J.B. Nelson

Family Science Night

Thursday, February 25th, 2016

Project Display Participation Guide

The JB Nelson Family Science Night is coming! We are fortunate to have Steve Belliveau joining us for an stimulating presentation "Getting Excited About Science!". There will also be plenty of hands-on activities to enjoy and student created projects to explore. Please mark your calendars and plan on joining us.

All students are invited to create a project to display. Use this guide to develop a project that you, your family and/or friends can all do together at home. There is a ton of information here to guide you in your scientific exploration!

We hope this document answers all your questions and has all the details you need to get started. We have LOTS of resources for you. Most importantly we are happy to answer any questions you might have and help as best we can. If you find you need help you can contact:

Ellen Kohlmeir at 630-548-2543 or ekohlmeir@gmail.com
Or
Heather Debaun at 630-743-8135 or hdebaun@gmail.com

Here is a summary of dates and times you should be aware of.

Science Assembly for all Students	December 17, 2015
Information and brainstorming topic help session	January 5, 2016 5:00-6:00pm
Intent to participate form due	January 15, 2016
Science project display help session	February 2, 2016 5:00-6:00pm
Bring project to school	February 25, 2016
	Projects can be dropped off between 3:30 and 5:30
Family Science Night	February 25, 2016

Schedule:

5:30-6:20pm Free time to explore projects and science stations

6:20-7:15pm Presentation by Steve Belliveau

"Getting Excited About Science"

7:15-8:00pm Free time to explore projects and science stations

What is the J.B. Nelson Family Science Night?

Family Science Night is a time for J.B. Nelson students to explore STEM related topics outside of the classroom and to display it so others can learn from what they have done. The purpose is to encourage a sense of wonder and curiosity in each student and to increase self-directed questioning of the world around them.

Can I come to Family Science Night even if I don't prepare a project to display?

YES! All can come and enjoy the student made displays. It will be our own J.B Nelson science museum made by students! In addition, there will be an exciting science presentation and several adult led hands-on science stations. Please come and enjoy!

What is STEM and why is it important?

STEM means Science, Technology, Engineering and Mathematics. People who work in STEM related jobs make it possible to invent new things, improve things already invented and change the way we live.

Is this a judged science fair?

No. This is not a judged science fair and is not structured as a competition. It is setup to be an opportunity for anyone to participate and all to succeed at exploring a scientific question.

Who can I work with?

Scientists frequently work with others. This is called collaborating. We want to encourage you to collaborate with others. You can work with a friend or a group of friends. You can work with your parents, brother, sister or another adult. The only rule is that you <u>give credit to everyone that helped with the project</u>. Parents: Remember the purpose of this project is to encourage kids to be curious about their world; learn to study independently and above all, to enjoy science! Your guidance and support will be necessary, especially for younger students, but keep in mind that it is their project and should look like it. A kindergartener's project will look like it was made by a kindergartener. They (and you) will be proud of their accomplishments.

What is the information and brainstorming session?

The information and brainstorming session on <u>January 5 from 5:00-6:00pm</u>, in the LRC, is an opportunity for you to come in the evening and get some help developing an idea for your project. This will be held in the J.B. Nelson LRC and we will have resources there to help you decide what you want to work on. We can also answer any questions you may have about Family Science Night.

What is the science project display help session?

The science project display help session on <u>February 2 from 5:00-6:00pm</u> is an opportunity for you to come in the evening and get some help with your project. We will not be performing experiments or doing any demonstrations. Those have to be done at home with your parents help. This is a chance for you to ask questions about your project and to get help deciding how to best display your information.

How do I get started?

First decide what type of project you would like to do. There are 4 different types of projects you can choose from:

1) Collection A collection is a group of related items that can be displayed to show some variety in nature.

2) Demonstration/Model A demonstration or model can be a lot of different things. It is kind of like what you might do if you worked for a museum.

3) Invention Find a problem and design a solution by using materials around your house.

