AUGUSTA COUNTY

Elementary Science Fair

2014-2015 TEACHER'S HANDBOOK

Hosted by

Clymore **Elementary School**

ELEMENTARY SCIENCE FAIR TEACHERS' HANDBOOK

Table of Contents

***Principals*:**
Return to Jenny Groh by April 9,

AUGUSTA COUNTY

Elementary Science Fair

School Name: _____

School Contact Person:
_____

1. How many from each grade level will be participating?* MAXIMUM 6 Per Grade Level

GRADE LEVEL	COLLECTION	EXPERIMENT	INVENTION

Kindergarten			
1st grade			
2nd grade			
3rd grade			
4th grade			
5th grade			

**Each grade level can send 3 per category per grade level- for example; Kindergarten can send 3 in collections and 3 in experiments, 3rd grade can send 3 in experiments and 3 in inventions. Team Projects count as 1.*

2. **List any *Classroom Projects* that will be displayed:**

	Teacher Name	Grade Level
1.	_____	_____
2.	_____	_____
3.	_____	_____

What is your plan to get projects to Clymore Elementary School on Monday, April 20, 2015? 3:15-6:00 pm.

_____

_____

_____

Please list the name and phone number of anyone who might be willing to judge the Augusta County Elementary Science Fair hosted by Clymore Elementary School on April 21, 2015.

_____

_____

AUGUSTA COUNTY

Elementary Science Fair

HOSTED BY CLYMORE ELEMENTARY SCHOOL

Entry Form

STUDENT NAME _____

ELEMENTARY SCHOOL _____

TEACHER _____

GRADE_____

Is this a team project**? (2 students may work together)** Yes or No

If yes, list team member's name._____

Both students working on a team project must turn in a Project Selection Form.

My project will be (please check one):

☐ **COLLECTION** for Kindergarten, 1st or 2nd grade students

My Collection will be about _____ _____.

☐ **EXPERIMENT** for Kindergarten, 1st, 2nd, 3rd, 4th, or 5th grade students

My experiment will answer the question _____
_____
_____

☐ **INVENTION** for 3rd, 4th, or 5th grade students
You will use science, math, and creativity to dream up and design an object or a process to solve a real life problem. My invention is:

_____
_____

Attach Entry Form to Your Project

Projects delivered to CLYMORE: Monday, April 20, 2015 from 3:15 to 6:00 pm

Judging of Projects: Tuesday, April 21, 9:00 am- 3:00 pm

Open to Public: Tuesday, April 21, Noon-6:00 pm

Awards Ceremony: Tuesday, April 21, 6:00-6:30 pm

(Projects must be removed from CLYMORE by 7 pm on Tuesday April 21)

Types of Projects (Categories)

1. **COLLECTION** (Kindergarten, 1st and 2nd grade ONLY) – Collect and organize something that you are interested in. For example: What kinds of insects can be found in my backyard? What types of tree leaves can be found on my street?
   Collections should be organized and items should be labeled.

   Examples for Your Classroom
   Collections: Create a classroom collection as an example.

Grade Level	Possible Classroom Collections
Kindergarten	Leaves Rocks Insects Seeds Cones
First	Plants Basic Plant parts (different stems, different seeds, different roots) Insects (can be more specific for example moths, butterflies, beetles)
Second	Fossils (can be reproduced in class instead of collecting) Bird nests (can be reproduced in class instead of finding in nature) Plant products

2. **EXPERIMENT** (Kindergarten, 1st, 2nd, 3rd, 4th, and 5th grade) – Conduct an experiment by using the **Scientific Method.** Ask a question, do some research, make a hypothesis (your best guess at how it will turn out), plan and conduct your experiment, and analyze your results.

   <u>The Scientific Method</u>
   - **Purpose** (What is the question or problem to be solved?)
   - **Research** (A summary of what you read about your science topic.)
   - **Hypothesis** (What do you think will happen after experimenting?)
   - **Materials** (A list of everything you need to complete your project.)
   - **Procedure** (What are the steps you need to take to carry out a controlled experiment?)
   - **Results** (Your observations, your data, and what happened during the experiment)
   - **Conclusion** (The answer--if you found one--to the original question or problem. Was your hypothesis correct?)

