

November 10, 2011

Dear Students and Parents,

Believe it or not the **Indian Head Science Fair** is quickly approaching. The science fair is going to be held on **Thursday February 9th**. Science projects are **mandatory** for fourth & fifth graders. Part of their third quarter grade is completing a science project. Projects need to be turned in by **January 30th**.

Students should choose a question to investigate and use the scientific process to find the answer to their question. Students are discouraged from doing models and reports since they will be using other people's research and not testing anything. (Difficulty will vary for different grade levels). Parents can help with the project, however the student needs to do most of the work.

This packet contains the following information; including science fair resources, how to set up their investigation, controlling variables, and setting up a backboard.

Students are **discouraged** from doing a project involving humans or animals with backbones (fish, birds, reptiles, amphibians, mammals, etc.). However, any project with invertebrates (animals without backbones) **must** have prior approval from their science teacher and the central office before beginning the project. Insects, worms, spiders, etc. are approved.

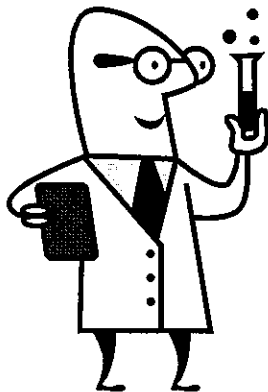
I have the forms in this packet on my webpage -
(www.ccboe.com/teachers/temhoff)

I look forward to seeing your child's project in the science fair in February!

Sincerely,

Tim Emhoff

E-mail: temhoff@ccboe.com



**Indian Head Elementary's
Annual Science Fair**



Steps for a Successful Project

Step 1: Follow the **Scientific Method**. Choose an idea or a **question to answer**. Check the library or even websites for project ideas. *On Mr. E's website (www.ccboe.com/teachers/temhoff) go to "**cool links**" for science fair sites and the bottom of "**Science Fair Information**" page.)* Be sure to get your topic **approved** (summary page) by Mr. Emhoff before starting any of the other steps. Turn in a summary page and Mr. E will approve or help you make changes.

Step 2: Research your topic. After researching, make a prediction or create a hypothesis. Guess what will happen during your project and describe why you think it will happen.

Step 3: Design your procedure. The procedure is the steps you will take to answer your question. **Remember...** when you are designing the procedure that you can only change **one variable** (independent) in the project! (Example: If you are doing a project on freezing liquids, then you can only change the type of liquid – water, milk, orange juice, soda. You have to keep everything else the same – same type of cup, same freezer, same amount of liquid, etc.) These are the controlled variables. The dependent variable in this example would be the freezing rate.

Step 4: Next, gather the materials you will need to complete your project. Also, select the appropriate place to do your project.

Step 5: Begin investigating! If you are doing something that could harm you, such as using the stove, get an adult to help you. Be sure to do your project at least three times and keep track of the results. Take photographs or sketch picture of your observations. You can keep a science log (charts, written observations, measurements, etc.) of what happened in your project. Creating a graph of the data is also a way to show what happened.

Step 6: Make a conclusion. Answer the question you started with. What did you find out after doing the project? The more details and proof you put in your conclusion the better.

Step 7: Create your backboard. Refer to link at the bottom "Science Fair Information" or the example in the packet to see a sample backboard. You can place items on your backboard and move them around until everything fits right. **Then, glue or attach** the items to backboard.

Step 8: Bring your project to school and set it up. Then comeback for the Science Fair. 😊

Project Ideas (or come up with your own 😊).

Physical Science:

What variables affect the swing of a pendulum (length of string or mass of pendulum)?

Is there a relationship between the size and strength of a magnet?

What types of surfaces produce the greatest or least amount of friction?

What variables determine the strength of an electromagnet (number of wire wraps, wire gauge, diameter of nail)?

What variables affect the flight of an airplane (materials, weight, shape, angle of launch)?

How is the bounce height of a ball related to the drop height?

What variables affect the efficiency of parachutes (size, shape, materials)?

How does the length of a rotor affect helicopter flight?

Does the length of a ramp (inclined plane) affect the amount of force needed to pull a load up a ramp?

Does the temperature of the air affect air pressure?

What effect does air pressure have on the bounce of a ball?

Does mass affect how fast objects of equal volume will fall through a liquid?

How does the size of a wheel affect the rate at which it lifts a load?

How does temperature affect the bounce height of a ball?

Does the angle of launching affect how far a paper airplane flies?

Will the amount of air affect the distance a balloon rocket will travel?

Which type of material conducts sound the best?

Do different types of string or string lengths affect the efficiency of a paper cup or tin can telephone?

Do different watt light bulbs produce different amounts of heat?

What effect does temperature have on buoyancy?

