Bradley International School

December 2016,

Dear Family,

Thank you for your support throughout the beginning of the school year. As we enter December, we enter the mind of the creative scientist. On Wednesday, January 18, every third, fourth and fifth grader will be expected to display a **cardboard challenge project or a science fair project**. The science fair and cardboard challenge is an optional project for students in ECE, kindergarten, first and second grade. The attached packet provides all the necessary details.

The following web sites are an excellent place for your child to deepen his/her understanding of the scientific process and science fair project (it has tips for parents too!).

SICK SCIENCE on YouTube
http://www.sciencehound.com/
www.sciencebuddies.org
www.all-science-fair-projects.com

In addition, the cardboard challenge is inspired by a 9-year-old boy. Watch the short film that started it all. Then see how it sparked a movement to foster creativity and entrepreneurship in children around the world!

http://imagination.is/about-us/our-story/

Please note that all students who need support with their projects can speak with their teacher to set up a time to meet before school, after school or during lunch.

The fair will begin at 2:00-3:30 p.m. and again from 6:00-7:30 p.m. on January 18th. Project boards can be dropped off in the classrooms on January 18h. Make sure to put your name on the project.

Again, thank you for your support of our science program. If you have any questions please contact me by phone (720-424-9439) or by email Margaret_cypress@dpsk12.org.

Choosing the Perfect Problem

Selecting an appropriate problem to investigate for the science fair is critical to your success. All of the science fair projects are expected to follow the scientific process where the results between two or more variables are compared and can be measured and graphed. Therefore, **projects that demonstrate a scientific principle, for example, a volcano or solar system model, are not permitted.** Be sure to get your idea approved by your teacher before you begin your experiment. If you are struggling with selecting an idea, some examples of possible questions that would work for the science fair are listed below. Most importantly, select a problem that you are interested in. It will make the science fair more fun.

Science Fair Project Ideas

1. What effects do different soils have on holding water?
2. How do different types of insulation affect temperature change?
3. Which toothpaste cleans with the fewest number of brushings?
4. Which glue holds the most weight?
5. Which cleanser cleans tiles with fewer scrubs?
6. Do the activities of microscopic life change with temperature?
7. Which paper towel is the strongest?
8. Which size Frisbee travels the farthest?
9. Which brand of sandwich bags is the strongest?
10. Which brand of plastic wrap is the strongest?
11. Which kind of architectural structures (bridges) can support the most weight?
12. Which paper airplane design flies the farthest?
13. What material makes the highest flying kite?
14. Which kind of boat can support the most weight?
15. What affect does light have on seed germination?
16. Under what conditions does mold grow faster?
17. How do different colors of light affect plant growth?
18. How does temperature affect plant growth?

**********Special note to parents**********

While this science fair project is the responsibility of your child, your assistance in discussing and planning the process your child will go through is critical to his/her success. Please use the included task analysis to evaluate your child's work and motivate him/her to reach higher levels of quality (word

processing looks nice, but is not required if handwriting is neat). So please guide your child, but don't do it all yourself. In the end it is still your child's project, and he/she will have to present it to peers and field questions about the scientific principle learned. **Thank you for your support.**

Let's take a closer look at each step……

Step 1: Stating your inquiry question

Try to keep your question as short and specific as possible. There are two models you might follow.

Model 1:
How does _____ affect_____?
Example: How does water temperature affect plant growth?
How does the amount of glue affect the strength of glue?

Model 2:
Which _____ is _____?
Which_____does_____ the best?
Example: Which brand of gum keeps its flavor the longest?
Which type of glue is the strongest?

******Make sure your question really asks what you are testing.******

Step 2: Stating your hypothesis

State your hypothesis or "guess" as to what you think the answer to your question will be. Your hypothesis does not have to be correct, but it should be a good guess based on prior knowledge or things you have seen.

Example: If I put coke, water, sugar-water, and salt-water on grass seeds, then the water would make the grass grow faster because it has no sugar or salt to dry up the plants seed.