   <u>More Details About the Scientific Method</u>

   <u>The Purpose or Question:</u>

A question may come from anywhere. A good experimental question will usually be stated in this form: How does _____ affect _____?

Sample Questions:

- How does drinking coffee affect teeth?
- How does light affect how a plant grows?
- Does Miracle Grow affect the way a plant grows?
- How do soil, compost, and dirt affect plants and how fast they grow?
- Will the type of lotion affect how much moisture is left on the skin?
- How does salt affect how fast ice will melt in a cup of water?

Research:

Research is when you read from books or online sites to find out what information there already is on your topic. Read about what other scientists have done before. Try to discover the scientific principle that is being proven in your experiment and read about it. You may want to ask questions to adults who work or know about your topic.

Hypothesis:

This is the part of the experiment where you make a guess as to what you think will happen. It shouldn't be a wild guess, but an educated guess. This means you should use what you have learned through your research and find out what others have observed before you decide what you think will happen.

A hypothesis should be in the form of a "If _____ then_____" statement

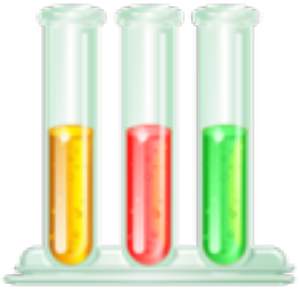
Sample hypothesis:

- If I raise the temperature of a cup of water then the amount of sugar that can dissolve in the cup will increase.
- If a plant receives fertilizer, then it will grow to be taller than a plant that does not receive fertilizer.
- If I eat pizza every day, then I will gain weight.

Materials:

This is a list of what you need to complete your experiment. Be sure to write it in list form (like a grocery list). Try to think of everything you use. Example:

- Small glasses
- Rubber bands
- Spray bottle filled with 2 oz. water
- 30 pennies
- Six different brands of toilet paper
- Chart to record results



Procedure:

This is like a recipe, step-by-step instructions for what you will do to test your hypothesis. It should be written in the order in which your experiment will be done. Your procedure must be complete and clear enough that another person could follow it and do the exact same experiment you do.

Results:

This is the part where you tell what happened. Show the data you collect and you organize your results and then make a graph to display the results. You could use a chart or table to record your results and then make a graph to display the results.

Conclusion:

Here are some general guidelines for writing your conclusion:

1. Try to answer your experimental question based on your results.
2. Was your hypothesis right?
3. How certain are you that your results are accurate?
4. Describe any uncontrolled variables and tell how they might have affected the results.
5. What else did you learn that wasn't part of your experimental question?
6. What are some ideas for further experimentation? Here you should tell what other questions you might investigate and how you would improve on the experiment you just did

Examples for Your Classroom

Experiments: Any activity that can create a question or problem to be solved.

Grade Level	Possible Classroom Experiments
Kindergarten	Does your sense of smell affect your taste? Does the slope of a hill affect the way water flows? How does the shape of an object affect how it floats in water?
First	How does the type of material affect sound? How does the temperature of water affect how substances dissolve? How does the amount of air (or light, space, water, nutrients) affect the growth of a plant?
Second	How does temperature affect water? How does the type of material affect a magnet? How does the temperature affect the type of precipitation? How can plants reduce erosion?
Third	How does the slope of an incline plane affect the amount of work to move an object? Does the type of soil change from the top of a hill to the bottom of a hill? Does the type of bedrock affect the properties of soil? Does the angle of the sun affect the amount of energy you can get from the sun?

Fourth	How does the type of material affect the amount of friction? How does the mass of an object affect how fast it moves? How does the size of nail affect the strength of an electromagnet? How does acid rain (made with vinegar) affect the growth of plants? Do the types of clouds predict the type of weather?
Fifth	How does the state of matter (solid, liquid, gas) affect the ability to transmit sound? How does the amount of salt in water affect its density? How does the slope of the land affect the amount of erosion?

