

# **PENN MANOR ELEMENTARY SCIENCE EXPO**

## **A GUIDE to Starting and Finishing a Project**

### **INTRODUCTION**

Penn Manor School District values incorporating skills that support 21<sup>st</sup> Century needs. These skills include: Critical Thinking and Problem Solving

Collaboration

Adaptability (open to new possibilities)

Initiative

Effective Written and Oral Communication

Accessing and Analyzing Data

Curiosity and Imagination

All these are a perfect match for the approach to science and discovering more about our world. A well-done science expo project can be a source of great satisfaction and pride. Like most worthwhile school work, a science project is not an easy job. It will require much time, thought, and plain hard work. However, there is no better way to understand what real science is all about. By doing a science expo project, you will learn how scientists work to solve problems.

Science and experimenting go hand in hand. Scientists solve problems by making observations, by writing down what they see and by conducting experiments. Such activities are known as science research. When doing a science expo project you must first decide upon a suitable topic for investigation. Then you develop a plan which you write down. It should tell step by step how you expect to proceed. As you carry out your project, you will experiment, observe, draw conclusions and maintain this information in a journal. The final steps will be to prepare final copies for your display, make a display and practice explaining your work to your parents or to a friend. In this way you will be prepared for the Science Expo.

### **SELECTING A PROBLEM FOR YOUR SCIENCE PROJECT**

Selecting a problem for your science expo project means finding a question to answer. Remember that the title of your project should always be stated as a question. Your project should help you answer the question. Sometimes the answer to the question is still not known when the project is completed, but even in this case, you will have measured many things and learned much.

Where can you look for questions to answer?

- Talk with your parents and classroom teachers for ideas.
- Talk with your older brothers and sisters.
- Every Penn Manor Elementary School has a teacher who serves as Science Expo representative. Find out who it is and talk to him/her.
- Watch TV advertisements. They can give you questions to answer.
- Check out your school library and look for books about science and science experiments. Your science book from class might have ideas.

## **MOST IMPORTANTLY FIND A SCIENCE QUESTION THAT IS INTERESTING TO YOU!**

**HERE ARE SAMPLE QUESTIONS TO THINK ABOUT, BUT THERE ARE HUNDREDS AND HUNDREDS OF POSSIBILITIES!**

1. What shape glass causes water to cool off most rapidly?
2. How does the size of a balloon affect its pressure?
3. Which area stream is the cleanest?
4. Which light bulb burns the longest?
5. Which filter does the best job of cleaning water?
6. How do light and temperature affect the growth of bread mold?
7. Which paper towel is the strongest?
8. Does tobacco in soil have an effect on the way plants grow?
9. How does salt concentration affect the freezing temperature of water?
10. What insulating material holds heat the longest?

**YOUR SCIENCE EXPO PROJECT SHOULD BE A COMPARISON OR A MEASUREMENT. IT SHOULD TEST YOUR PREDICTION OF HOW THINGS ARE DIFFERENT OR HOW THINGS ARE THE SAME.**

*The Science Expo will allow for the collaboration of 2-3 students as well as individual entry. Please note if this approach is desired the registration form needs to be filled out accurately and school time is NOT granted for the completion of the project. Science Expo projects are typically completed outside of the school day. This is the case for collaborative projects as well.*

### **THE SCIENTIFIC PROCESS**

Knowing about the scientific method will help you do a good job with your Science Expo project.

**OBSERVE:** Before a scientist gets involved with an experiment she watches and learns. This might mean reading in the library, watching how things work or looking at nature for a question to which you would like to know the answer.

**FORM A QUESTION:** Once you know what you want to study and learn about, think about the question you want to answer. It should be a question that can be answered in real terms. “Which light bulb lasts the longest?” is a much better question than “Which light bulb is best?” Remember that you are going to be measuring to find the answer to your question. When you know exactly what your question is you will know how you want to set up your experiment.

**FORM A HYPOTHESIS:** This means to make a best guess at what the answer to your question will be. It is a prediction about the outcome of your experiment. A hypothesis can be tested. It might sound something like these: “The Eveready battery will last the longest... The more salt you put in the water the longer it will take to freeze... When I change the shape of the

pot it will have no effect on the way the plant grows.” You should know that it is not a problem if your hypothesis is wrong.

