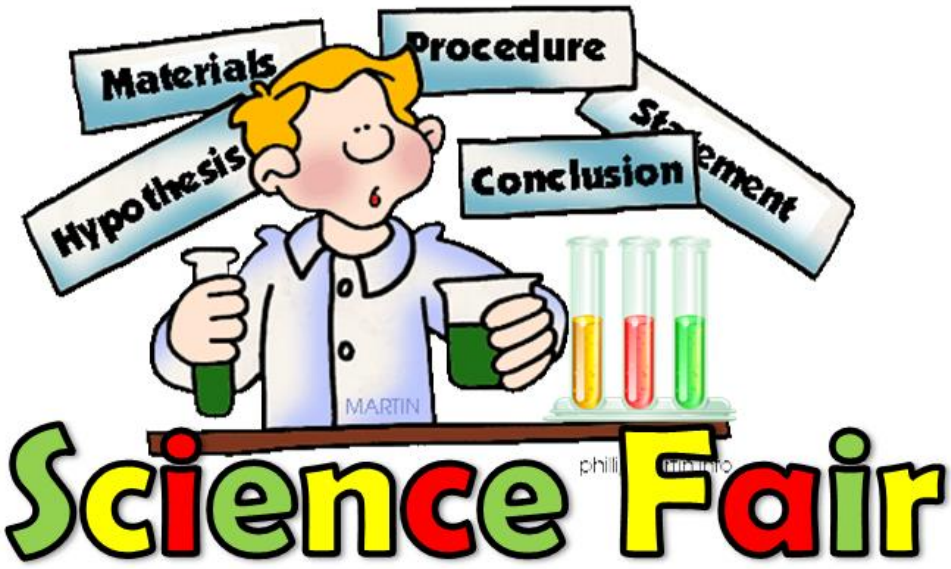
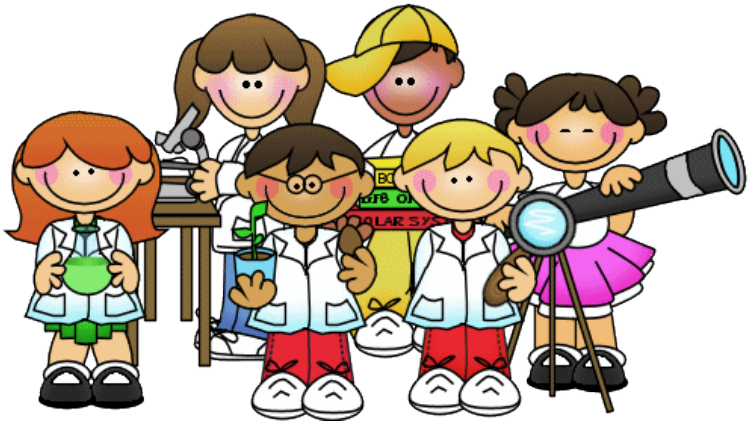


Ashby Lee Science Fair Packet



SAVE THE DATE!

What: Ashby Lee Science Fair

When: **Science Fair Judging** will take place on Monday, February 22nd during the school day.

Science Fair Family Night will be February 22nd at 6:30pm

(Awards Ceremony will begin at 7:00pm)

Science Day at school will take place on Tuesday, February 23rd during each grade's Specials Time.

Snow Dates are 2/29/16 & 3/1/16

Where: Ashby Lee Elementary School

Other Important Dates:

- **Science Fair Project Drop Off Dates & Times**
  - Friday, February 19th from 2:50-3:45pm
  - Monday, February 22nd from 7:45-8:15am
- **For students being mentored by high school students, the meeting dates are:**
  - Thursday, January 14th 3:00-4:30pm
  - Thursday, January 21st 3:00-4:30pm
  - Thursday, February 11th 3:00-4:30pm

Introduction

The Ashby Lee Elementary School Science Fair is a PTO and school-sponsored event that supplements the regular curriculum of classroom instruction. The purpose of the Science Fair is to encourage students' interest in science, to develop their inquiry and investigation skills, and to enhance children's pride in completing research projects. Elementary-level science fairs enable students to exhibit their projects and share ideas with other students and community members; provide opportunities for students to receive feedback from professional scientists and community members; and provide students with exciting opportunities to work with science process skills and the scientific method on a topic of their own choosing.

