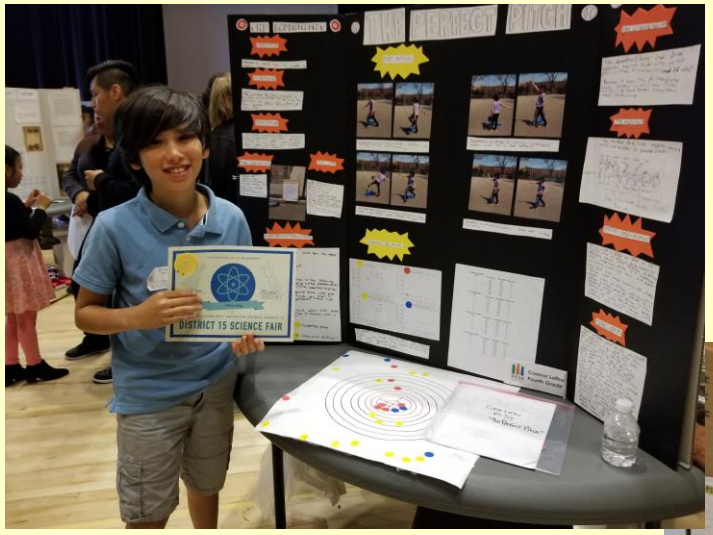
# Science Fair Grades 3-5








# What is a Science Fair Project?

A Science Fair project is a unique way for students to pose questions for which they must seek out answers, and to satisfy their own curiosity about the world around them.

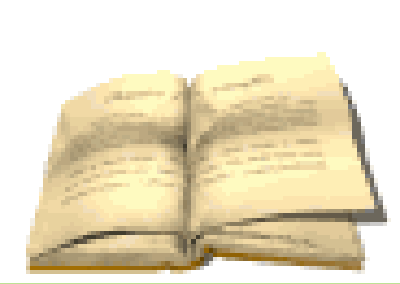
We use the **Scientific Method** to help us with this process.

# Scientific Method

Scientists do not always follow these steps in this order or even go through all of them every time, but for Science Fair we will.

1. Ask a question and state a purpose
2. Research
3. Hypothesis
4. Procedures (variables, materials, step by step directions)
5. Collect data
6. Create a graph
7. Draw a conclusion