**EXPERIMENT/RESEARCH PLAN AND MATERIALS (Write out your procedures and materials):**

This is the experiment itself. It should be well planned. You must observe it closely and you may want to repeat it several times just to make sure it is done properly. You will have to think about what causes things to happen and what is the effect of the causes. When you do your experiments you will want to “control the variables.” This means that you will do your best to make sure that all things are equal in your experiment except the one thing you are testing. If you are testing to see how different types of water affect plants, then you will want to make sure that each plant gets the same sun, the same temperature, the same soil and that only the water is different.

**DATA ANALYSIS/ REPORT RESULTS (Do your experiment and record your results):**

This is an important part of your science expo project and will be a big part of your display at the Science Expo. You will want to display your results. This means to show the measurements you have done. Depending on the nature of your experiment you may be reporting time, or temperature, or length, or numbers, or degrees of change, or weight. The best way to report your results is to use a graph. This is one area where you might want to work with your parents or your teacher to make sure that you are doing a good job. There are many types of graphs – pie graphs – bar graphs – line graphs – picture graphs.

**DRAW CONCLUSIONS:** This is when you finally get the chance to tell what answer you found to your question. Remember that it is not a problem if your conclusions show that your hypothesis (prediction) was wrong. You have still found out new information and added to what science knows about the world. Summarize your findings. Explain. What did you learn? Did you find any experimental errors?

**HERE ARE SOME TIPS THAT MIGHT HELP YOU DO YOUR VERY BEST WITH  
YOUR SCIENCE EXPO PROJECT**

1. Do the work so that you understand your project. It is always a good idea to ask your parents and teachers for advice but, **you should do the work and make the decisions.**
2. It is always important to be neat. If you do a neat job your project will look great when it is displayed. Use your best grammar and spelling in the written report.
3. Use a timetable or a schedule to make sure you get all of your work done on time and that you don't have to rush at the end.
4. Keep a log book that will have notes about your work and the test results you are getting. This will be a record of the work you have done.
5. **Be proud of your work and have a good time.**

## A NOTE TO PARENTS

We recognize that any student will require the assistance of an adult to complete his/her science expo project. We ask your help in always remembering that the focus of Science Expo is to help your child learn about the scientific process and to gain a love for science study.

### INFORMATION TO KEEP IN MIND

1. Work on the project and display must be done by the student who enters the expo. Teachers and family may advise but, may not complete work on the project.
2. Projects entered in the expo are to be voluntarily entered by the students, not required by a teacher.
3. Students are permitted to complete a collaborative project working in a group of 2-3 students. It is expected that the intricacies of the project would increase if more students are involved.
4. Any project in which animals are to be used must be approved ahead of time by the Science EXPO Committee Representative at each of the seven elementary schools. The safety of animals is the number one priority.
5. Project subject matter must positively reflect the policies of the school district. (no experimentation using tobacco, alcohol or firearms)
6. There will be no place to plug in electrical devices. If a project needs electricity, batteries will have to be used.
7. Displays must be made so they will stand alone on a table top without any special assistance.
8. Displays must not be more that 3 feet wide and 2 ½ feet from front to back.
9. Displays must include the following:
  - A. Title (stated in the form of a question) (
  - B. Hypothesis
  - C. Research plan
  - D. Materials
  - E. Results (date, tables, charts, graphs)
  - F. Conclusions
  - G. Bibliography (if appropriate)
  - H. A log or journal may be appropriate for certain projects.
10. Displays should show the name of the student and the student's school name in lower right-hand corner.
11. Technology may be used during the interview portion to illustrate experimentation process. No outlet access will be available and students must take laptops with them following the interview. Penn Manor does not loan out equipment to be used for the science expo.
12. No live animals may be included in a science expo display.
13. A project must follow the scientific method.
14. In doing a project you should be able to measure something, or record a change such as color, shape or size.
15. The student should not just build a model, or buy something from a store and put it together.