What is a Science Fair Project?

A science fair project is a unique way for students to pose questions for which they must seek out answers and to satisfy their own curiosity about the world around them. A science fair project is an experiment, a research effort, a collection of scientific items, or display of scientific apparatus presented for viewing. It represents the efforts of a student's investigation into some area of interest and provides a way for the student to share the results of those investigations. Through the development of a science fair project, students gain a first-hand appreciation of the work of scientists and the value of their discoveries.

Ashby Lee Elementary School Science Fair Project Rules/Guidelines

- A project should include a display board and any pertinent hands-on objects. Students are expected to be able to share/discuss their project with the judges. **Presentations will be conducted during school on Monday, February 22nd.**
- Projects must fit within a **3 foot wide by 18 inch** deep area. This should allow us to accommodate numerous back to back projects on tables. It should also accommodate a typical trifold display board, slightly folded. If a project will require additional room, the student may petition the science fair committee for an exception.
- The display board may be a typical trifold display board available at local stores such as Walmart/Dollar Store, or it may be any type of free-standing cardboard. The display board must stand upright.
- Projects should include a title, clear description of what is being investigated, and what was learned. Graphs, charts, photos and other visual aids are encouraged.
- The project should be completed by the student. Parents may assist students where safety is an issue (drilling, cutting, etc.). Acknowledgement of any parent assistance should be displayed somewhere on the project.
- The project should include the student's name, grade, and teacher.
- The project must follow the safety rules.
- Using the scientific method is strongly encouraged, but not required.

Science Fair Safety Rules

In order for the fair to be an enjoyable experience for all persons involved, there are some safety guidelines that should be followed. The project must follow the safety rules. Certain substances/circumstances are prohibited from the school premises. This does not prevent the student from using them; for instance, a project utilizing house current electricity, animals, or prohibited chemicals may be documented photographically, and with charts and graphs. Models, photographs, or simulations can be used in place of things that are restricted from the display. The materials themselves may not be present in the school.

Safety Guidelines

• Students should avoid using live animals or preserved animals or parts of animals.
• Microbial cultures or fungi, living or dead, are not permitted.
• Avoid projects with open containers of liquids, including water, as part of the display. These can spill. Liquids may be used, but must be within closed containers.
• Chemicals and/or their empty containers, including caustics, acids, and household cleaners are not permitted. You may choose to do something such as a volcano at home, but it may not be a hands-on activity in the exhibit area.
• Open or concealed flames are not acceptable.
• Batteries with open-top cells are not allowed. Sealed batteries are acceptable.
• Combustible materials are not permitted. Rockets and/or other engines must not contain fuel.
• Aerosol cans of household solvents are not permitted.
• Controlled substances, poisons, or drugs are not permitted.
• No projects using 110 volts (house current) are allowed.
• Sharp items, such as syringes, knives, and needles are not acceptable.
• Gases are not permitted.
• Glass, glass cups, or glass aquariums are not allowed

The Scientific Method

Students are not required to use The Scientific Method in their Science Fair project; however, some students may find it helpful when planning their experiment. Below, please find a detailed Scientific Method…

Scientific Method Steps:

1. Ask a question
2. Form a hypothesis
3. Design an experiment
    a. Identify variables
    b. Develop procedures
    c. Gather materials and equipment
4. Collect data
5. Analyze the data
6. Form a conclusion

Detailed Description of The Scientific Method:

Step 1 – Choose a Topic and Problem Statement

Begin by exploring a scientific concept that you are interested in. This can be something that was read about or was introduced in the classroom. Go to the library or internet to learn more about your topic. Write a brief summary of the background information you gather for your science fair topic. Keep a record of where the background information came from in your Science Fair notes.

At this point, your brain will start asking "What if...." questions. One of these questions is what you will use to design your experiment. It is called the "TESTABLE QUESTION.” This will become your problem statement.

Step 2 – Form a Hypothesis

Once you have a testable question, you have some decisions to make that should be recorded in your Science Fair notes.