3. **INVENTION** (3RD, 4TH, and 5th grade ONLY) - Everyone is an engineer! You will use science, math, and creativity to dream up and design an object or a process to solve a real life problem. Use **The Engineering Design Process** to take you through all the necessary steps: the design problem, brainstorming, planning, creating, testing, and making it even better.

The Engineering Design Process

Plan

- Identify the design problem
- Research the problem
- What are the design limitations and requirements?

Design

- Brainstorm to generate design alternative
- Choose the best option and explain why
- Develop a design model or prototype

Check

- Test and evaluate the design
- Modify the design to make it better

Share

- Communicate achievements

Examples for Your Classroom

Inventions: Design an object or a process to solve a real life problem.

Grade Level	Possible Classroom Inventions

Third	Design a “machine” to do a specific job Design a solar oven to cook a hot dog Design a windmill that will create energy
Fourth	Design an electromagnet that can pick up large objects Design a car with very little friction
Fifth	Design a musical instrument that has at least five different sounds Design a habitat that can support plant and animal life for one month.

How to Choose a Project

The most important part of any science fair project is determining what the project will be about. When you select a topic, start with observation.

Look Around You……

What interests you?

What do you want to know more about?

A Good Topic is……

- Realistic
- Can be accomplished with available resources
- Asks a specific question that can be solved in a reasonable amount of time

Take Some Time……

- Take a couple of days to think about your topics
- Go to a library and look through some science books
- Talk to people around you

Teachers ……

- Model each type of category in your classroom at various times during the year. Tell the students this is a good example of an "experiment" or "invention" for a science fair project.

- Brain storm with students after every unit, activity, or concept for science fair ideas. Keep a list of these ideas posted where students can see them.

Parent Involvement

Good communication between teacher and parent will help parents understand their role in the science fair process.

Although students receive help at school from teachers, parent support and assistance are essential to student success. A general rule of thumb to go by is:

- 4th and 5th graders should be doing almost the entire science project by themselves.
- 2nd and 3rd graders should be able to do many parts.
- Kindergarteners and 1st graders will need help for most of the project

Encourage parent participation, but encourage the parents to allow the students to do as much of the work as possible.

One good measure to determine how much work the student did on the project is to ask questions. This is something judges may do in class, at school or at a science fair.

Teachers: How to Organize a School/Grade Level Science Fair

Advance Planning

- Scheduling- Choose a good day for your school. Check with the principal to make sure there are no other conflicts.
- Reserve other rooms in the school if necessary (library, cafeteria, etc).
- Make sure you have the approval of your principal.
- Decide if your School Science Fair is going to be during the school day or after school.
- Try to arrange for projects to be displayed for several days.
- Invite parents and the community.
- Secure judges (the more you have the quicker it will go).
- Determine the type of recognition students will receive (ribbons, trophies, certificates) and order materials.
- Plan for an "open house" for parents to visit (this good PR for your school).
- Ask for parental help in setting up and tearing down the science fair.

Classroom Planning

- Model different types of science investigation projects in your classroom.
- Create a list of possible projects.
- Send information home to parents.
- Develop a timeline for the student and parent including:
    - Students pick projects and complete project selection form.
    - Students work on projects.
    - Monitor student progress on projects.
    - Projects due at least one week prior to the date of the fair.

School Fair Planning

- Determine how projects will be selected for fair.
- Arrange for the set-up of projects.
- Allow classroom time for presentations.
- Send reminders to judges (you can use teachers in your building or community members).

The Day of the Fair

- Set-up boards.
- Name tags for volunteers and judges.
- Meet with judges to go over rubric.

After the Fair

- Send thank you notes to those who helped.
- Recognize student achievement and participation.
- Evaluate your science fair for possible changes for next year.
- Send forms of winners to Jenny Groh for the district Elementary Science Fair.

