process, describe 2 ideas you have to approach your problem.

Procedure: What steps do you need to take to answer your question or solve your problem? (use the back of this page if you need more space)

Any special display requirements (such as electrical outlet)? _____

Parents: Please sign to indicate that you have read the entire Fireside STEM Fair Packet including the BVSD Safety Display Guidelines, and that you will help your child follow the guidelines and oversee the safety of their project.

Parent Signature _____ Email/Phone _____

_____ This project is approved by the STEM Fair Committee.

All projects are subject to final approval upon delivery.