- How do you design the experiment to answer your question?
- What measurements do you need to take to record your results?
- Think about what might happen in your experiment. This is called a HYPOTHESIS. The hypothesis is an educated guess. Most of the time a hypothesis is written like this: "**If** _[I do this]_, **then** _[this]_ will happen." (Fill in the blanks with the appropriate information from your own experiment.) An example hypothesis for an experiment about plant growth and fertilizer might be: "**If** a plant receives fertilizer once a week for one month, **then** it will grow to be taller than a plant that does not receive fertilizer." Write down what you think will happen BEFORE actually doing your experiment.

Step 3 – Experimental Design

The experimental design is a plan to test your hypothesis. This is not necessarily a specific item on your display board. Your experiment plan will be determined by what your hypothesis is, the variables in your experiment (test or independent, outcome or dependent, and control variables), the materials that you need, and the procedures that you will carry out.

Materials/Equipment

Once you have a plan for your project, gather all the materials you will need to do the experiment. As you begin the experiment, make detailed observations of what is happening. Take your measurements carefully. Keep written notes about what you do and how you do it.

Procedure

Write a detailed description of how to do your experiment. As you work through it, you may find that you have to change it. Make notes and change your procedure afterwards, to show the changes. Remember, any scientist should be able to take your procedure and repeat your experiment following your instructions. It is usually easier to make a numbered list, like in a cookbook, rather than write a paragraph. Start each sentence with an action verb (mix, stir, get, measure, etc.) and include quantities or amounts that you will measure using metric units.

Variables and Control Group

- Identify the test variable (independent/manipulated variable). This is the variable that you are changing on purpose in your experiment to observe what will happen. For example: whether or not a plant gets fertilizer OR the temperature of water in an experiment.
- Identify the outcome variable (dependent/responding variable). This variable is the one that reacts or changes in response to the test or independent/manipulated variable. For example: height of plant OR the amount of salt that dissolves in water. The dependent variable is usually something that can be measured.
- Identify the constant variables in your experiment. These are the variables in your experiment that you do not change so that you can compare the effects from only one test (independent/manipulated) variable. Constant variables are quantities that a scientist wants to remain the same or be held constant. Most experiments have more than one constant variable. Some people refer to controlled variables as "constant variables." In an experiment watering plants, you would want to make sure the type of plant, size of pot, and amount of soil were the same for each plant being tested.
- Use a control group if applicable in your experiment. A control group is the group that does not receive the experimental variable. Both it and the experimental group have what is usually considered normal conditions (room temperature, normal amount of water, normal amount of sunlight [constants]). A control group helps you to be sure that what YOU DO in your experiment is affecting your test results.

Step 4 – Collect Data from the Experiment

Design a data table to keep track of your results. Make sure you carry out your experiment following your written procedures. Observe and record the results in a data table using metric units (centimeters (cm); grams (g); or degrees Celsius (˚C).). Qualitative (descriptive) observations can also be made.

Use photographs whenever possible to record observations. These can be shown on your display board. If time and resources allow, you can also REPEAT THE EXPERIMENT. This allows you to compare your results each time.

Step 5 – Analyze Data

When you have all of your results, you need to design the way that you will report the data. Many students use graphs, charts, photos, and written summaries of what happened in the experiment. Display all your data in charts, graphs, and/or pictures even if it does not match what you thought was going to happen in the experiment. Compare your results with your Hypothesis. **Use your data to think about what happened and why it happened that way.** Determine if your hypothesis was supported or not supported. You will use your observations to help you write your Conclusion.

Step 6 – Draw Conclusions

You can answer the following questions to summarize what you have learned from the experiment in your Conclusion:

- What was the purpose of the investigation?
- Was your hypothesis supported by the data? (Indicate evidence and reasoning that supports your conclusion.
- What were the major findings?
- What are possible reasons for the results?

You can also consider these questions when thinking about your project:

- How can you use the findings from this investigation in your day-to-day life?
- How can the investigation be improved?
- What new question(s) has your experiment lead you to ask that could be tested in a new investigation.