4) Experiment Use the scientific method by developing a hypothesis (a guess), test your theory, gather data, and develop a conclusion.

These are some general descriptions. To get more specific instructions and ideas, look further in this packet. You can also stop by the school library or the public library and find books with project ideas. The internet is also a great place to look. Ask your parents or friends to brainstorm with you. Just don't give up! When considering a topic for your project, do not forget about technology and mathematics. Your project does not need to be from one of what we think of as a scientific field (e.g. biology, chemistry, earth science, physics), but it can investigate a mathematical question, learn about how a particular technology works, or use technology in an unexpected way. Inventions developed by the students are welcome. Students can display biographical information about famous scientists. Every topic and project related to science, mathematics, and engineering is a good topic!

Just a quick browse in the youth section of the Batavia Public Library revealed some great titles such as:

Silly Science
Mr. Wizard's Supermarket Science
Investigating science with: Rubber bands, Coins or Paper
Sports Science

And so many more! The JB Nelson library has many great titles too!

I've decided on my topic. Now what?

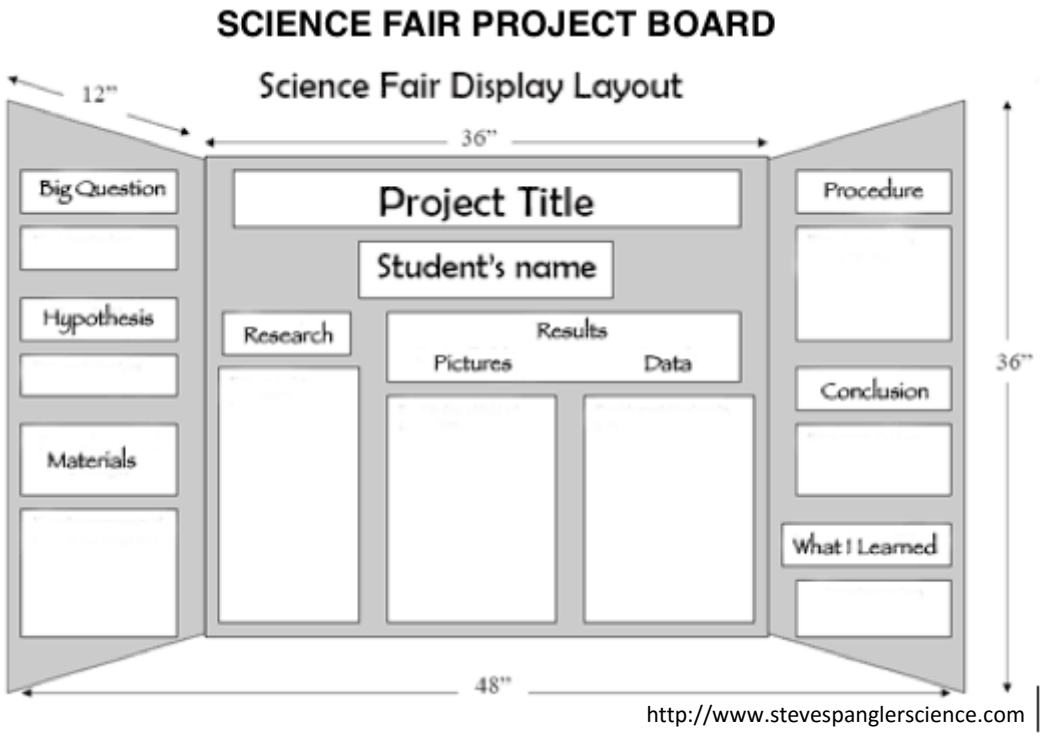
1. Ask yourself: "What is the question I want to answer?", or "What do I want to know more about?'
2. Decide if you are going to work alone or with a friend(s).
3. Fill out and turn in your registration form by January 15. Parents must sign the form and for groups, each child must submit a signed form.
4. Research and read about your topic. Contact people who may help you.
5. Refer to the list of questions below for your project type. These will help you plan your project. By following this plan, you will answer your question.
6. Gather and list your materials.
7. Begin following the steps you have outlined in your plan.
8. If appropriate, organize your results in charts, graphs, or illustrations.

