NEWTON COUNTY SCHOOL SYSTEM
ELEMENTARY SCIENCE FAIR PACKET
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Types of Science Projects

There are two types of science projects: Models and Experiments. Here is the difference between the two:

A Model, Display or Collection:
Shows how something works in the real world, but doesn’t really test anything.
Examples of display or collection projects can be: “The Solar System”, “Types of Dinosaurs”, “Types of Rocks”, “My gum collection…”
Examples of models might be: “The solar system” or “How an Electric Motor Works”, “Tornado in a Bottle”

An Experiment:
Information is presented; however, it also has a project that shows experimentation and the gathering of data.
Examples of experiments can be: “The Effects of Detergent on the Growth of Plants”, “Which Paper Towel is more Absorbent” or “What Structure can Withstand the Most Amount of Weight”
You can tell you have an experiment if you are testing something several times and changing a variable to see what will happen.
We’ll talk about variables later….

Even though you can learn a lot from building a model or creating a display, we recommend that you do an EXPERIMENT!!! Why? Well, they are fun, they are interesting, and they take you through the SCIENTIFIC METHOD, which is the way real scientists investigate in real science labs.
Selecting a Topic that Interests You

**Life science:** This category deals with all animal, plant, and human body questions that you might have. Remember that it is against Science Fair Rules to intentionally hurt an animal during an experiment. If you are dealing with animals, please let an adult assist you. It is okay to do experiment on plants, as long as they don’t belong to someone else. For example, don’t do an experiment on your mom’s rose bushes unless you ask her first. Life science also includes studying behaviors, so it’s a perfect category to try taste tests, opinion surveys, animal behavior training.

**Physical Science:** If you like trying to figure out how things work, then this is the category for you! It includes topics about matter and structure, as well as electricity, magnetism, sound, light or anything else that you might question, “How does it work and what if I do this to it, will it still work?” But remember, you always need to ask an adult first (and always make sure there is an adult with you when you try it.) Physical Science also includes the composition of matter and how it reacts to each other. These are the science experiments that may have bubbling and oozing going on, like figuring out how an acid and a base work with different substances. It is a perfect category to try to mix things together to see what will happen. Again, if you are experimenting with possibly dangerous things, you need to recruit an adult to help you out.

**Earth and Space Science:** This category is really awesome because it covers all sorts of topics that deal with the Earth or objects in space. This includes studying weather, Geology (which is the study of everything that makes up the Earth, like rocks, fossils, volcanoes, etc.), and the study of all that is in space, including the stars, our sun and our planets. Unfortunately, this topic is also where most kids mess up and do a collection or model project instead of an “Experiment,” so be careful!!

**Engineering:** Engineering involves designing, creating and studying the function of machines and their processes. An engineering project might involve designing bridges to determine, “Does the length of a bridge affect how much weight it can hold?”

**Now it’s Your Turn:**
Write down your favorite Science Fair Category and what it is you want to learn more about:

__________________________________________

__________________________________________

My favorite Category was __________________________________
(Life Science, Physical Science, Earth and Space Science, Engineering)

I want to do an experiment involving __________________________________
Steps of the Scientific Method

1. Choose a problem.
   State the problem as a question.

2. Research your problem.
   Read, get advice, and make observations.

3. Develop a hypothesis.
   Make a prediction about what will happen.

4. Design an experiment.
   Plan how you will test your hypothesis.

5. Test your hypothesis.
   Conduct the experiment and record the data.

6. Organize your data.
   Create a chart or graph of your data.

7. Draw conclusions.
   Analyze your data and summarize your findings.
Step One: Coming up with a Good Question…

Now that you have picked out a topic that you like and that you are interested in, it’s time to write a question or identify a problem within that topic. To give you an idea of what we mean you can start off by filling in the question blanks with the following list of words:

The Effect Question:

What is the effect of ___________ on ___________?  
- sunlight on the growth of plants  
- eye color pupil dilation  
- brands of soda a piece of meat  
- temperature the size of a balloon  
- oil a ramp

The How Does Affect Question:

How does the ___________ affect ___________?  
- color of light the growth of plants  
- humidity the growth of fungi  
- color of a material its absorption of heat

The Which/What and Verb Question:

Which/What ___________ (verb) ___________?  
- paper towel is most absorbent  
- foods do meal worms prefer  
- detergent makes the most bubbles  
- paper towel is strongest  
- peanut butter tastes the best

Now it’s your turn:
Create your Science Fair question using either the “Effect Question”, the “How does Affect Question” or the “Which/What and Verb Question”:

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
Step Two: Research and Forming a Hypothesis

Now it is time to research your problem. Becoming an expert about your topic is what real scientists do in real labs.