Science Project Ideas

Sometimes, one of the hardest parts of planning a Science Fair project is figuring out what to do and where to start. Below are various resources to help you think about what kind of Science Fair project you want to complete.

The following are Science Topics covered in Kindergarten through 5th Grade to help guide you as you look to pick out a Science Fair topic…

- **Kindergarten:**
  - 5 senses
  - Magnets
  - Physical properties of objects
  - Properties of water - solid, liquid, gas (Flow of Water/Sink or Float)
  - Living/Nonliving Organisms
  - Plant and Animal Life Processes and Needs
  - Shadows
  - Weather Observations
  - Reduce/Reuse/Recycle
- **1st Grade:**
  - Non-Standard Measurement
  - Motion
  - Properties of Water
  - Plants and Animals
  - Seasonal Changes
  - Day/Night
  - Natural Resources
  - Reduce/Reuse/Recycle
  - Water Quality

- **2nd Grade:**
  - Magnets (attract, repel, applications of magnets)
  - Solids, Liquids, and Gases (identifying, measuring, changes in phases)
  - Plant and Animal Life Cycles
  - Habitats, Living and Nonliving, Fossils
  - Weather Patterns, Types of Storms, Measuring and Recording Weather Data
  - Water Cycle
  - Seasonal Changes affect Plants, Animals, and their Surroundings
  - Weathering and Erosion
  - Plants produce oxygen and food, are a source of useful products, and provide benefits in nature
  - Plant Products

- **3rd Grade:**
  - Animal and Plant Life Cycles
  - Adaptations (physical/behavioral/learned/instinct)
  - Ecosystems and Environments (terrestrial, aquatic, populations, communities)
  - Food Chains
  - Environments (human impact, conservation of resource renews, effects of fire, flood, erosion on organisms)
  - Water Cycle
  - Soil
  - Earth Patterns (Day/Night, seasons, tides, moon phases)
  - Renewable Resources
  - Types of Energy
  - Matter
  - Simple Machines

- **4th Grade**
  - Adaptations
  - Seasons
  - Weather
  - Phases of Moon
  - Electricity (open/closed circuits; electromagnets)
  - Force and Motion
  - Plant Anatomy
  - Photosynthesis
  - Solar System

- **5th Grade**
  - Scientific Investigation (scientific reasoning, scientific process of investigations; classification keys, hypothesis, independent and dependent variables, constants, predictions, inferences, conclusions)
  - Sound (compression waves, vibration, compression, wavelength, frequency, amplitude, solids, liquids, gases, sound waves)
  - Light (transverse waves, visible spectrum, opaque, transparent, translucent, reflection, refraction, prisms)
  - Matter
    - Mass and volume
    - Phases of matter (gas, liquid, solid)
    - Temperature affecting matter
    - Periodic Table of Elements
    - Atoms and elements; Molecules and Compounds; Mixtures
    - Nanotechnology
  - Living Systems/Cells
    - Plant Cells (nucleus, cell wall cell membrane, vacuole, chloroplasts, cytoplasm)
    - Animal Cells (nucleus, cell membrane, vacuole, cytoplasm)
    - Invertebrates and Vertebrates
    - Vascular and Nonvascular
  - Oceans
    - Ocean Floor (continental shelf, continental slope, continental rise, abyssal plain, sea mounts, trench, mid-ocean ridge)
    - Mariana Trench and Gulf Stream
    - Depth, Salinity, Temperature, Waves, Tides, Currents
    - Plankton (phytoplankton and zooplankton)
  - Earth/Geology
    - Layers of the Earth
    - Rock Types, Rock Cycle, Earth history and fossils
    - Plate Tectonics; Earthquakes; Volcanoes
    - Weathering, Erosion, Deposition, and Human Impact on Earth

Website Resources

Supplies (Many science projects can be made with inexpensive things found around the house or found at Wal-Mart, Dollar General, or the Dollar Tree. If you need a little more though, here are some excellent science supply sites):

www.stevespanglerscience.com
www.artec.com
www.scientificsonline.com
www.arborscientific.com
www.homesciencetools.com
www.teachersource.com