9. Look carefully at the results. Write down the answer to your question.
10. Make an interesting display board.
11. (Optional) Make a report about your science project.
12. Prepare to tell others (teachers, parents or classmates) all about your project, if asked.
13. Bring your project to school on February 25th between 3:30 and 5:30pm.
14. Retrieve your project after the fair and take it home.

HAVE FUN!!

How do I display my project?

Your project should be displayed is a space no larger than 48" wide and 24" deep. Most projects will fit on a 36"x48" three-sided display board (as illustrated below). You may use the table space in front of the board to include any displays you wish to have. The middle panel is 2 feet wide. The side panels are each 1 foot wide. The board is three feet high. These boards are available at several local businesses including Hobby Lobby and The Chalkboard.



If your project does not fit this format (for example, you decide to do an ecosystem diorama and it is in a box) don't worry. We just want you to remain within this size. But please include some text to explain what your project is and what we can learn from it. If this display doesn't work for your awesome idea, or you need special accommodations such as electricity, please contact us. We will do our best to make sure you have what you need.

Content
Use the questions listed under each type of project to organize your display. You can either use the questions or the scientific terms to label it. The main thing is to make it easy for your parents, teachers and friends to look at your display and know what you did and what you found out. If you have a collection, model or demonstrations, prepare your display board telling about what you've done, and place the collection, model or display in front of your board.

Lettering
Large letters for titles and headings are easier to read. For the three-sided display boards, we suggest 2" to 3" letters for the center, 1" to 2" letters for the side panels.

Computers
Please avoid creating a computer slide show or other computer-dependent display. It will be difficult to provide electrical outlets to more than a few projects, and we cannot guarantee the safety of your computer or other electronical device.

Hands On/Hands Off
Decide if you want people to be able to touch your display or not. Displays that allow viewers to interact with your experiment or topic can be very interesting and fun. Please consider prominently displaying a sign that say "Do not touch" or a sign encouraging people to properly interact with your display. Please understand that hands-on materials will be left in areas where there often will be no supervision, and we cannot ensure that items will not be broken, mishandled, or stolen. Plan your hands-on materials with this in mind.

Putting it all together
When you have decided what to put on your display, lay the whole thing on the floor and look at it. Arrange it to your satisfaction, and then glue it on. Every person who helps with your project should be given credit somewhere on your display. Use your creativity to make it interesting! Examples of things to include are: large, bright or black lettering, pictures, diagrams, a catchy title, and a photo of yourself working on your project. When making the display, we suggest that everything be blocked in first with pencil. After changes are made, felt pens or cut stencils can be used for the final form. Put your name prominently on your project in the center under your title. Place acknowledgments for those people that helped you in the lower right hand corner.

There are plenty of pictures and examples of Science Fair projects on the internet. Spend some time looking at what others have done to get some good ideas for your display. Also, consider the grade level of the student before deciding on a project – younger students will want to pick simpler projects.

And remember: it's OK if the display looks like it was created by an elementary school student!

Project Type Descriptions and Guidelines

Project Type 1: Collection

Collection projects help students to learn observation and classification skills. It is hoped that each student will reach a conclusion about their collection and then be able to generalize that information. The display of a collection could include an actual collection, a report, photographs, graphs and charts, or anything that shows what was learned by doing the collection. It is more appropriate if the collection is somewhat science related (i.e. not a collection of baseball cards, Hot Wheels, etc.)

Guidelines

• Sort your collection and tell why you collected it. Tell when and for how long you collected it.
• Tell where you collected it, and how many items are in your collection.
• Create a display board showing what you learned. If you are able to bring your collection to the Science Fair, you may do so, as long as the items are not too valuable. Take pictures if your items are too valuable to leave unattended.