# What is a Science Log?

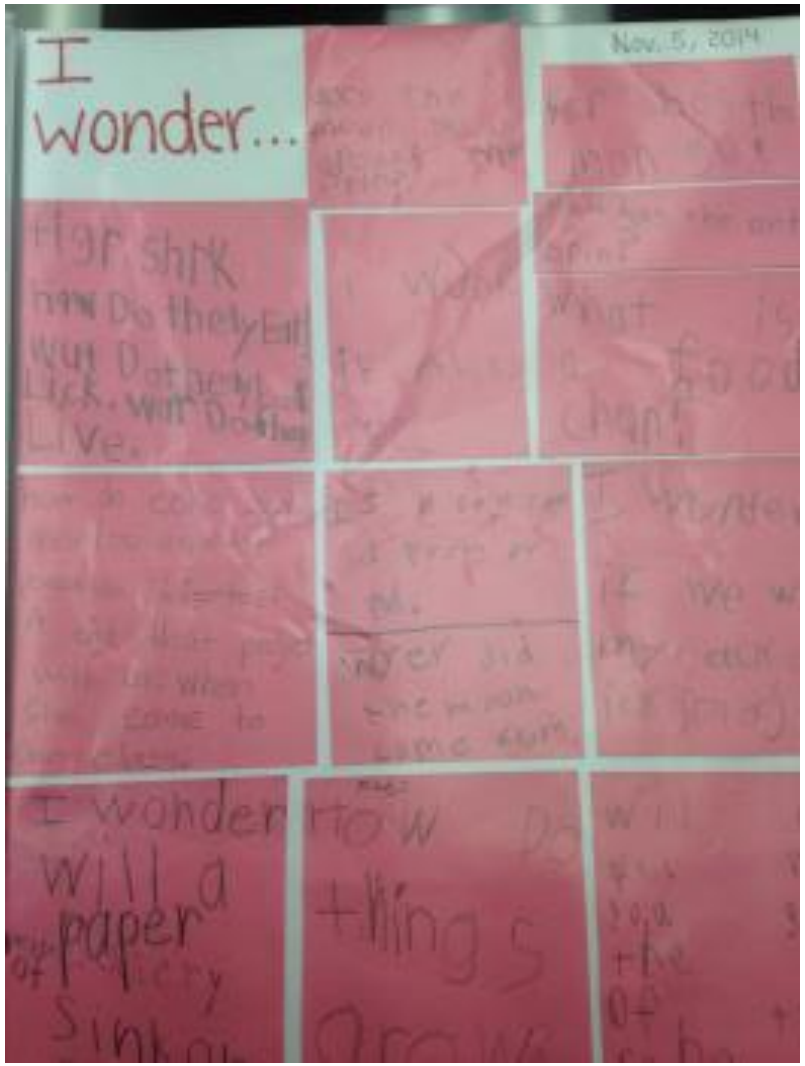


It is a written account of **<u>everything</u>** you think and do as you work on your Science Fair project.

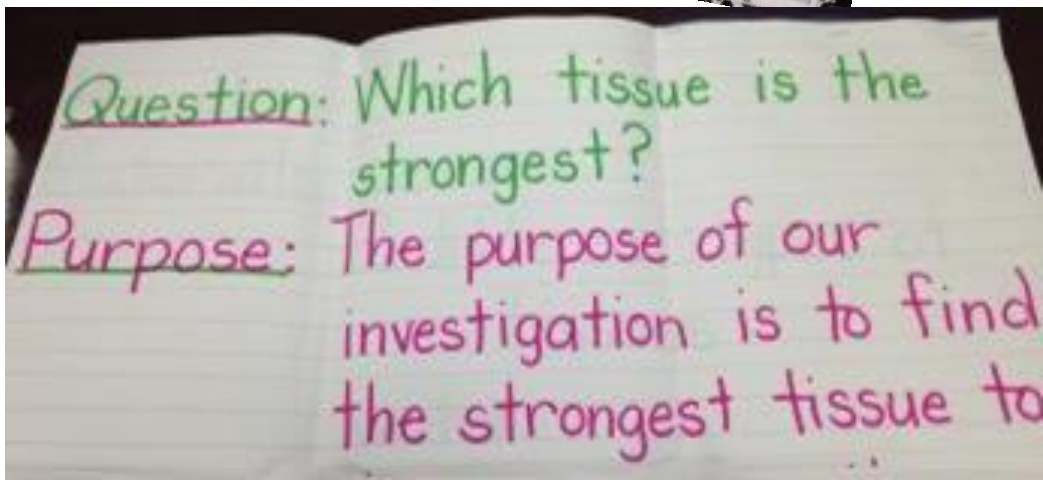
Your log is like a diary or journal of your progress in your investigation.

Keep everything you write in your log even if you change your mind or start over.

