**Pioneer Elementary's 2019**



# January 31st, 2019

Pioneer Elementary - 8213 Eaglefield Drive, Arlington, WA          Phone:  360-618-6230  Fax:  360-618-6234

# Welcome to the World of STEAM Fairs!

The *STEAM Fair Guide* is designed to guide teachers, students, and parents through all phases of a science project and prepare students to participate in our STEAM Fair. A science project serves more than one purpose. The goal is to extend a student's understanding of science. Science is hands-on by nature - there is no doubt that hands-on experiences facilitate the learning process. This guide will also walk your student through a science project using the five phases of the scientific method:

• Phase 1: Generating an Idea

• Phase 2: Research and Planning

• Phase 3: Data Collection and Analysis

• Phase 4: Writing a Report

• Phase 5: Creating and Exhibiting a Display

## WHAT IS THE SCIENTIFIC METHOD?

The scientific method is a process for experimentation that is used to explore observations and answer questions. Does this mean all scientists follow *exactly* this process? No. Some areas of science can be more easily tested than others. For example, scientists studying how stars change as they age or how dinosaurs digested their food cannot fast-forward a star's life by a million years or run medical exams on feeding dinosaurs to test their hypotheses. When direct experimentation is not possible, scientists modify the scientific method. In fact, there are probably as many versions of the scientific method as there are scientists! But even when modified, the goal remains the same: to discover cause and effect relationships by asking questions, carefully gathering and examining the evidence, and seeing if all the available information can be combined into a logical answer

When students use the scientific method to design and execute a project they use the same steps that professional researchers use to glean new information about the world.

The steps of the scientific method that your **child uses naturally** will be added to the project board...

- **Purpose:** developing an investigative question

- **Hypothesis:** making an educated guess about the answer to the investigative question based on research
- **Experiment:** testing the hypothesis, collecting data, and making observations

- **Analysis:** organizing data from the research and experimentation and looking for patterns

- **Conclusion:** determining if the hypothesis is supported or disproved by the experimental results
- **Communicating the Results:** sharing the conclusion with others

Most importantly, science projects make science more fun and relevant to the student. Every student, regardless of aptitude, can benefit from planning and executing a science project. A science project can be a great way to spark a student's interest in science or to help a student develop a broader interest in research.

- Emphasis on using the scientific method
- Investigation by experimentation (inquiry-based learning)
- Development of critical thinking skills
- Opportunity for a positive learning experience
- Extension of formal science education

*It is up to the student to decide what to study. You can help by motivating, encouraging and listening to a child's ideas. However, it is crucial to remember that it is up to the child to design and execute the entire project. The judges that will be joining us and judging the STEAM entries are for the 3rd ~ 5th grades only. Grades K-2 and all Art entries will not be judged.*

Your child may need some adult attention, but parents should try not to "take over" the project. Your child may find it helpful to do more library research outside of school. Expect your child to spend time brainstorming, researching, planning, experimenting, analyzing data, writing a report, and constructing a display, depending upon their age/grade. You can also help by encouraging your child to record everything in his or her science project journal, such as notes from brainstorming, sources used during research, and observations made during data collection. *Your child needs to know that an adult must be present during all data collection. Please supervise the experimental phase for safety purposes. You may refer to a Safety Guide to help avoid accidents during data collection.*

It is very easy to accidentally take control of a student's project, especially if you think it should be done differently/more precise/etc.. Remember that this project is a learning experience for your child, and he or she will not benefit from a project performed by you. If your child is performing all the necessary tasks to an acceptable standard and is not requesting assistance, your job is to supervise. If your child asks for help, appears to be struggling, or is performing below acceptable standards or with disregard for safety measures, then you may offer assistance.

## 4-5 weeks prior:

- Choose, and submit for teacher approval, a topic question/problem to investigate.
- Do preliminary research. Collect and read books for your topic.
- Develop a hypothesis (your best guess) based on your preliminary research.
- Decide on the procedure that you will use to test your hypothesis.
- Make a list of your materials. Gather your materials.

## 3-4 weeks prior:

- Conduct your experiment or build and test your invention. Compile your research or collection. Record data.
- Organize your data and results.

- Write your conclusion based on your results. Write a "real world" application of what you learned.

## 2-3 weeks prior:

- Write a draft of your science fair report.

- Proofread your draft or have someone else proofread it. Type or write a final copy of your report.

- Assemble your science fair display board and display items.

- Turn in your science fair project (report, display board and display items).