Questions for a Collection Project

1. What question did I ask about my collection?
2. What materials did I use, including what I collected and tools I used in my collecting?
3. What did I do? How did I do my collecting?
4. What did I notice when I sorted my collection?
5. What is the answer to my question?
6. What books or resources did I use to help me identify items in my collection?
7. What does my collection make me wonder? What do I want to learn more about?
8. Who helped me with my project?

Project Type 2: Demonstration/Model

This is the broadest type of project and can include anything from a model or demonstration of a scientific principal. It can include a display reporting on something of interest to you. For example: a display on the life and accomplishments of a famous scientist. Model/Demonstration projects give students the opportunity to research a topic and/or build a model of something they are interested in and then present it. Learning about the heart, the digestive system, or the solar system can be very exciting. How does an internal combustion engine work? Find out, and share your answer! There are science kits available at Hobby Lobby, Michael's, American Science and Surplus etc. You can follow the directions in those kits, make a display and teach us what you learned.

***If you are interested in art and wish to be creative we suggest you look up the book Exploring Science Through Art by Phyllis Katz. The Batavia Public Library has a copy. Perhaps it will inspire you to create some artwork and let us know what you learned about science.

Guidelines

• Pick something you are interested in studying, and show that you understand what you studied.
• Make a model or display that shows things completely and correctly, so someone who hasn't studied your subject understands your topic.
• Create a display board showing what you learned. There is space in front of your display to place your model if you'd like.

Questions for a Model/Demonstration Project

1. Why did I choose this topic to study (i.e. what was my question about this topic?)
2. What is the question I want to answer?
3. What materials did I use to build my model? How did I use those materials to build my model?
4. What books or resources did I use?
5. What did I learn about this topic?
6. Who helped with my project?

Project Type 3: Invention

Use your creativity to solve a problem. Try and find a problem and design a solution by using materials around your house. The design process helps inventors understand a particular need and design appropriate solutions. Remember that your invention doesn't need to work perfectly. Many first prototypes don't. They teach us a lot about what needs to be done to improve the product. So, give it a try and see what you can learn.

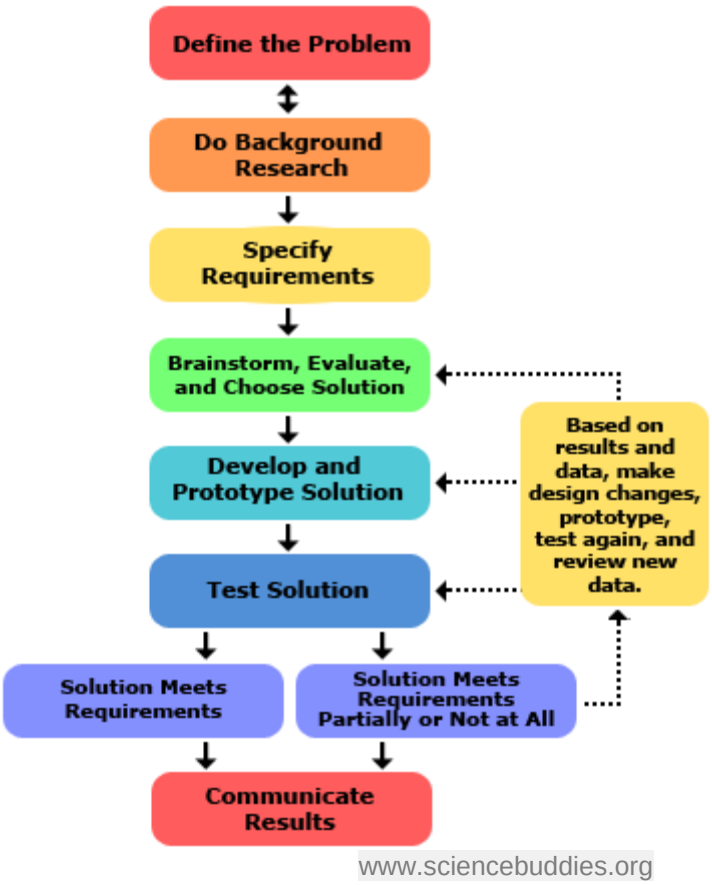
Guidelines

- Ask your friends and family members if they have a problem you might be able to solve with your own invention.
- Seek out materials around your house that you might use to construct a prototype.
- Test your invention to see if it will solve the problem.
- Think about what changes might improve your design.
- Make a display that shows us what you invented, how you tested it, what the results of your tests taught you and how you could improve on your design.

