SCIENCE FAIR

Dear Parents,

It is Science Fair Time! This school year Amelia Earhart students will have two categories to choose from when completing their school-wide Science Fair; Experimental and Design. Most projects will be experimental in nature using the scientific method. However, if the objective of your project is to invent a new device, this will be considered as a design. Students must complete a scientific experiment and **NOT** just a simple demonstration. An experiment usually occurs over time and takes multiple trials to complete. A big component of the Science Fair Projects is the display/ presentation. Students should have a **standard size tri-fold** display board or a **POWERPOINT presentation**. This can be purchased at any teacher or office supply store. All components must be **typed and displayed** on the board or presentation along with **pictures and charts**.

Following the attached timeline will keep your student(s) on track and ensure that your students have correctly completed the necessary steps and can move forward to the next component.

- All science fair projects are due and presentations begin on **October 19, 2020** .

We encourage all students to be committed to their Science Fair Projects and do their very best. They are the future inventors and scientists.

Thank You,

Primary Team

Earhart Student Science Fair Checklist

Student's Name: _____

Teacher: _____

Project Title: _____
(In the form of a question)

COMPONENTS	DUE DATE	DATE COMPLETED	PARENT INITIAL
PART 1			
Topic Selection	9/21/20		
Hypothesis			
PART 2			
Material List	9/28/20		
Procedures	10/5/20		
References	10/13/20		
PART 3			
Construction of Display	10/19/20		
Classroom Presentation			

Please pace yourself to allow enough time to complete multiple trials and **retest** your data. It is important to test the experiment **at least three** times before developing a conclusion.

The Scientific Method

The Scientific Method is an organized way of figuring something out. There are usually six parts to it.

Purpose/Question- What do you want to learn? An example would be, "What doorknob in school has the most germs?" or "Do girls have faster reflexes than boys?" or "Does the color of a light bulb affect the growth of grass seeds?"

Research- Find out as much as you can. Look for information in books, on the internet, and by talking with teachers to get the most information you can before you start experimenting.

Hypothesis- After doing your research, try to predict the answer to the problem. Another term for hypothesis is 'educated guess'. This is usually stated like " If I...(do something) then...(this will occur)"An example would be, "If I grow grass seeds under green light bulbs, then they will grow faster than plants growing under red light bulbs." Experiment- The fun part! Design a test or procedure to find out if your hypothesis is correct. In our example, you would set up grass seeds under a green light bulb and seeds under a red light and observe each for a couple of weeks. You would also set up grass seeds under regular white light so that you can compare it with the others. If you are doing this for a science fair, you will probably have to write down exactly what you did for your experiment step by step.

Analysis- Record what happened during the experiment. Also known as 'data'.

Conclusion- Review the data and check to see if your hypothesis was correct. If the grass under the green light bulb grew faster, then you proved your hypothesis, if not, your hypothesis was wrong. It is not "bad" if your hypothesis was wrong, because you still discovered something!

A few other terms you may need to know:

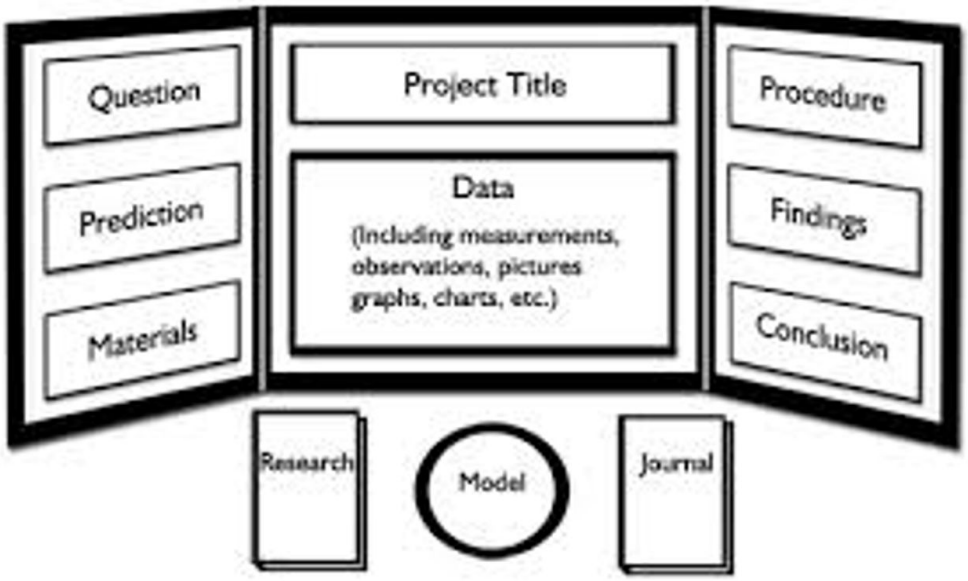
Independent Variable
This is the part of your experiment that you will test (vary) to answer your hypothesis. In the example above, the independent variable would be the different colors of the light bulbs.

Dependent Variable
This is what occurs in response to the changing independent variable. In our

example the Dependent Variable is how much the grass seeds grow.

Control

The control should be the part of the experiment where you do not include the Independent Variable. In our example, grass seed that is growing under the white (uncolored) bulb would be your control. The control lets you compare your results in the experiment.



The Design Process

DEFINE A NEED

Instead of stating a question, state a need. Can you describe in detail a problem that your design will solve? Does your research relate to a real-world need?