Step 3: Designing an experiment

After a hypothesis has been formed, an experiment needs to be done to support your hypothesis or solve the inquiry.

You must keep careful records of everything you do. These records need to be detailed and nicely written so another person could read your notes and do the experiment without any trouble.

Write out step by step what you did and include the materials that you use. It might be easier to write down the steps after you have done them. Numbering the steps as you go is a good strategy.

There is one important part of your project that you must include in order to have a valid test. That is your **"independent variable".** An independent variable is the one part of your experiment that is different and changed during the test. **All other parts of the test must be kept the same.**

Example: In our grass seed experiment the independent variable was the fluid that was fed to the grass seed. That was the only change that was allowed. Each cup of seeds had the same amount of soil, same amount of grass seeds, all were placed in the same amount of sunlight, and all were feed with the same amount of liquid. The independent variable (coke, water, sugar-water, and salt-water) was the only thing that changed. If more than one thing is changed in an experiment, you cannot be sure what exactly is affecting the results.

Step 4: Observations and writing results

Throughout your experiment you will have many observations to make. These observations usually fall into three categories.

#1 Measurement: Here you would measure things like temperature, weight, distance, speed or time.

#2 Counting: You might count the number of worms found in a certain type of soil or the number of animals living in a small pond.

#3 Using your senses: You would record things you see, hear, taste, smell, or feel, as they relate to your experiment.

- Write a paragraph summarizing the results in words.
- Write a second paragraph including the trends or patterns in your results.
- Write a third paragraph that describes the science knowledge that supports your results

You should use a chart or graph to show your observations. In addition, you may want to display photos that you took during the different stages of your experiment.

Step 5: Drawing Conclusions

After you have conducted your experiment and recorded your observations, you are ready to write your conclusion. A conclusion is the end product of the whole process called the scientific method.

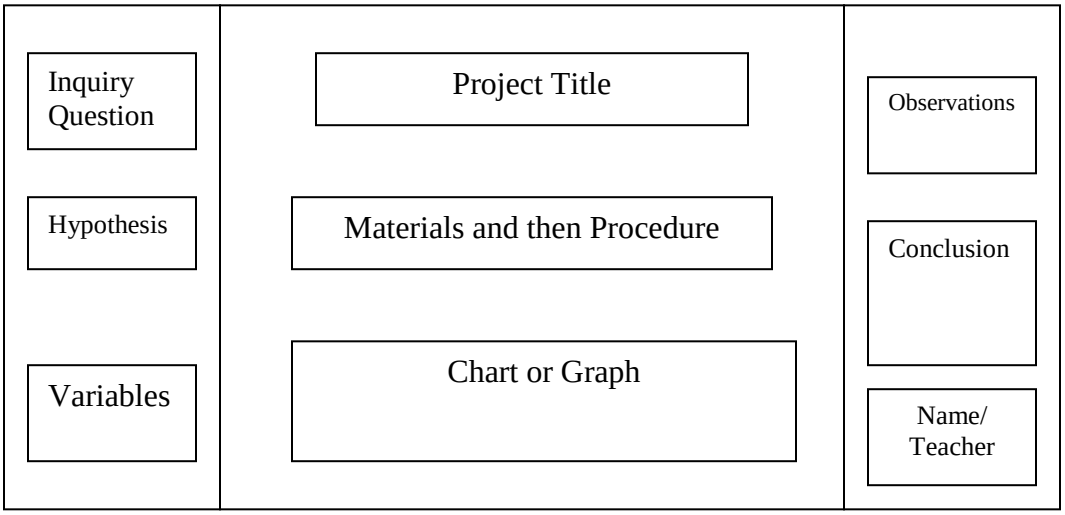
What decision did you come to? Was your hypothesis correct? Did you find an answer? What might you do differently in further studies? What else might you want to find out?