Does color affect the rate in which an ice cube melts?

What effect does color have on temperature?

What material makes the best heat insulator?

Which type of container keeps liquids hotter longer?

What effect does temperature have on the elasticity of a rubber band?

Do suction cups stick equally well to different surfaces?

Does the amount of stretch of a rubber band affect the distance a rubber band will travel?

What design shape supports a bridge the best?

What shape of container allows for greater rates of evaporation?

Does salt water or lemon juice have any effect on the rate of dehydration of different types of apples?

How is the strength of a magnet affected by glass, cardboard and plastic?

What is the relationship between temperature and amount of carbonation in soft drinks?

Does the density of a liquid affect its droplet shape?

Do basketballs that are fully inflated bounce better than flatter ones?

Does the depth of a pan affect how water freezes?

Do different types of liquids have an effect on the rate of oxidation?

Does viscosity (thickness) of a liquid have an effect on the rate of evaporation or the boiling/freezing point?

Does iron rust faster in salt or fresh water?

Does hot water freeze at a different rate than cold water?

Which will food coloring mix into faster - hot, medium, or cold water?

Which chemicals slow the browning of apples or other fruits?

What food dry cells (tomato, potato, or apple) will produce the highest amount of energy measured in voltage?

What effect does temperature/packaging have on the ripening of bananas?

Does temperature have an effect on solubility? Does the color of water have an effect on evaporation rate?

Does temperature affect the growth of sugar or salt crystals?

What materials melt an ice cube most efficiently?

How does temperature affect the reaction rate of Alka Seltzer?
Do heavier objects fall faster than lighter ones?
Does the density of wood affect how much weight different pieces of wood will hold in water?
Do water purifiers really work?
How well do different types of wood absorb water?
What type of metal, steel, copper, or bronze, will rust faster?
What liquid works best in making invisible ink?

Mathematics:

What are the most common sums of two dice when rolled?
What is the relationship between height and arm length?
What is the probability of reaching into a bin and selecting a particular color of M&M candy?
Can statistics be used to predict the contents of edible consumer products such as fruit snacks, a bag of jelly beans or M&Ms?
Which juice box manufacturer has the largest volume of juice and uses the least amount of packaging material?
How do the dimensions of a rectangular prism change with respect to each other?
Does the probability of drawing a particular card from a deck depend upon the number of that type of card in the deck?

Computer Science:

Does the font style of the letters (or characters) in a file change the size of the file?
How does the file size change as more letters (or characters) are added to a file?
How does the file type affect the printed image? (JPEG, GIF, Bitmap, etc)
What search terms give the best results?

Life Science/Environmental:

What effect do different colors of light have on the growth of plants?
What type of seeds will germinate fastest?
How does soil temperature affect the germination of seeds?
Does the direction a seed is planted affect the growth of the seed?
Do vitamins or fertilizers affect the growth of plants?
Do mirrors have an effect on plant growth?
Does acid rain have an effect on the germination of seeds?
Which direction will a vine grow around its support object?
What medium works best for growing seeds or plants?
Does temperature affect the growth of seeds or plants?
Is there a relationship between seed size and fruit size?
Which fruits or orange drinks have the most vitamin C?
Do potato cubes gain or lose mass in salt water solutions?
What kind of soil is best for water retention?
How does a garden mist spray affect plant growth?
Which plants and vegetables make the best dye?
How does temperature affect the water uptake in celery plants?
Does the type of water affect the growth of plants?
Is soil necessary for plant growth? (hydroponics study)
How does rotation affect plant growth?
Does music affect plant growth?
Does a plant grow best in sunlight or artificial light?
Can plants deprived of sunlight recover?
What is the relationship between root and stem growth?
Which color of light causes green beans to grow best?
Can potatoes be grown without soil?
How do worms affect plant growth?
What affect do Epsom salts have on plant growth?
How does mint extract affect bean growth?
Can recycled newspaper be used to fertilize plants?
How does the concentration of salt in water affect seed germination?

Do beans grow better in clay, sand or potting soil?
What kind of light do plants grow under best? Sunlight, grow light or regular light bulb?
Do detergents affect plant growth?
What percentage of an orange or other fruit is water?
Do magnets affect plant growth?
What difference is there in the tree species found in high and low areas of a forest?
Does recycled paper break down faster than new paper?
How does temperature affect the activity of meal worms?
Are there differences in the amount of air pollution inside vs. outside a building?
Are there differences in temperature in shaded vs. non-shaded areas during the day & at night?
What happens to pond water when fertilizer is added? Collect pond water and add fertilizer.