Great Sites for Science Ideas

http://pbskids.org/zoom/activities/sci/
www.eia.gov/kids/energy.cfm?page=teacher_experiments#sf_primary
www.sciencebuddies.org/science-fair-projects/project_ideas.shtml
www.sciencebuddies.org/science-fair-projects/science_project_ideas.php
http://www.education.com/science-fair/elementary-school/
www.stevespanglerscience.com
www.exploratorium.edu/snacks
http://www.all-science-fair-projects.com/
http://scienceforkids.kidipede.com
http://www.neok12.com/
http://teacher.scholastic.com/dirt/index.htm
http://www.sciencekids.co.nz/experiments.html
http://science.wonderhowto.com/how-to/
http://www.physicscentral.com/experiment/physicsathome/index.cfm
http://www.teachersource.com/category/science-fair-ideas
http://www.chromebattery.com/battery-kids/projects
http://www.funsci.com/

Science Fair Project Examples to Get You Thinking

- How does light affect plants?
- Which dog food does your dog like best?
- Which silly putty/slime recipe is best?
- Which detergent removes grass stains best?
- Which detergent removes grease best?
- Crystal Growth
- How does the temperature of water affect the freezing time?
- What shape of glass causes water to cool off fastest?
- Test a variety of water and/or a variety of ways to remove contaminants from the water
- How can you get kidney beans to grow fastest?
- How can you affect the shape of a magnetic field?
- What is the biggest shadow you can make with a piece of paper 8.5 inches by 11 inches? What is the smallest shadow you can make with the same piece of paper?
- What is the effect of turning young plants upside down as they grow?
- What is the fastest way to cool a cup of hot water?
- How can you affect the time it takes for bread to rise?
- What happens when you soak egg shells in vinegar? What about when you soak them in lemon juice or other kitchen chemicals?
- What kind of fruit rots fastest?
- Which brand of paper towel stays strongest when wet?
- Which freezes fastest - Coke, Kool-Aid, strong salt water, or weak salt water?
- How can you stop cut apples from going brown?
- How does the color of light affect plant growth?
- Which materials insulate best against the cold?
- Which design of paper plane will fly the furthest?

Judging/Trophies

Projects will be judged based on the attached Judging Rubric. Trophies will be awarded for 1st, 2nd, and 3rd place in the PreK-2nd Grade category and the 3rd-5th Grade category. Several Honorable Mentions will be awarded as well. All students submitting a project to the Science Fair will receive recognition for their participation.

Judging Criteria and Points

CRITERIA	4	3	2	1
Written Explanation	Clear explanation of what the project is about, and what was learned	Clear explanation OR includes what was learned, but not both	Explanation is vague or missing key information	No written explanation
Clearly Labeled	Key parts of the model/collection are properly labeled and the project is labeled with a clear title	Properly labeled collection OR appropriate title, but not both	Incorrect label and/or unrelated title	No labels or title
Visual Presentation	Information is neat, engaging, and pleasing to the eye. Includes graphs/charts/photos or other visual aids	Information is neat, well laid out, and easily understood	Information is present, but difficult to decipher	Very little information is present; messy and confusing
Listed References	3 or more references from at least 2 types of resources (websites, books, magazines, people, etc)	2 references from at least 2 types of sources	1 resource	No documented resources
Originality/ Difficulty	Project is of an original nature and required considerable work on the part of the student	Very original and average difficulty OR very difficult and of average originality	Project is of average originality and difficulty	Project is not very original or difficult
Project Sharing (PreK-2nd Grade Only)	Can answer questions about project, explain what was done, and tell what was learned	Can answer some questions about project, explain some about what was done, AND tell some about what was learned	Can answer some questions about project, explain some about what was done, OR tell some about what was learned	Not able to explain or tell much about project
Oral Presentation (3rd-5th Grade Only)	The student's presentation demonstrates that they are the authority on their specific project. The student makes eye contact, has good voice projection, and is enthusiastic. The student can easily answer questions and obviously understands their results.	The student makes eye contact, has good voice projection, or is enthusiastic. The student can answer questions and talk about their project in good detail	The student presents their project with little confidence and without referencing back to their findings or display	The student has difficulty answering questions and talking about their project. The student does not reference their display.