What is the Design Process?

The design process is and orderly way to develop an idea that solves a need or a problem. Many companies use this method to develop products or improve ones that already exist. The design process starts with a problem to be solved. Through research and talking to others you learn what your invention needs to do to solve the problem. To brainstorm means to spend some time coming up with every idea you can and discussing them with other people, even if they seem crazy! This can be a very good way to come up with ideas. No inventions are built right the first time. That's why you start with a prototype. A prototype is a first version of a product that is used to test and develop further versions. Use the diagram below as your guide to develop your own invention.

The Design Process



Questions for an Invention Project

1. What is the problem I want to solve?
2. What have others done to solve similar problems?
3. What does my invention need in order to be effective?
4. What materials will be used to build my invention?
5. How do I test my prototype?
6. What did I learn from my tests?
7. What needs further improvement?
8. Who helped me with my project?

Project Type 4: Experiment

An experimental project can be done by anyone. The hardest part is thinking of a question that interests you. Once you've done that, using the scientific method to learn about it is fun and exciting.

Guidelines

Use the Scientific Method, described below, to perform your experiment. Base your conclusions on your data, and create a display board showing that you understand what happened. Include some ideas of your own in the project!

What is the Scientific Method?

The Scientific Method is simply an orderly way to find an answer to something. The basic steps are illustrated by the questions below. Using these steps as a guideline, you can conduct an investigation that will make it possible for you to convince someone else what you discovered is true. It allows others to repeat your experiments and verify your results. Scientists have specific words for these questions. They are listed after the question.

Questions for an Experimental Project

1. What is the question I want to answer?
2. What do I think the answer will be before I start? (HYPOTHESIS)
3. What did I do to test my hypothesis? (METHOD)
4. What materials did I use? (MATERIALS)
5. What things did I change? (VARIABLES)
6. What things did I keep the same? (CONTROLS)
7. What happened as a result of what I did? (RESULTS/DATA)
8. What is the answer to my question based on my experiment? Does it match my hypothesis? Why or why not? (CONCLUSION)
9. Based on my results what do I wonder about what I have found out? (FUTURE QUESTIONS)
10. What books or resources did I use? (REFERENCES)
11. Who helped with my project? (COLLABORATORS)

Experimental Project Terms

A **hypothesis** is a guess or speculation about how or why something happens. You should form a hypothesis or guess about your questions before you begin your experiment. **Methods and Materials** is where you describe how you can test your hypothesis. Write out your plan. You should plan to run your test a number of times. Next, change one part of your test and see what happens (while keeping everything else the same.) Change another thing, and see what happens. The things you change are called **variables**. The thing or things you keep the same are called **controls**. Test only one variable at a time, and repeat the tests several times to get good data. Make sure your test is fair, so that it doesn't only show the results that support your hypothesis. You should look for the answer, whatever it is - proving your hypothesis is wrong is just as valid as proving it right! The information gathered during the investigation is called **data**. After collection, data can be put in chart or graph form if a more formal and concise presentation is desired. From looking at the data or **results**, you can answer the question that started the whole adventure. The answer is the **conclusion**. If you do prove something right or wrong, try to figure out why, and write it down in your conclusion. Then imagine how you might further test your theory. List any books, magazine articles, or any other sources of written information you used to learn about and do your project, and their authors. These are known as **references**. **Collaborators** are the people who helped you with your project. This may include your family, other adults, and friends.