Engineering:

What factors affect the top speed of a radio-controlled car?
What brand of matchbox car rolls more freely?
Does the material of a parachute affect how fast it drops?
What levee construction will hold the most water?
What levee construction will hold the most force?
Which truss design will withstand the most weight?
Will the amount of material eroded change as the slope angle increases?
Does the area of a parachute affect how fast it falls?
Which file card bridge hold the most pennies?
Which paper hoop plane will fly the longest distance?
Which building design is best in withstanding an earthquake?

Earth Science:

Where do crystals form first, hot, cold, or room temperature?
What type of soil or grass filters water the best?
Which sediment gets warm faster – sand, soil, clay, gravel?
Do different types of soil hold different amounts of water?
How accurate are local forecasters?
Do weather conditions affect the broadcasting of AM radio stations?
What materials or methods work best for cleaning up oil spills?
How are different depths and shapes of craters made?
Are different sizes and shapes of sand dunes formed at different wind speeds?
How well does charcoal filter water?
What effect does freezing or boiling have on rocks?
Which material absorbs heat most efficiently, sand, soil, or rocks?
Do different types of soils have different percolation rates?
What type of building design will withstand the shaking motion of an earthquake best?
How wet should sand be to build a sandcastle?
How accurate are web-based weather forecasting services?
Is there a relationship between the phases of the moon and the weather?
What effects do the changes in the length of day and night have on household plants?
Is air in your house the same temperature at floor level and near the ceiling?
Will the size of a crater be greater when the impact object is bigger? faster?
Does the moon rise every night at the same time and in the same location?
How accurate are long-range weather forecasts?
Is rainwater absorbed at the same rate in different kinds of soil?
From which direction, does the wind blow most frequently?
How warm is it under the snow?
How accurate are homemade weather instruments?

INVESTIGATION WRITE-UP SAMPLE

This is a rough draft for you.

Use the spaces provided to record information about your project. If you need more room, use the back of this sheet.

QUESTION: _____

MATERIALS: (List specific amounts)

| | |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

HYPOTHESIS: (What do you think is going to happen and why you think that.)

PROCEDURE:

Independent variable: What are you changing?

Dependent variable: What are you looking for or measuring?

Controlled variables: Things in the investigation that you are keeping the same.

Steps: (Describe what you did.)