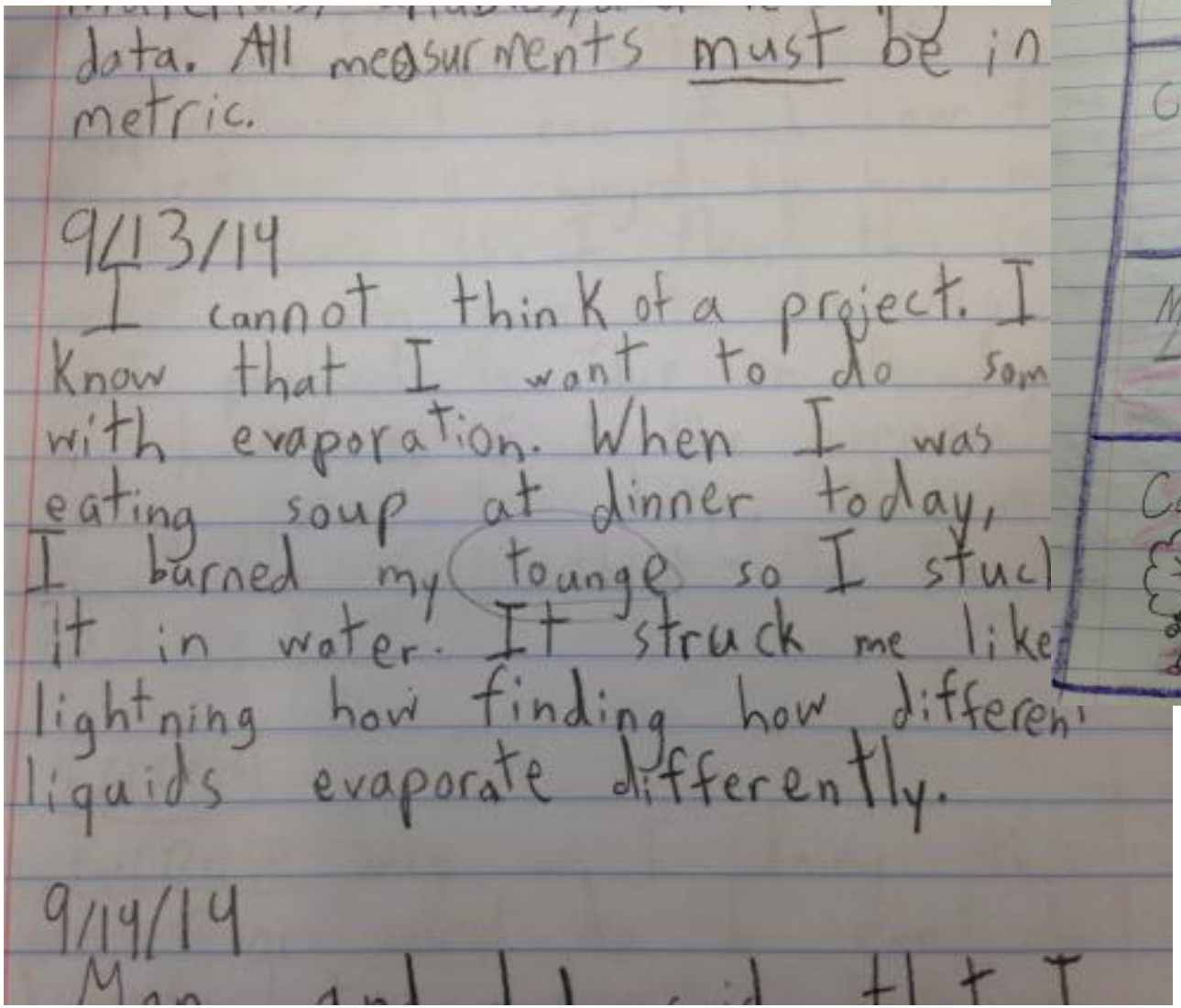
# Science Fair Log







# + Science Fair Log

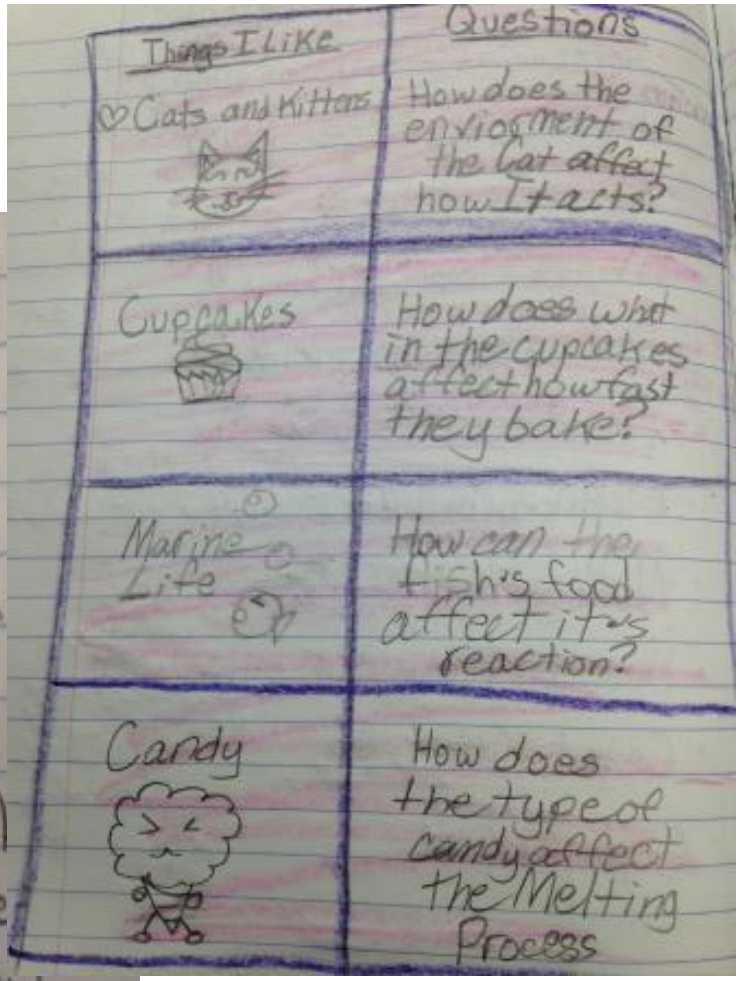


data. All measurments must be in metric.

9/13/14

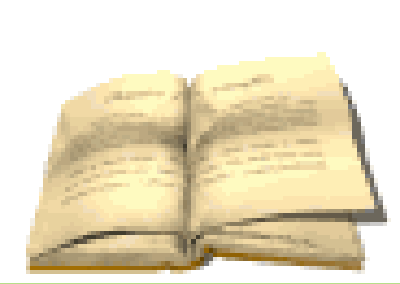
I cannot think of a project. I know that I want to do som with evaporation. When I was eating soup at dinner today, I burned my tounge so I stucl it in water. It struck me like lightning how finding how differen liquids evaporate differently.

9/14/14



| Things I Like | Questions |
|---|---|
| ♡ Cats and Kittens | How does the enviorment of the Cat affect how It acts? |
| Cupcakes | How does what in the cupcakes affect how fast they bake? |
| Marine Life | How can the fish's food affect it's reaction? |
| Candy | How does the type of candy affect the Melting Process |

# Log



- The first thing you need to do to begin a Science Fair project is to begin writing in a log.
- Your log is a required part of your project.
- The log tells us the entire story about your project. The display board is a commercial for the project.
- **Please remember to date each entry**.
- Research notes, measurements, observations, and test results should be included.

Specific Dates

# Sample Science Fair Log Entry

- 9/4/2015 My teacher said it is time for Science Fair. I think it would be cool if I could come up with a topic. I kind of have 3 in mind.

- 9/5/2015 I shared my ideas with my teacher. She loved my idea about experimenting with water filters.

- 9/6/2015 My teacher said I have to turn my idea into a question. I wonder if homemade water filters are easy to make? I know that animals drink water from rivers and streams. I wonder if I could create different water filters and test them to see which one creates the clearest water? I wonder how I could test the water clarity?