An Example of an Experimental Project

Question: Will different surfaces affect how far a toy car rolls?
Hypothesis: I think a toy car will roll farther on a smooth surface than on a rough surface.
Method: I will set up an inclined ramp and put different surfaces on it (variables), such as: a) rough sandpaper b) linoleum c) indoor/outdoor carpet d) a mirror (or glass). I will keep the incline and the car the same for each trial (controls). I will run three races on each surface and measure how far the car rolls from the end of the ramp. I will graph the results for each surface and find the average distance the car travels on each surface.
Results: The car traveled the furthest distance on the glass surface and the shortest distance on the indoor/outdoor carpet.
Conclusion: The smooth surface provides the least amount of friction.

If you want to think about doing an experiment and want a little more direction this is a link to a document with some excellent suggestions.

http://www.utelementary.org/ourpages/auto/2013/1/9/54511288/ScienceFairGuide%202013.pdf

The following list is intended to show you how diverse and simple your question can be. See what catches your eye and perhaps you can find something to test. However, it would be even better to see if there is a unique variation that you come up with on your own.

SCIENCE FAIR PROJECT IDEAS

- What kinds of things do magnets attract?
- What kind of juice cleans pennies best?
- Which materials conduct heat best?
- Do watches keep the same time?
- Which materials dissolve in water?
- Do ants like cheese or sugar better?
- How does temperature affect plant growth?
- Do coins corrode more in salt or fresh water?
- Does a ball roll farther on grass or dirt?
- Do plants give off water?
- Do large apples have more seeds than small ones?
- Do any people in my class have the same fingerprints?
- Which bread molds most quickly?
- Which color liquid do hummingbirds prefer?
- Can people identify flavors of KooI-Aid when blindfolded?
- Which dissolves better in water - baking soda or salt?
- On which type of battery do toys run the longest?
- What magnet is the strongest?
- Do plants prefer tap or distilled water?
- Can an earthworm detect light and darkness?
- On which surface can a snail move faster-dirt or cement?
- How can you measure the strength of a magnet?
- Can the design of a paper airplane make it fly farther?
- Can you tell where sound comes from when you are blindfolded?
- Does warm water freeze faster than cold water?
- Do bigger seeds produce bigger plants?
- Do wheels reduce friction?
- What holds two boards together better - a nail or a screw?
- Does water with salt boil faster than plain water?
- Can you tell time without a watch or clock?
- Does an ice cube melt faster in air or water?
- How much of an orange is water?
- Will more air in a basketball make it bounce higher?
- Does baking soda lower the temperature of water?
- Which brand of popcorn pops the fastest?
- In my class, who has the biggest feet - boys or girls?
- Does the color of water affect its evaporation?
- How does omitting an ingredient affect the taste of a cookie?
- Which student in the class (or person in my family, etc.) has the greatest lung capacity?
- Does it matter in which direction seeds are planted?
- Which cheese grows mold the fastest?
- Which brand of diaper holds the most water?
- What is the best shape for a kite?
- How does a pulley help you do work?
- What is the best condition for the growth of mold?
- Which brand of paper towel is the strongest?
- Which paper towel absorbs the most water?
- Can things be identified just by their smell?
- Does a bath take less water than a shower?
- Will an ice cube melt faster whole or when crushed?
- In which soil do plants grow best?
- How far can a snail travel in one minute?
- Do roots of a plant always grow downward?
- What foods do mealworms prefer?
- Can plants grow without soil?
- How long will it take a teaspoon of food dye to color a glass of still water?
- In my class, who is taller - boys or girls?
- Which materials absorb the most water?
- Does holding a mirror in front of a fish change what a fish does?
- Does temperature affect the growth of plants?
- How far can a person lean without falling?
- Does the shape of a kite affect its flight?
- Does sugar prolong the life of cut flowers?
- Which liquid has the highest viscosity?
- Does the color of light affect plant growth?
- Which brand of popcorn pops the most kernels?
- How much can a caterpillar eat in one day?
- Do plants grow bigger in soil or water?
- Can you separate salt from water by freezing?
- Do suction cups stick equally well to different surfaces?
- How much weight can a growing plant lift?
- Will water with salt evaporate faster than water without salt?
- Do all colors fade at the same rate?
- In my class, who has the smallest hands - boys or girls?
- Does a baseball go farther if hit by a wood or metal bat?
- What gets warmer - sand or dirt?
- Which material makes the best insulator?
- Which color container cools off the quickest?
- What is the effect of heat when dissolving sugar? Salt?
- Why is salt put on icy sidewalks?
- What is the acidity of various household products?
- What kind of materials will put out a fire?
- Do all crystals have the same shape?
- How much of the air is oxygen?
- How is the strength of a magnet affected by glass, cardboard, or plastic?