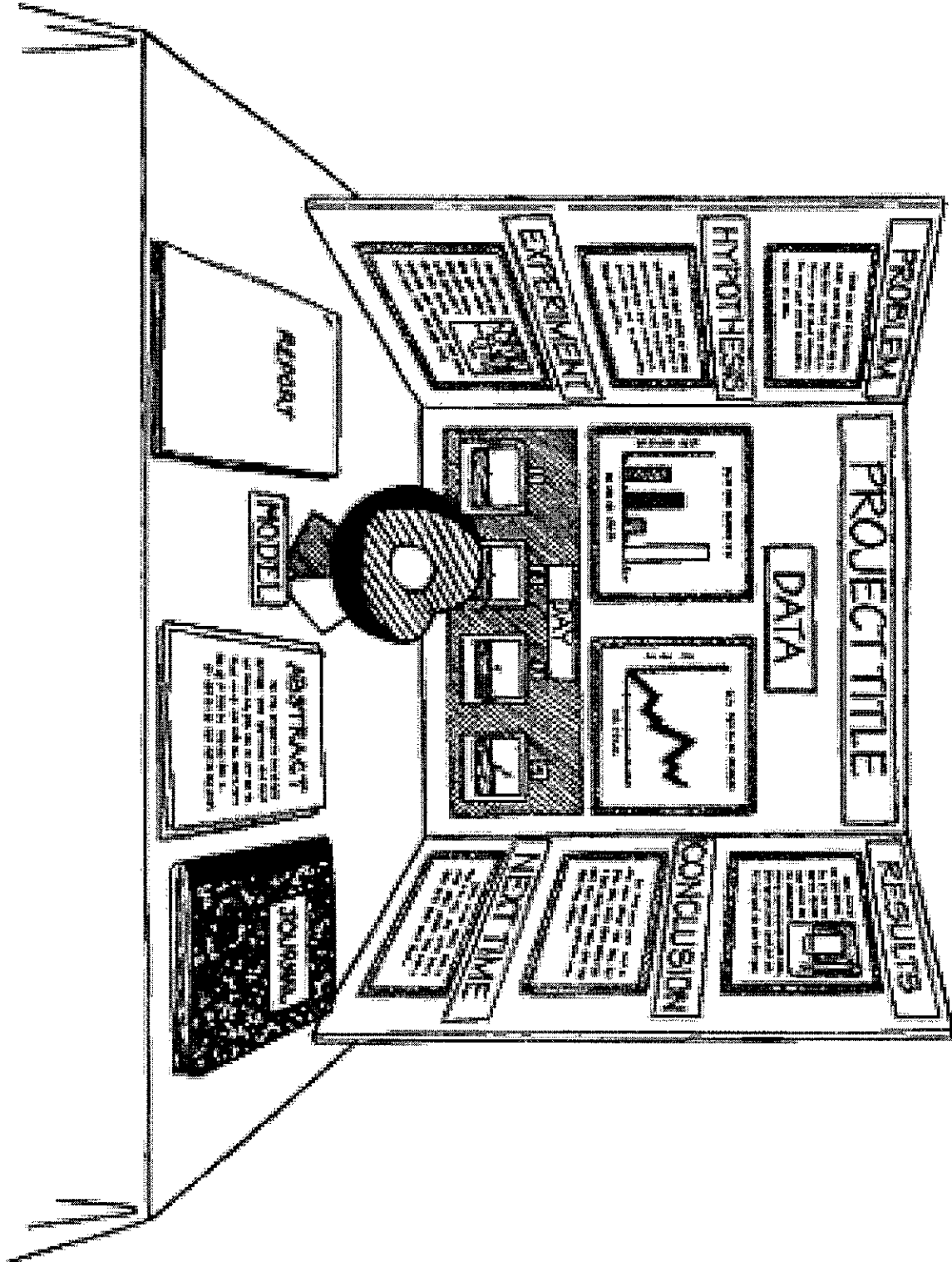
TIPS FOR CREATING OUTSTANDING DISPLAYS

- **Be Neat** – Avoid frayed or ripped edges of paper, glue globs, lots of cross outs or white outs.
- **Use Colors to Attract Attention But Don't Over Do It** – Choose a few colors to use on your project or stick to a theme. Too much color can be distracting. Instead develop a color pattern that is pleasing to the eye.
- **Frame or Matte Your Work** – Use construction paper or colored materials to provide a background for your written (or typed) work and labels. (construction paper, newspaper, wrapping paper, old wall paper, etc.)
- **Titles Should be Short, Catchy and Related The Project Idea** – For example:
Color of Cool Cubes – is better than The Melting Rate of the Different Colors of Ice Cubes.
Sizing Up Seeds is better than The Relationship between the Size of the Seed and the Size of the Plant.
- **Writing Should Be Neat and Legible** – If you choose to use a computer, stick to one or two fonts. If you hand write, print neatly. Cursive is harder to read. Check your spelling.
- **Practice Your Board Layout** – Do not glue down the parts of your project on your board until you have practiced moving them around on your board. They should be evenly spaced and centered. Crowding together or large gaps can take away from your project's appearance. Trying to rip off or move things once they are glued down can be messy and often ruins the display board.
- **Take Photos, Draw Pictures/Diagrams, and Keep a Science Journal** – This will greatly enhance the visual appeal of your display.
- **Journal** – Your journal (a few pages...you don't need a binder or composition book) should be placed out in front of your project. DO NOT attach it to the display.

Good Luck!

A "Sample" Display Backboard

*This image is from Science Fair Central. Instead of using "Experiment" please use "Procedure". You also can identify materials used. Students do not have to have an abstract (a homemade journal is fine). Look on my website for another example.
www.ccboe.com/teachers/temhoff



Judge's Scoring Sheet

Project Number: _____ Project Title: _____

Using the judging criteria below, award points in each category by circling the proper score.
Category scoring is at the bottom:

Appearance & Organization

- | | |
|---|-----|
| <input type="checkbox"/> Title – Accurate, grabs the viewers attention | 1 0 |
| <input type="checkbox"/> Mechanics – Correct spelling, punctuation, capitalization | 1 0 |
| <input type="checkbox"/> Backboard - Neat and presentable | 1 0 |
| <input type="checkbox"/> Originality – Original topic idea | 1 0 |

Scientific Procedures

- | | |
|--|-------|
| <input type="checkbox"/> Problem/Purpose – States what the project is about | 1 0 |
| <input type="checkbox"/> Hypothesis/Prediction – Includes the student's prediction AND explains why | 2 1 0 |
| <input type="checkbox"/> Materials – List is accurate and complete | 1 0 |
| <input type="checkbox"/> Procedure/Method – All steps are written or typed in detail | 2 1 0 |

Scientific Thought

- | | |
|--|-----------|
| <input type="checkbox"/> Data – Includes charts, graphs, or pictures | 3 2 1 0 |
| <input type="checkbox"/> Trials – must include at least three trials of data | 3 2 1 0 |
| <input type="checkbox"/> Conclusion – States whether the prediction was supported AND includes data from the investigation that supports the conclusion, answers problem/purpose, extends ideas | 4 3 2 1 0 |

Total Score: _____