Keep Everything

- 10/8/2015 I have noticed that most rivers and streams have water rolling over rocks and pebbles. I am going to gather rocks and pebbles for my materials. I think I can compare a water filter made with rocks and pebbles and a water filter made with sand. I can collect data on the clarity of the water in each filter over multiple trials.

Include data & observations

- 10/12/15 I realized that both water filters will need the same amount of dirty water to compare the results accurately.

# Brainstorming Topics
# (Grades 3-5)

Make a list of things you are interested in.

The things you like do not need to have anything to do with science or school; it's just a list of things you like.


Can you think of 20 or more?

# Think of as many questions as you can about the things you listed. A list might look like this one:

| **Things I Like** | **Questions** |
|---|---|
| Baseball | Does a baseball roll farther on artificial grass? |
| Paper Airplanes | How does the shape of the wing affect how far a paper airplane glides? |
| Rocks | Do most rocks erode in the rain?  Can some rocks float? |
| Playing outside | What are good ways to cool off when you are hot? |

# A good question cannot be answered yes or no.

(There are exceptions to this rule.)

- Good Question: How does the type of water affect the growth rate of a plant?
- Poor Question: Can plants grow in water?

# A good question tells you what you need to measure.

- Good Question: How does the species of the orange affect the amount of juice it has?
- Poor Question: Are oranges juicy?

# You can investigate the question yourself.

- Good Question: How do shade trees affect temperature of areas on our playground?