ESTABLISH DESIGN CRITERIA

Engineering Projects: Decide what features your design must have, for example, size, weight, cost, performance, power, etc. Perhaps include a table showing how each design criterion will be addressed by the features of the product being designed.

PREPARE A PRELIMINARY DESIGN

Engineering projects should have a materials list, programming and mathematical projects do not need a materials list. Projects should include a block diagram, flowchart or sketch of the design that shows all of the parts or subsystems of the design.

BUILD AND TEST A PROTOTYPE

When others are conducting their experiment, investigators doing engineering, computer programming, or mathematics projects should be constructing and testing a prototype of their best design. For example, you may involve targeted users in your testing to get feedback on your design; or some projects may analyze data sets.

REDESIGN AND RETEST

Evidence that changes in design were made to better meet the performance criteria established at the beginning of the project. Test results may be included in tables, if applicable. Data analysis/ validation may also be a part of this step.

REPORT THE RESULTS

Your report should provide all the information necessary for someone who is unfamiliar with your project to understand what you were trying to accomplish, how you did it, and whether you succeeded. The report should not only talk about your successful design attempts, but also the problems you encountered and how you solved them. Be sure to explain what new knowledge has been gained and how it leads to further questions.

Student Name: _____ Title: _____

Project Number: _____ Grade Level: _____ Judge Name/Initials: _____

	0-1	***2-3***	***4-5***	***List Score Here***
Question Hypothesis and Variables	▪ Question/Problem is **not clear** ▪ Hypothesis/Prediction is **not** present or **doesn't** address the question at all ▪ Variable(s) are not included	▪ Question/Problem is **somewhat clear** ▪ Hypothesis/Prediction **somewhat** addresses the question ▪ **Some** variable(s) are included but are not complete or are not clearly identified	▪ Question/Problem is specific and **very clear** and can be answered by doing an experiment ▪ Hypothesis/Prediction addresses the question **very clearly** ▪ Independent (manipulated), Dependent (responding) and Controlled variable(s) are included and are clearly identified	
Experimental Procedure	▪ Materials list is **not** detailed and complete and clear ▪ Experimental procedure is **not clear** ▪ Includes **no** repetitions	▪ Materials list is **somewhat** detailed and complete and clear ▪ Experimental procedure is **very clear** ▪ Includes **only 2** steps	▪ Materials list is **very** detailed and complete and clear ▪ Experimental procedure is **very clear** ▪ Includes **at least 3** steps	
Data	▪ Data is **not clear** ▪ **Poor or No** use of photos/charts/graphs to display data.	▪ Data is **somewhat clear** ▪ **Good use** of photos/charts/graphs to display data	▪ Data is **very clear** ▪ **Excellent use** of photos/charts/graphs to display data	
Conclusions	▪ Conclusions are **not supported** by the data.	▪ Conclusions are **not clearly supported** by the data.	▪ Conclusions are **clearly supported** by the data.	
Display	▪ Display is **neither** neat, creative, **nor** organized ▪ **No** attention to detail	▪ Display is **somewhat** neat, creative and organized ▪ **Minor** attention to detail	▪ Display is **very** neat, creative and organized ▪ **Significant** attention to detail	
Creativity	▪ Project shows a **low** amount of creativity.	▪ Project shows a **medium** amount of creativity.	▪ Project shows a **high** amount of creativity.	
Oration	● Student is **not prepared** for his/her presentation. ● It's extremely **difficult to hear or understand** the presentation, even when teacher is prompting.	● Student **lacks confidence** in his/her presentation. ● The student's presentation is **almost entirely read** (or entirely) read from note cards or display board.	● Student **speaks loudly**, clearly, and enthusiastically about his/ her project. ● The student **faces his/her audience** and present with confidence. ● Student may reference the display board, but does not read from it or use note cards for his/her presentation.	

Project Score_____

ENGINEERING DESIGN RUBRIC

Areas Assessed	Excellent work! 4pts	Good work! 3pts	On your way! 2pts	Not there yet! 1pt
Planning Sheet	All information is clear and easy to understand and include materials used and why, design sketches, test outcomes and revisions.	Design sketches, materials used and why, test outcomes and revisions are included and mostly clear and easy to understand	Some design sketches, materials used and why, test outcomes and revisions are included and mostly clear and easy to understand.	Most information is not neat and is hard to understand or interpret, materials used and why is incomplete.
Prototype	Student takes design and makes it into a workable prototype. Prototype is realistic and functional.	Student takes design and makes it into a workable prototype. Prototype is somewhat realistic and functional.	Student takes design and makes it into a workable prototype. Prototype is not realistic and functional.	Student does not make a workable prototype.
Rationales	Student completely explains thinking of why design would work, what happened to designs that did not work, and what changes were made.	Student generally explains why design would work, what happened to designs that did not work, and what changes were made, but needs more details.	Student somewhat explains why design would work, what happened to designs that did not work, and what changes were made, but needs more details.	Student does not explain why design would work, what happened to designs that did not work, and what changes were made.
Reflections	Reflection is clearly written and easy to understand. Reflection includes problems and revisions.	Most of the reflection is clearly written and easy to understand. Reflection includes problems and revisions.	Only some of the reflection is clearly written and easy to understand. Reflection includes some problems and revisions.	Reflection is not clearly written and easy to understand. Reflection does not include problems and revisions.
Presentation	Student is well prepared and able to present and answer questions without support.	Student is prepared and able to present and answer questions with some support.	Student presentation is almost entirely read from notes or display.	Student is not prepared.

Student Name _____ Total Points _____/20