**Children can do any one with adult supervision - individually or in groups.**
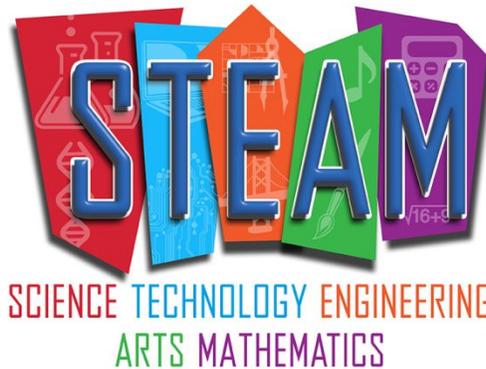


**Return this form to the teacher or place in the PTSA mailbox in the front office by:** January 18th

Student's first & last name (printed) _____

Grade _____ Room # _____ Teacher's Name _____

Parent's/Guardian's signature _____ Date_____

THE ORIGINAL **SCIENCE QUESTION** (KNOWN AS A **PROBLEM**) MY PROJECT WILL ANSWER (SOLVE) IS:

_____

_____

_____

Please choose **one** of the following options:

I'd like to participate in the judging portion of the STEAM Fair, please judge my project accordingly. ☐

I do not wish to participate in the judging portion of the STEAM Fair, please do not judge my project. ☐

# Our judges use the following criteria in evaluating the student's project:

- **Knowledge of Project Topic (25%)**
  Good, well-balanced explanation of project. Able to answer all questions asked by judges about project. Provide supporting evidence and/or comparisons
- **Knowledge of Scientific Principles (20%)**
  Sections outlining purpose, describing procedures, methods and materials, reporting results and conclusions, and discussion of overall project are present. Understands each section Explanations match each section. Sections are related or explained why they differ. Thorough understanding of the sections and how they are obtained i.e. statistics.
- **Journal and Records (20%)**
  (Computer-generated journals are acceptable) Journal is available. All journal sections are present. All journal entries support the project. Journal entries are in chronological order without missing pages. Project can be duplicated by reading the journal.
- **Creativity and Originality (20%)**
  Project is consistent with the student's knowledge. Originality is shown in the testing of the hypothesis. Data presented in a unique manner. Project shows overall originality. One-of-a-kind project.
- **Display (15%)**
  Display meets guidelines. Neat, visually pleasant and organized. Makes effective use of visual aids. Exhibit should be self-explanatory.

Please be sure to label the project and all of it's separate components so that we're sure to not lose anything while setting up!

## How to Layout Your Science Fair Display Board

| | **Project Title** | |
|---|---|---|
| | **Data** | |
| | **Results (Write a short statement about what your data tells us)** | |
| **Problem** - stated in question form. | | **Procedure** - (or here) how you conduct your test. |
| | **Graphs** - show your data that was collected and display the results in the appropriate graph. | |
| **Hypothesis** Must be in the if...then...because... format. | | **Conclusion** - Most important part of your experiment! |
| | **Pictures**— pictures are not required but add to the quality. | |
| **Procedure**— (or here) how you conduct your test. | | |
| | ***Your data notebook (if done) should sit in front of your board on the table** | |

**\*\*\*You can make changes as long as everything above is on your board.\*\*\***

# Additional Science Fair Resources

**Agricultural Ideas for Science Projects**
www.ars.usda.gov/is/kids/fair/ideasframe.htm

**Science at Home**  http://washingtonstemeducation.org/

**Archimedes Initiative**
http://www.archimedesinitiative.org/

**STEMtoSTEAM**  http://stemtosteam.org/

**Discovery Education – Science Fair Central**
http://school.discoveryeducation.com/sciencefaircentral/Parent-Resources.html
**"How To" Guide for Parents**
http://go.hrw.com/resources/go_sc/hst/HSTGP331.PDF

**NASA Jet Propulsion Lab – Video Series on "How to do a Science Fair"**
http://www.jpl.nasa.gov/education/sciencefair/

**Washington State Science and Engineering Fair –**
see real examples and get ideas http://www.wssef.org/
**Washington State STEM Website –**
all about STEM - http://www.washingtonstem.org/

**Science Buddies – Project ideas and more**
http://www.sciencebuddies.org/

**Washington State STEM Education Foundation –**
**Professional Development**
http://washingtonstemeducation.org/

# Instructions – STEAM Fair

➢ th**Remember to put your name, grade, and teacher's name on your projects**
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Dear Pioneer Science Fair Participants,

Congratulations on completing your projects. We want to make sure your Science Fair experience is a success. Here are some simple instructions. Enjoy!

1. Please stay next to your project board during judging portion of the Science Fair. The judging time will be determined at a later date.

2. Answer questions from guests who visit your project if you're there.

3. Remember to take your project home when the fair has ended the same evening.

4. Most of all, remember to have fun! ☺