- Poor Question: What are the temperatures on Venus? (Although you can look it up, you cannot build a rocket, go to Venus, study this on your own and get back before the due date.)

# The answer is a fact, not an opinion.

- Good Question: How does the brand of soap affect the amount of bubbles produced?
- Poor Question: What kind of soap smells the best?

# What is a Good Question?

**A good science investigation question:**

- Cannot be answered with one word such as yes, no, or purple.
- Tells you what you need to measure.
- Is something you can investigate yourself.
- Is answered with a fact, not an opinion.

# Example of log entry for question:

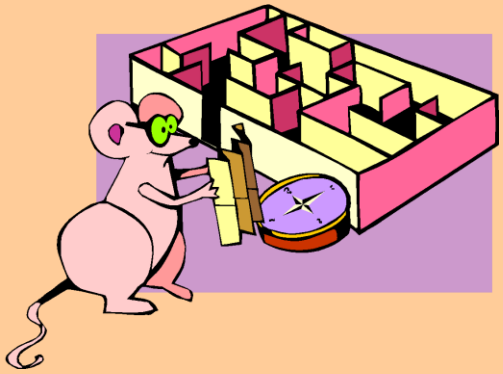
August 20, 2011

I saw a picture of icebergs floating. They look really cool and pretty. Ice floats in a glass of water too. I wonder if ice is lighter than water.

My question is: Does the mass of water change when it goes from a liquid to a solid? No, How does going from a liquid to a solid affect the mass of ice? is better.

The boat in the picture floats too. Is the boat wood or metal? I think metal sinks, but metal boats float. I know wood will float..

# Research Involving Animals



For the safety of all animals, NO research on animals is allowed for your Science Fair project.

# Purpose

The purpose of the project should tell what you want to find out.

**The purpose of my project is to find out…**

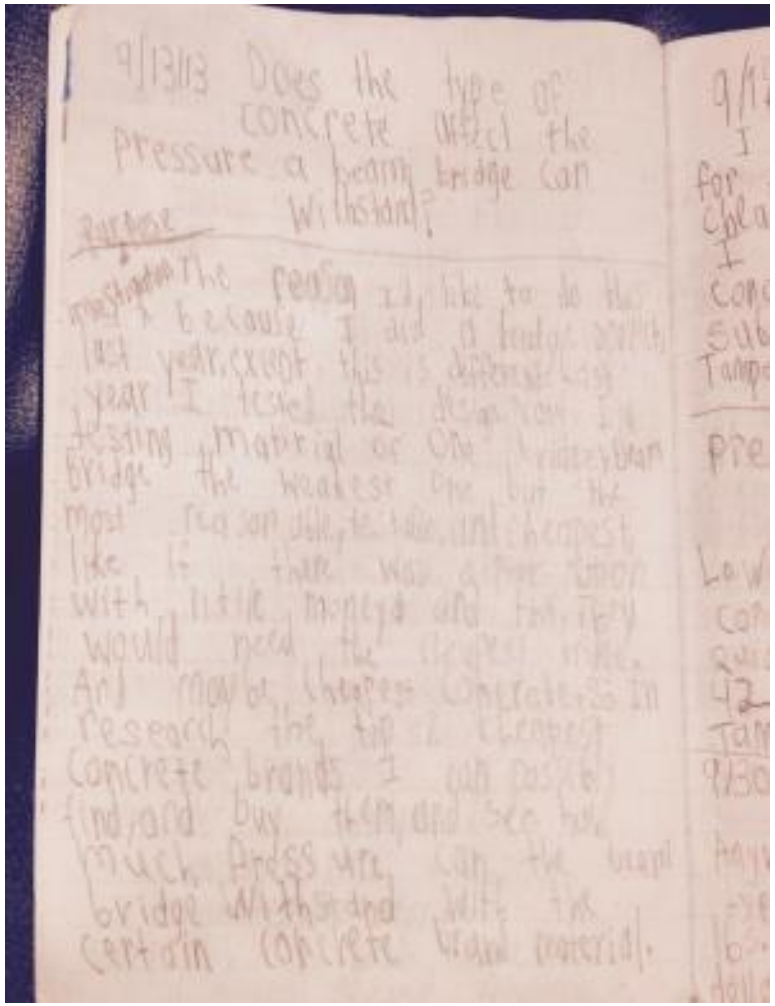
It is really just restating the question.