Step 6: Exhibiting your Science Fair Project

The display board is very important because it is the first thing that people see. (Boards can be purchased at Michaels, Hobby Lobby, Office Max and Office Depot etc.). IT MUST STAND ALONE.

The display board should be eye catching and attractive. You want to quickly capture the attention of the audience so they will stop and take a closer look at your science fair project.

Everything about the display board should be neat and attractive!



Science Fair Project

Please use this as a guide through your experiment and then transfer the information to your science fair board.

Inquiry question: Write the problem in the form of a question. Remember the question mark.

_____

_____

Hypothesis: Write a statement of what you predict will happen in the "If...then format.

If_____

then_____

because_____

Independent variable:_____

Materials: List and quantify.

_____ _____ _____

_____ _____ _____

_____ _____ _____

Procedure: Number the steps so procedure can be replicated easily.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Repeat experiment three times in order to compare results.

Make a graph of your results. This can be done by hand or computer.

Data/Observation: Describe in paragraph form what happened during the experiment. Be detailed.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Conclusion:

1. Write your hypothesis in past tense using "when….then" format.

   When_____

   then_____

   _____.
2. Was your hypothesis supported or not?

   _____
3. Describe any scientific principles learned.

   _____
4. Reflection: Next Inquiry- another related experiment you could try or how you could make this experiment better?

   _____

   _____

Science Fair Task Analysis

Name: _____

Statement on Inquiry: (2 pts.) ____
Is it written in the form of a question?

Hypothesis: (3 pts.) ____
Written in a good sentence with a good reason.

Procedure:

Materials: (3 pts.) ____
Listed:

Experiment: (5 pts.) ____
Complete list of procedure listed. Repeat three times.

Independent Variable: (2 pts.) ____
Fully explained

Results: (10 pts.)

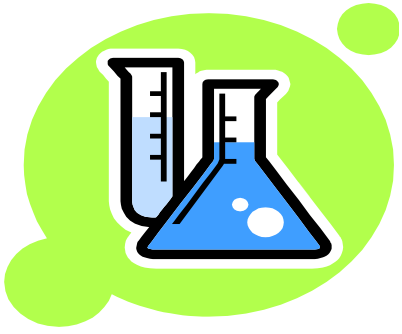
____
Clear description of experiment results in paragraph form.

Chart or Graph: (5 pts.) ____
Effectively displays data from experiment.

Conclusion: (5 pts.) ____
Rewrite your hypothesis;
Tell if your hypothesis was supported;
Tell what you have learned;
Reflection.

Display Board: (15 pts.) ___

Total (50 pts.) _____x 2= ____%



EXAMPLE SCIENCE FAIR PROJECT

Inquiry question: Write the problem in the form of a question. Remember the question mark.
How will the number of paper clips on the nose of a paper airplane affect the distance that it can fly?

Hypothesis: Write a statement of what you predict will happen in the "If...then format.
If ***I put five paper clips on the nose of a paper airplane***
then ***the airplane will fly father than with none, one, two, or three paper clips on the plane's nose***
because ***heavier things fly farther than lighter things. I can throw a baseball farther than I can throw a ping pong ball.***

Independent variable: ***The number of paper clips on the nose of the plane.***

Materials: List and quantify.

Computer paper	***paper clips***	***chart***
Pen	_____	_____
_____	_____	_____

Procedure: Number the steps so procedure can be replicated easily.

1. ***Construct identical planes to use in the experiment.***
2. ***Attach the appropriate number of paper clips for each trial.***
3. ***Throw planes.***
4. ***Measure the distance and record data after each throw.***
5. ***Average the results to record in the "conclusion" section of display.***
   Repeat experiment three times in order to compare results.