District Science Fair
Clymore Elementary School

<u>Dates</u>:

April 20, 2015 (set up)

April 21, 2015 (judging)

April 21, 2015 (awards ceremony at 6:00 p.m.)

<u>Categories for District Science Fair</u>

<u>Note</u>: 2 students may work as a team on a project. A team project counts as 1entry in the list below.

Kindergarten: (total of 6 students from each school)

Collections: 1st-3rd place
Experiment: 1st-3rd place

First Grade: (total of 6 students from each school)
Collections: 1st-3rd place
Experiment: 1st-3rd place

Second Grade: (total of 6 students from each school)
Collections: 1st-3rd place
Experiment: 1st-3rd place

Third Grade: (total of 6 students from each school)
Invention: 1st-3rd place
Experiment: 1st-3rd place

Fourth Grade: (total of 6 students from each school)
Invention: 1st-3rd place
Experiment: 1st-3rd place

Fifth Grade: (total of 6 students from each school)
Invention: 1st-3rd place
Experiment: 1st-3rd place

Science Fair Rules and Regulations for Students

1. Think safety first before you start. Make sure you have recruited an adult to help you and that your teacher has approved your project.

2. Wear protective goggles when doing any experiment that could lead to eye injury.

3. Respect all life forms. Do not perform an experiment that will harm an animal.

4. All projects should be supervised by an adult!

5. Always wash your hands after doing the experiment, especially if you have been handling chemical or animals.

6. Any project that involves drugs, firearms, or explosives is not permitted.

7. Any project that breaks district policy, and/or local, state, or federal laws is not permitted.

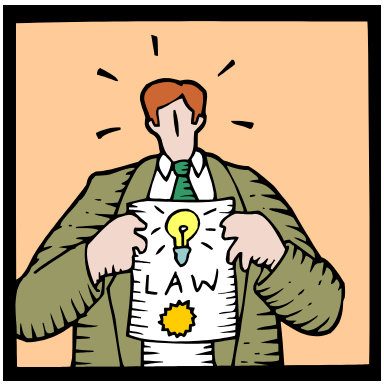
8. Use safety on the internet. Never write to anyone without an adult knowing about it. Be sure to let an adult know about the websites you will be visiting, or have them help you search.

9. If there are dangerous aspects of your experiment, like using sharp tools or experimenting with electricity, have an adult help you or have them do the dangerous parts.

10. Displays must be on display boards or can be made with cardboard. They can be no greater than 183 cm in height, 122 cm in width and 76 cm deep. They must stand alone.