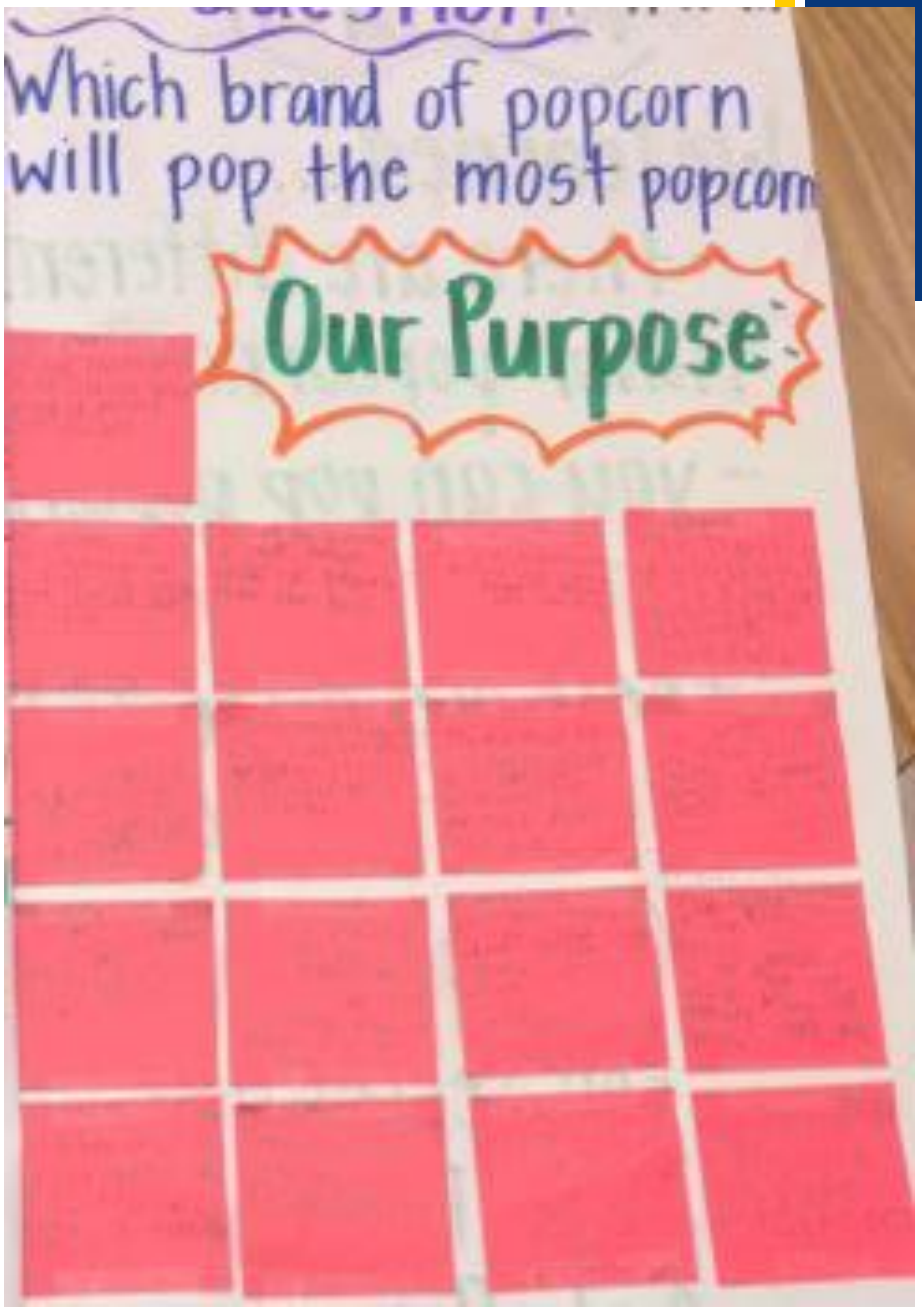
# Examples

Question:  Will a cable-stayed bridge or a beam bridge support the most weight?
Purpose: The purpose of my project is to find out if a cable-stayed bridge or a beam bridge will support the most weight.