How do you become an expert?

**YOU READ!!!**
READ about your topic. READ encyclopedias. READ magazine articles and books from the library. READ articles from the internet. Take note of any new science words you learn and use them. It makes you sound more like a real scientist. Keep track of all the books and articles you read--You’ll need that list for later.

**YOU DISCUSS!!**
Talk about it with your parents. Talk about it with your teachers. Talk about it with experts like Veterinarians, Doctors, Weathermen or others who work with the things you are studying. Sometimes websites will give you e-mail addresses to experts who can answer questions…. Again, do not write to anyone on the internet without letting an adult supervise it. (*hint: take pictures of yourself interviewing people)

Whew…
Then, when you think that you can’t possibly learn anymore and the information just keeps repeating itself. You are ready to...

**Write a Hypothesis**

Now it is the time to PREDICT what you think will happen if you test your problem. This type of “SMART GUESS” or PREDICTION is what real scientists call A HYPOTHESIS. Using this fancy word will amaze your friends and will have you thinking like a scientist.

How do you begin? Well, just answer this very simple question:

What do you think will happen, (even before you start your experiment)?

**Example Problem:** Which Paper Towel is more absorbent?
**Example Hypothesis:** I think Brand X will be more absorbent because it’s a more popular brand, it is thicker and the people I interviewed said that the more expensive brands would work better

(This hypothesis not only predicts what will happen in the experiment, but also shows that the “Scientist” used research to back up his/her prediction.)
Step Two: Now it’s your turn
Write down the problem and create a Hypothesis based on what you have researched.

Problem _____________________________________________
______________________________________________________________________________________________

Research: My problem is about this subject:
(sample topics could be magnetism, electricity, buoyancy, absorbency, taste, plant growth, simple machines or other scientific topics that relate to your problem. If you are having problems finding out what the topic is, ask your teacher or an adult to help you on this one….)
Books I found in the library on my topic are:

Title: ___________________________    Author: ___________________________
______________________________________________________________________________________________
______________________________________________________________________________________________

Internet sites that I found on my topic are:
______________________________________________________________________________________________
______________________________________________________________________________________________

People I talked to about my topic are:
______________________________________________________________________________________________
______________________________________________________________________________________________

Some important points that I learned about my topic are
• _______________________________________________________________________________________
• _______________________________________________________________________________________
• _______________________________________________________________________________________
• _______________________________________________________________________________________
• _______________________________________________________________________________________

Hypothesis: I think that ____________________________________________
(will happen) because (my research shows…) ________________________________________________
______________________________________________________________________________________________
Step Three: Testing your Hypothesis by Doing an Experiment- Follow these 7 simple steps!

First: Gather your materials: What will you need to perform your experiment? The safest way to do this is get an adult to help you get the stuff you need. Don’t forget to take pictures or draw pictures of your materials. This will come in handy when you are making your presentation display.

Second: Write a PROCEDURE. A procedure is a list of steps that you did to perform an experiment. Why do you need to write it down? Well, it’s like giving someone a recipe to your favorite dish. If they want to try it, they can follow your steps to test if it’s true. Scientists do this so that people will believe that they did the experiment and also to let other people test what they found out. Did we mention to take pictures of yourself doing the steps?

Third: Identify your variables. The variables are any factors that can change in an experiment. Remember that when you are testing your experiment you should only test one variable at a time in order to get accurate results. In other words, if you want to test the affect that water has on plant growth, then all the plants you test should be in the same conditions, these are called controlled variables: same type of dirt, same type of plant, same type of location, same amount of sunlight, etc. The only variable you would change from plant to plant would be the amount of water it received. This is called the independent or manipulated variable. The independent variable is the factor you are testing. The results of the test that you do are called the dependent or responding variables. The responding variable is what happens as a result of your test. Knowing what your variables are is very important because if you don’t know them you won’t be able to collect your data or read your results.