11. All decisions of the judges and science fair committee are final.

12. The top three in each category are eligible to participate in the district Elementary Science Fair.

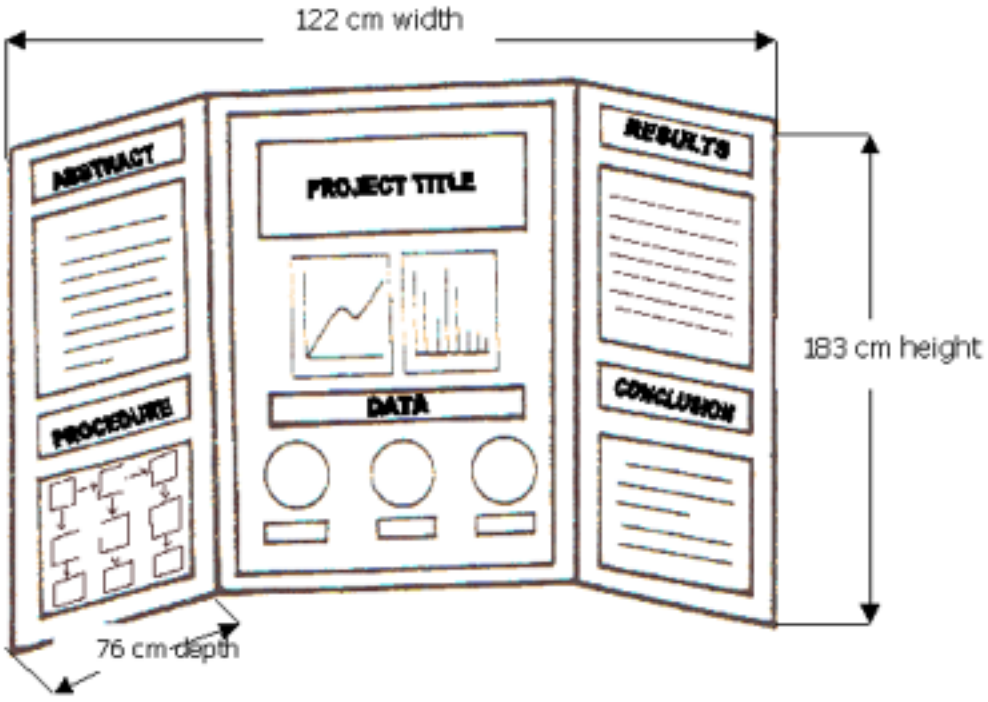


(For Kindergarten, 1st Grade, 2nd Grade)

Sample Displays

Collection

Experiment


122 cm width
ABSTRACT
PROJECT TITLE
RESULTS
PROCEDURE
DATA
CONCLUSION
183 cm height
76 cm depth

(For 3rd Grade, 4th Grade, 5th Grade)

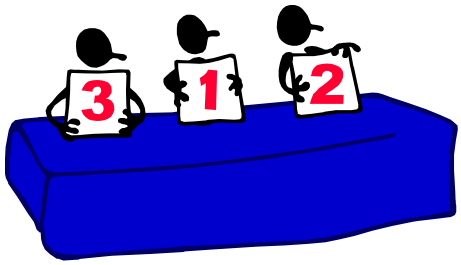
Invention

The format of the board should be similar to a science fair project you will just need to replace certain items with their engineering equivalent. Here are my suggested titles:

Purpose
Background Research
Design Criteria
Prototype
Testing
Redesign
Results

Remember that people read from top to bottom for each part of the board, and then from left to right overall. So for example, your purpose could be on the top left, and your results would be on the bottom right. That's the general "flow" of a display board.

As for measuring your results, you could create some sort of scale from 1 to 5 and then put the description of the scale near your graphs. This would work best with bar graphs. You could also do a table with pictures and a simple diagram. This would be easier than describing with words.



Judging

Try to have at least two judges for each category. Judges will score each project then the committee will tally results.

Rubric for Collections	**Superior**	**Above Average**	**Average**	**Below Average**	**No Evidence**
Point Value	**5**	**4**	**3**	**2**	**1**
Collection is scientific in nature					
Collection is complete with labels					
Evidence of age appropriate research					
Information displayed is correct					
Project display is neat, well organized, visually appealing					

Rubric for Experiment	**Superior**	**Above Average**	**Average**	**Below Average**	**No Evidence**
Point Value	**5**	**4**	**3**	**2**	**1**
Presented a question that could be answered through experimentation					
Developed a hypothesis in an "If _____ then _____" statement					
Research is complete and age appropriate					
Materials list is complete					
Procedure is clear					
Results are organized in graphs, charts, and/or pictures					
Conclusions relate back to hypothesis					
Project display is neat, well organized, visually appealing					

Rubric for Invention	**Superior**	**Above Average**	**Average**	**Below Average**	**No Evidence**
Point Value	**5**	**4**	**3**	**2**	**1**
Presented a design problem					
Research of the problem is evident					
Classified design limitations and requirements					
Generated design alternatives					
Chose a design and explained why it was the best choice					
Developed a design model or prototype					
Tested and evaluated the design solution					
Project display is neat, well organized, visually appealing					

Introductory Letter to Parents

Dear Parents,

Our school will be having a **Science Fair**! We hope that with your enthusiastic encouragement your student will participate in the fair by preparing a project. This will be an exciting experience that will help them understand scientific principles. Although students receive help at school from teachers, parent support and assistance are essential to your child's success. A general rule of thumb to go by is:

- 4th and 5th graders should be doing almost the entire science project by themselves.
- 2nd and 3rd graders should be able to do many parts.
- Kindergarteners and 1st graders will need help for most of the project.