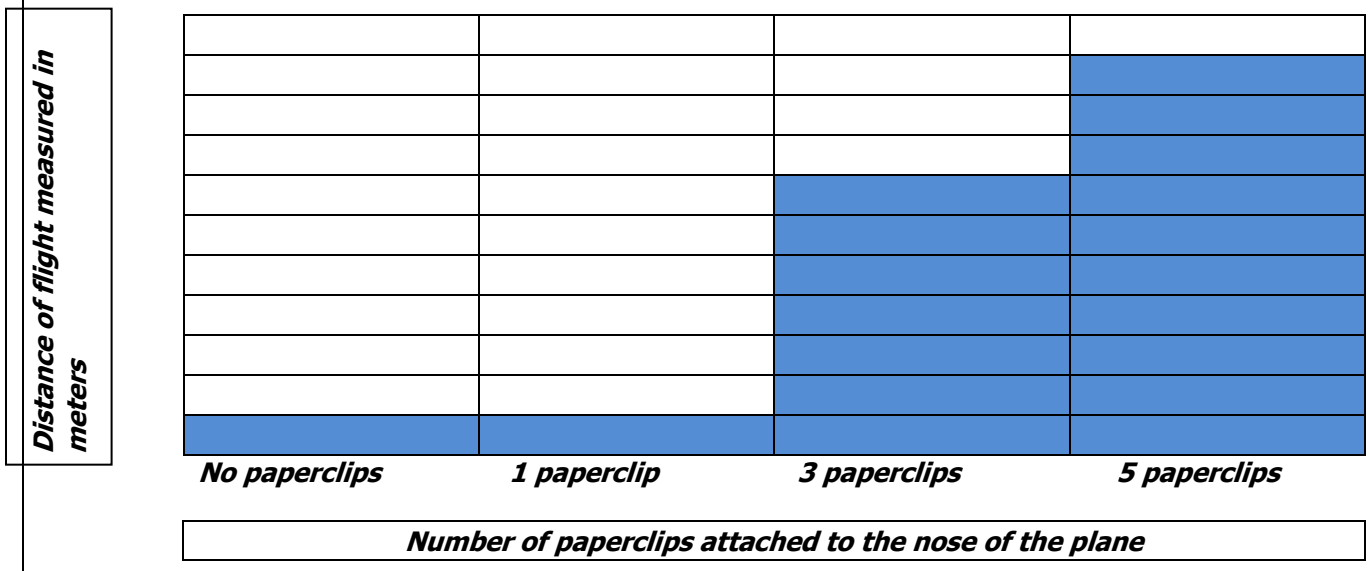
Make a graph of your results. This can be done by hand or computer.

Make a graph or chart of your results. This can be done by hand or computer.

Flight Results (Chart format)

	Test 1	*Test 2*	*Test 3*	*Average*
No paper clips	*0m*	*1m*	*0m*	*.3m*
1 paper clip	*0m*	*0m*	*1m*	*.3m*
3 paper clips	*8m*	*7m*	*5m*	*6.6m*
5 paper clips	*9m*	*11m*	*8m*	*9.3m*

Flight Results (Graph Format)



Data/Observation: Describe in paragraph form what happened during the experiment. Be detailed.

The plane did not fly very far with no or one paper clip attached to the nose of the plane. It flew the farthest when it had five paper clips attached to the nose. I believe that the plane flew farther with the paper clips because the paper clips added weight which helped to guide it longer. For example if I threw a ball, which has weight, it would go farther than if I threw a feather, which is a much lighter weight.

Physics can come in handy when designing the craft, as various forces can easily affect the distance and length of the flight. The current Guinness Book of World Record for the furthest paper aircraft flight is 69.14 meters. This record was accomplished on February 26, 2012 in North Highlands, California by John M. Collins and Joe Ayoob. In order to achieve a flight of this length, one must learn about various designs and how they work with the different forces affecting flight.

Conclusion:

5. Write your hypothesis in past tense using "when….then" format.

   When ***I put more paper clips on the end of my airplane***

   Then ***the plane flew a farther distance.***

6. Was your hypothesis supported or not? ***The results showed that my hypothesis was supported.***

6. Describe any scientific principles learned.

7. Reflection: Next Inquiry- another related experiment you could try or how you could make this experiment better?

_____

_____