Helpful Websites

Science Kids http://www.sciencekids.co.nz/experiments.html or http://www.sciencekids.co.nz/projects.html

Science Fair Projects World http://www.sciencefair-projects.org/index.html

10 STEM Tips for Parents from Middleweb

http://www.middleweb.com/3569/10-stem-tips-for-parents/

Science Buddies http://www.sciencebuddies.org/

Teacher Vision - Resources for Invention Projects

https://www.teachervision.com/inventions/teacher-resources/6636.html?WT.mc_id=GS_2014-05-07_email&GS1

There are many many more websites out there. These are just a few we have found. We hope they are helpful to you.

A Note to Parents

Dear Parents,

You can be a real help and truly enjoy working on a Science Fair project with your child. Don't worry if you haven't created a project before – anyone can do it! First, become familiar with the guidelines for the fair. Tape the fact sheet from your packet on your refrigerator for easy reference. Next, allow plenty of time to do the project, at least 4 weeks. Try to set aside time every few days or so for work sessions. Make them short, about 20 minutes, to allow for slow, but steady, progress. This will accommodate a child's attention span and ensure that each session is pleasant.

Try not to get possessive about the project. Let it end up looking like exactly what it is: the work of a youngster learning about something that interests him or her. You will both feel considerable satisfaction when the project is complete. Your child may be asked to explain the project. It is wise to practice this so your child will feel more comfortable. Simply encourage your child to go through the project as if explaining it to someone who knows nothing about it. He or she might begin by telling how he or she became interested in doing this project, and then simply talk their way through the project step by step.

If your student wants to participate and create a display but you need financial assistance to do so please contact Julie Phillips julie.phillips@bps101.net or Theresa Olson theresa.olson@bps101.net for information on how the PTO can help.

We hope this information will assist you in the role of guide. Have Fun!

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Science Fair Safety Rules

In order for the Fair to be an enjoyable experience for all persons involved, there are a few safety guidelines that must be followed.

1. No open flames are permitted.

2. No dangerous or combustible chemicals are permitted. (Rockets/other engines must not contain fuel.)

3. Dangerous substances, such as chemicals, drugs, poisons, etc. are not permitted.

4. All electrical safety rules should be obeyed.

5. Expensive or highly fragile items should not be displayed. If these types of items are essential to the project, use photos or simulations.

6. Students should avoid using live or preserved animals or parts of animals as part of their experiment. An exception may be made for sealed insect collections.

7. No active chemical reactions may be performed in the exhibit area. Examples of chemical reactions are vinegar and baking soda volcanoes, and Diet Coke/Mentos experiments. You may choose to do a volcano at home, but it may not be a hands-on activity in the exhibit area.

8. Avoid bringing open containers of liquid to the Science Fair as they can easily spill.
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Acknowledgements

This Packet was put together with resources from the following:

1. Steve Spangler Science

   http://www.stevespanglerscience.com/

2. Lawton Elementary School

   http://www.a2schools.org/lawton.home/files/2011_sf_handout_1.pdf

3. Science Buddies

   www.sciencebuddies.org

4. PTO Today

   http://www.ptotoday.com/sfn#science-night