Question:  Does the shape of a container affect the amount of evaporation that occurs?
Purpose:  The purpose of my project is to find out how the shape of a liquid container will affect how much liquid will evaporate.

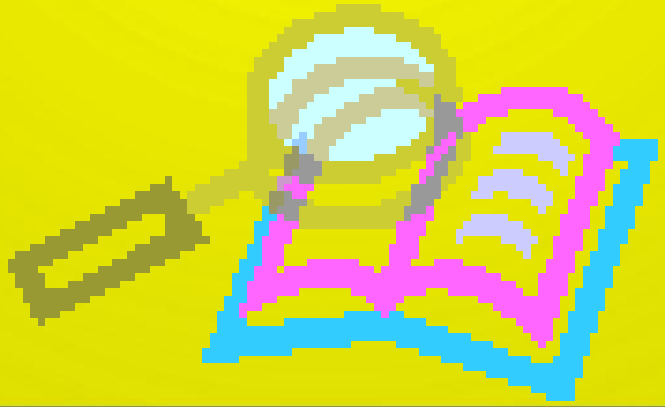
# PURPOSE


9/13/13 Does the type of concrete affect the pressure a beam bridge can withstand?
Purpose


Which brand of popcorn will pop the most popcorn
Our Purpose:

# Research

- Before you can begin your project, you need to learn more about the topic.
- You will write the information you learn in your Science Fair log.
- You will use this information to make your hypothesis.



# Research

Complete a Science Log Entry about your project. Think about the materials you might use, ideas for conducting your investigation, or any other thoughts you might have.

# Hypothesis

- The hypothesis is what you predict will happen when you perform the experiment based on your research.

- It doesn’t matter whether you are right or wrong; in your conclusion, you will tell if your hypothesis was supported or not.

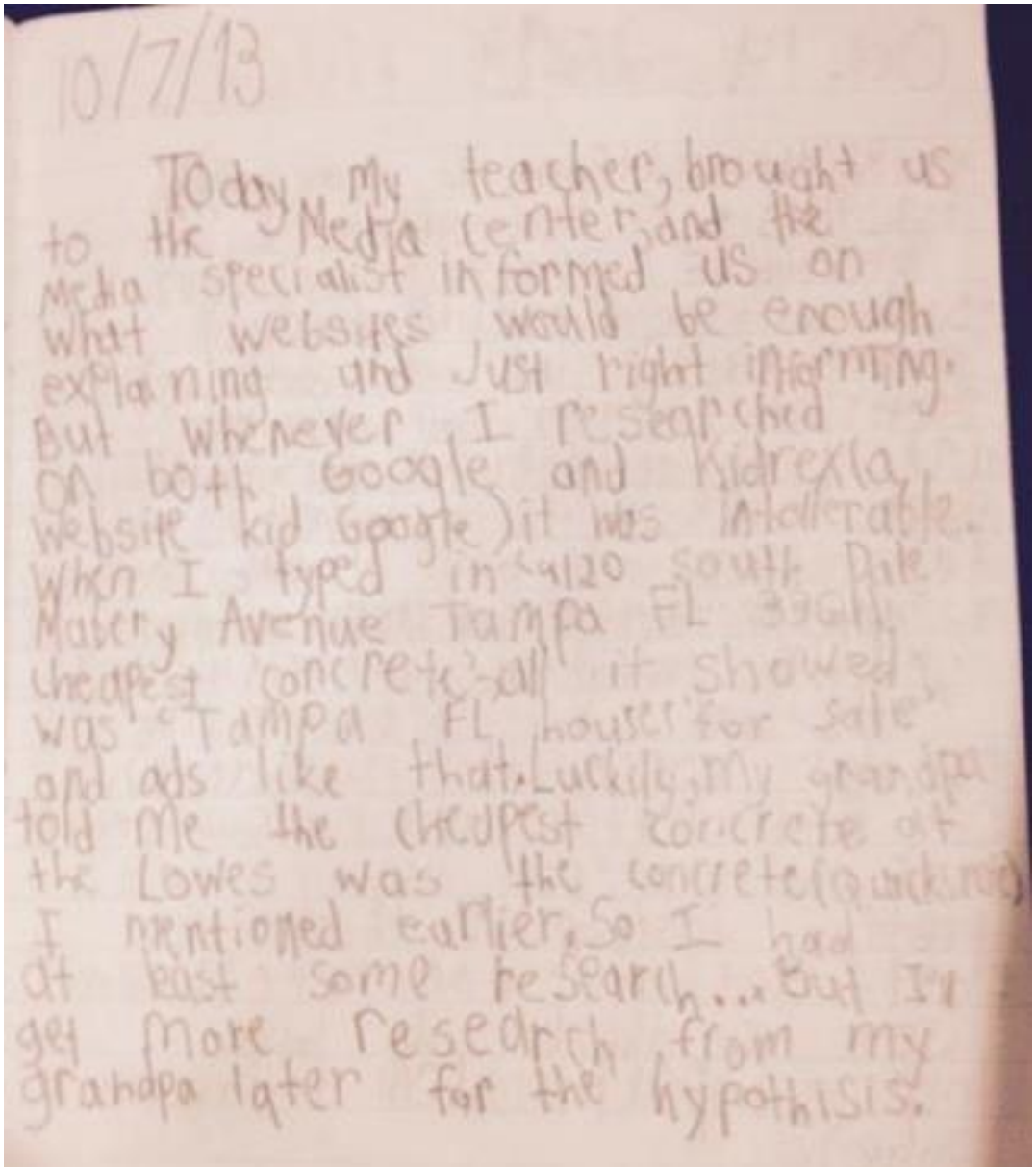
- It is what you think the results of your experiment will be and WHY you think that.