Fourth: TEST, TEST, TEST. Remember that the judges expect your results to be consistent in order to be a good experiment, in other words, when you cook from a recipe you expect the outcomes to be the same if you followed the directions (or procedure) step by step. So that means you need to do the experiment more than once in order to test it properly. We recommend three times or more. More is better! Don’t forget to take pictures of yourself conducting the science experiment and the results.

Fifth: Collect your DATA. Write down or record the results of the experiment every time you test it. You also need to organize it in a way that it is easy to read the results. Most scientists use tables, graphs and other organizers to show their results. Organizing makes the results easy to read, and much easier to recognize patterns that might be occurring in your results. Don’t make a graph or table because we asked you to, use it to benefit your project and to help you make sense of the results. There is nothing worse than having graphs and tables that have nothing to do with answering the question of a science project.

Sixth: Write a Conclusion: tell us what happened. Was your hypothesis right or wrong or neither? Were you successful, did it turn out okay? Would you change anything about the experiment or are you curious about something else now that you’ve completed your experiment. EXPLAIN WHAT YOU LEARNED FROM CONDUCTING THE EXPERIMENT!

Seventh: Understand its Application. Write about how this experiment can be used in a real life situation. Why was it important to know about it?
Time Out: How Do You Collect Data?

- **Keep a science journal:** A science journal is a type of science diary that you can keep especially if your experiment is taking place over a long period of time. We suggest you do that if your experiment is over a period of a week or more. In your journal you can record observations, collect research, draw and diagram pictures and jot down any additional questions you might have for later.

- **Have the right tools to do the job:** make sure you have the stuff you need to take accurate measurements like rulers, meter tapes, thermometers, graduated cylinders or measuring cups that measure volume. The recommended standard of measurement in science is metric so if you can keep your measurements in meters, liters, Celsius, grams, etc., you are doing great!

- **Tables, charts and diagrams** are generally the way a good scientist like you would keep track of your experiment trials. Remember you are testing at least 5 times or more. A table is organized in columns and rows and **ALWAYS** has labels or headings telling what the columns or rows mean. You will probably need a row for every time you did the experiment and a column telling what the independent variable was (what you tested) and the responding variable (the result that happened because of the independent variable).

- **Be accurate and neat!** When you are writing your tables and charts please make sure that you record your data in the correct column or row, that you write neatly, and most of all that you record your data as soon as you collect it **SO YOU DON’T FORGET WHAT HAPPENED!** Sometimes an experiment might be hard to explain with just a table, so if you have to draw and label a diagram (or picture) to explain what happened, it is recommended that you do.

- **Use the right graph for your experiment.** There is nothing worse than a bad graph. There are all types of graph designs, but these seem to be easy to use for science fair experiments.

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**Pie graphs** are good to use if you are showing percentages of groups. Remember that you can’t have more than 100% and all the pieces need to add up to 100%. This type of graph is great if you are doing surveys.

**Bar graphs** are good to use if you are comparing amounts of things because the bars show those amounts in an easy to read way. This way the judges will be able to tell your results at a glance. Usually the bars go up and down. The x axis (or horizontal axis) is where you label what is being measured, (like plant A, B, C and D) and the y axis (or vertical axis) is labeled to show the unit being measured (in this case it would be centimeters that the plant grew).

**Line graphs** are good to use if you are showing how changes occurred in your experiments over time. In this particular case you would be using the x axis to show the time increments (minutes, hours, days, weeks, months) and then you would use the Y axis to show what you were measuring at that point in time.
Step Three: Now it’s Your Turn!

Materials: (take pictures!)
List the materials that you will need for your science experiment here:

1. ___________________________ 6. ___________________________
2. ___________________________ 7. ___________________________
3. ___________________________ 8. ___________________________
4. ___________________________ 9. ___________________________
5. ___________________________ 10. ___________________________

Variables:
List the variables that you will control, the variable that you will change and the variables that will be the results of your experiment:

My **controlled variables** are (the stuff that will always stay the same):
______________________________________________________________
______________________________________________________________

My **independent variable** is (this is the thing that changes from one experiment to the next, it is what you are testing):
______________________________________________________________

My responding variables might be (in other words, the results of the experiment)

Procedure: (the steps…. Don't forget to take pictures)
List the steps that you have to do in order to perform the experiment here:

1st…

2nd

3rd

4th

5th….
Data: Design a table or chart here to collect your information

Conclusion:
Explain what you learned from the experiment and if you were able to prove your hypothesis. Did it work? Why did it work or why didn’t it work? What did the results tell you? Sometimes not being able to prove a hypothesis is important because you still proved something. What did you prove?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Application: (How does this apply to real life?) It’s important to know about this experiment because…..
Step Four: The Presentation

This is an example of a neat looking Science Fair Display Board. It is just an example. Depending on your information and the number of pictures, tables and graphs, you may have a different layout. Just make sure it is neat! Prior to judging, students can upload pictures of the display board.

Display Beauty Secrets:
• Use a computer to type your information, if you can’t, write out your information in your best writing. Printing the titles is usually best. If you are using a computer, make sure the fonts are readable and only use one or two type faces.
• Use spray adhesive or glue stick to adhere your papers. It is less messy
• Mount white paper, pictures, graphs and tables on colored papers (making sure the colored paper is larger so it creates a border for the white paper.)
Step Four: The Virtual Presentation Board

This year, students have the option of utilizing PowerPoint or Google Slides to display and present their presentations. Two sample templates are featured below.

Sample PowerPoint Template:

Link to Microsoft PowerPoint template:

Sample Google Slides Template:

Link to Google Slide template:
https://docs.google.com/presentation/d/1VpW1mueHDLzMqawH-xYEYdYjOs4Ci29_copyp
Georgia College Science Fair
Judging Criteria for Science and Engineering Projects

Judges are tasked with making difficult decisions and the criteria below is used to help them make those decisions. Keep in mind, considerable emphasis is placed on two areas: Creativity and Presentation, especially in the Interview section.

- **Creativity**: A creative project demonstrates imagination and inventiveness. Such projects often offer different perspectives that open up new possibilities or new alternatives. Judges should place emphasis on research outcomes in evaluating creativity.

- **Presentation/Interview**: The interview provides the opportunity to interact with the finalists and evaluate their understanding of the project’s basic science, interpretation and limitations of the results and conclusions.

**Judging Criteria for Science Projects:**

I. Research Question (10 pts)
   - clear and focused purpose
   - identifies contribution to field of study
   - testable using scientific methods

II. Design and Methodology (15 pts)
   - well designed plan and data collection methods
   - variables and controls defined, appropriate and complete

III. Execution: Data Collection, Analysis and Interpretation (20 pts)
   - systematic data collection and analysis
   - reproducibility of results
   - appropriate application of mathematical and statistical methods
   - sufficient data collected to support interpretation and conclusions

IV. Creativity (20 pts)
   - project demonstrates significant creativity in one or more of the above criteria

V. Presentation (35 pts)
   a. Poster/Display (10 pts)
      - logical organization of material
      - clarity of graphics and legends
      - supporting documentation displayed
   
   b. Interview (25 pts)
      - clear, concise, thoughtful responses to questions
      - understanding of basic science relevant to project
      - understanding interpretation and limitations of results and conclusions
      - degree of independence in conducting project
      - recognition of potential impact in science, society and/or economics
      - quality of ideas for further research
      - for team projects, contributions to and understanding of project by all members
Georgia College Science Fair
Judging Criteria for Science and Engineering Projects

Judging Criteria for Engineering Projects

I. Research Problem (10 pts)
   ___ description of a practical need or problem to be solved
   ___ definition of criteria for proposed solution
   ___ explanation of constraints

II. Design and Methodology (15 pts)
   ___ exploration of alternatives to answer need or problem
   ___ identification of a solution
   ___ development of a prototype/model

III. Execution: Construction and Testing (20 pts)
   ___ prototype demonstrates intended design
   ___ prototype has been tested in multiple conditions/trials
   ___ prototype demonstrates engineering skill and completeness

IV. Creativity (20 pts)
   ___ project demonstrates significant creativity in one or more of the above criteria

V. Presentation (35 pts)
   a. Poster (10 pts)
      ___ logical organization of material
      ___ clarity of graphics and legends
      ___ supporting documentation displayed

   b. Interview (25 pts)
      ___ clear, concise, thoughtful responses to questions
      ___ understanding of basic science relevant to project
      ___ understanding interpretation and limitations of results and conclusions
      ___ degree of independence in conducting project
      ___ recognition of potential impact in science, society and/or economics
      ___ quality of ideas for further research
      ___ for team projects, contributions to and understanding of project by all members
Science Fair Project Websites