We are confident the following benefits will result from your child's participation in the Science Fair:

- Reinforcement of grade level science, literacy and math skills
- Fostering curiosity, awareness, and creativity

- Increased scientific knowledge
- Learning research techniques
- Growth in ability to work independently
- Having fun with science!

In addition to the opportunity to work on a project, the Science Fair provides students with an increased awareness of science and an opportunity for them to develop positive attitudes about themselves and their work. The science project allows children to use critical thinking and problem solving skills learned in science and in math.

Attached is a Science Fair **Project Selection Form**. Please complete the form with your child and have your child return it to me by the date listed at the top of the form.

Sincerely,

Helpful Hints for Parents

Welcome to the Science Fair!

This should be a fun project! Success is when your child asks their own questions, completes their project with a smile, and knows more than when they started. Enjoy this time of discovery and fun for you and your child!

- The science fair project reinforces reading, writing, logic and math skills, and creativity.
- For their daily reading, recommend they choose a science book that can be a research resource for their project.
- Research is part of the process.
  - It does not have to be typed
  - Type the report *as your child wrote it or dictated it to you*. If the sentence structure is off, ask them if it needs correction. **Guide** them to the correction.
  - Use their words; children say things in unique and fun ways.
- It is best to guide and answer their questions with questions. You may know the answer, but help them discover it themselves. For example, you may want to show them which paragraph in the book to re-read rather than giving them the answer.
- Although neatness is good, it's not the main focus. A 6-year-old can make the data chart with a little help. They should do that part while you operate the hot glue gun.
- The project does not have to look store bought. It needs to be made by them, so that they truly get better every year they participate.
- Encourage your child's artistic side with the display. For example, you can show how the use of color and shapes can be used to show the importance of a part of the display.
- If you allow your child to use web sites for research; verify the site is "correct" and then let them use the research found there. *Remember:*
  - Anyone can create a web site; this does not mean the information is correct!
  - Make sure the web site is run by a large, recognized group such as a college or organization.
  - DOT "org", "gov" or "edu" are generally trustworthy for accuracy of content.
- What is an acceptable science fair project?
  - A scientific collection (grades K-2nd only)
  - Something they can change somehow, add another variable, and then predict the outcome. That's an experiment! (all grades)
  - An invention using the engineering design process (grades 3rd-5th)
- What is NOT an acceptable science fair project?
  - Reproducing results found on the web is *not* an experiment; it's a reproduction.

- A demonstration is not an experiment (i.e., volcano)

Student Page for Collections

Grade K-2 students can do a collection for a science project.

Guidelines:

- Collection should be scientific in nature
- Collection should be complete with labels
- Collection should include evidence of age appropriate research
- Information display is accurate
- Project display is neat, well organized, and visually appealing

Examples:

Collections of rocks, fossils, seashells, tree leaves, grasses, insects

Student Page for Experiments

Grades K-5 can do an experiment for a science project

Guidelines:

- Can your question be answered through experimentation?
- The hypothesis is clear and written in the "If _____ then_____" format.
- Experiment should include evidence of age appropriate research
- Materials list is complete
- Procedure is clear and concise
- Results are organized in graphs, charts, and/or pictures
- Conclusion relates back to the hypothesis
- Display is neat, well organized, and visually appealing

Student Page for Inventions

Students in Grades 3-5 can design an invention for a science project.

Guidelines:

- A design problem is presented clearly
- Research of the problem is evident
- Design limitations and requirements are given
- Design alternatives are generated
- The “best” deign was chosen and explained
- A design model or prototype was developed
- The design solution was tested and evaluated
- Project display is neat, well organized, and visually appealing