**All Science Fair Projects:** Science Fair Projects for all levels. We have hundreds of ideas for every science topic, from Astronomy to Zoology! [http://www.all-science-fair-projects.com/](http://www.all-science-fair-projects.com/)

**Education.com:** Education.com's elementary school science fair projects expose kids to a broad range of opportunities for scientific inquiry, arming them with the tools and knowledge they need to answer their questions about the world around them. Elementary school science experiments are a great way to demonstrate important concepts in physics and chemistry, while our elementary school science fair project ideas equip kids with carefully explained procedures that yield enlightening results. [http://www.education.com/science-fair/elementary-school/](http://www.education.com/science-fair/elementary-school/)

**Science Buddies:** Use the topic selection wizard to help you figure out what science projects interest you most. Once you have a topic, get help doing research, setting up the experiments, and completing them. [http://www.sciencebuddies.org/](http://www.sciencebuddies.org/)

**Super Science Fair Projects:** Guide to projects, topics, experiments, and tips for successfully completing a science project, including the six steps of the Scientific Method. [http://www.super-science-fair-projects.com/](http://www.super-science-fair-projects.com/)

**ThoughtCo:** Science fair projects are a great way to learn about the scientific method, experimentation, and science concepts. However, it can be difficult to know where to start when you need a project idea. Sometimes you already have a great idea but have problems with the project or questions about the report, judging, display, or presentation. Here are some resources to give you the help you need. [https://www.thoughtco.com/elementary-school-science-fair-projects-609075](https://www.thoughtco.com/elementary-school-science-fair-projects-609075)

**ThoughtCo:** Engineering science fair projects can involve designing, building, analyzing, modeling, or improving a device. You can also test or create materials. Here are some specific ideas for engineering science fair projects. [https://www.thoughtco.com/engineering-science-fair-project-ideas-609039](https://www.thoughtco.com/engineering-science-fair-project-ideas-609039)
# Student Checklist

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Component</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/19/2020</td>
<td><strong>Topic</strong>: Choose a topic. <em>Be sure it interests you. Don’t pick one because you think it will be easy. Talk it over with your parents and when you have decided, do not change your topic later.</em></td>
<td></td>
</tr>
<tr>
<td>10/19/2020</td>
<td><strong>Purpose</strong>: State your purpose as a question or a statement. <em>What is it you that you want to find out by doing this project?</em></td>
<td></td>
</tr>
<tr>
<td>11/4/2020</td>
<td><strong>Research</strong>: Look at any books that might help you, make observations by simply looking at things, talk to people, and find out as much as possible about your topic. Write down any ideas you have and where you got them. <em>(You must have THREE!)</em></td>
<td></td>
</tr>
<tr>
<td>11/4/2020</td>
<td><strong>Hypothesis</strong>: Form a hypothesis. <em>What do you think is going to happen? Based on what you know or found out, what do you think the results of your experiment will be? After doing the experiment, it may turn out that your guess was wrong. It’s okay if this happens.</em></td>
<td></td>
</tr>
<tr>
<td>11/6/2020</td>
<td><strong>Materials</strong>: List all materials that will be used in your experiment. <em>Include exact quantities for each item used.</em></td>
<td></td>
</tr>
<tr>
<td>11/11/2020</td>
<td><strong>Procedures</strong>: List and describe steps taken to complete the project. <em>Presented in chronological order or numbered order.</em></td>
<td></td>
</tr>
<tr>
<td>11/24/2020</td>
<td><strong>Experiment</strong>: Conduct your experiment and collect data. It is wise to repeat your experiment several times before drawing conclusions!</td>
<td></td>
</tr>
<tr>
<td>12/2/2020</td>
<td><strong>Conclusion &amp; Application</strong>: What did you learn from your experiment? How does it apply to real life?</td>
<td></td>
</tr>
<tr>
<td>12/7-12/11</td>
<td><strong>MRES Science Fair Judging and Interviews</strong></td>
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## Important Dates:

### School Fair

December 4, 2020

Newton County School System’s Virtual District Fair will take place January 11-22, 2021.