# Hypothesis

**Based on my research, I think… will happen because ...**

**Remember to use the information from your research to explain why you think this will happen!**

# + Hypothesis



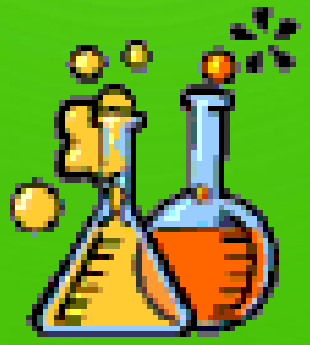
10/7/13

Today my teacher, brought us to the Media center, and the Media specialist informed us on what websites would be enough explaning and just right informing. But whenever I researched on both Google and Kidrexla website kid Google) it was intollerable. When I typed in "4120 South Dale Mabery Avenue Tampa FL 33611 cheapest concrete" all it showed was "Tampa FL houses for sale" and ads like that. Luckily, my grandpa told me the cheapest concrete at the Lowes was the concrete (quickrete) I mentioned earlier. So I had at least some research... but I'll get more research from my grandpa later for the hypothisis.

# Materials

- This is a list of **all** the materials you need to perform your experiment.

- You must also include how much and which types.



# Example of Materials List

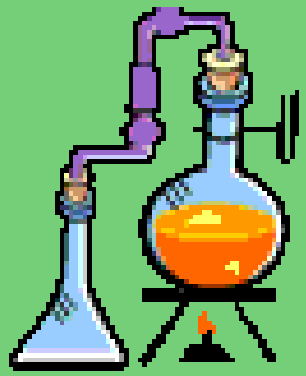
## Materials

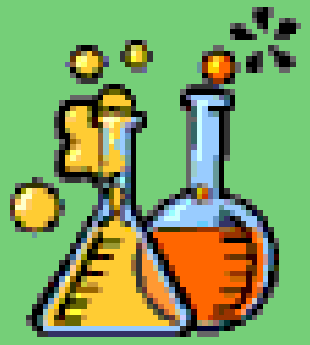
- 2 – 16 oz Office Depot clear plastic cups
- 130 ml tap water
- 1 Thermometer
- 16 oz of ice from ice maker

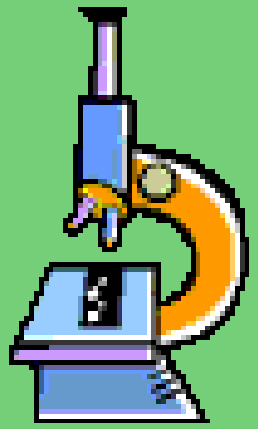
# Materials

HOW, WHEN, and WHERE will you get your materials?

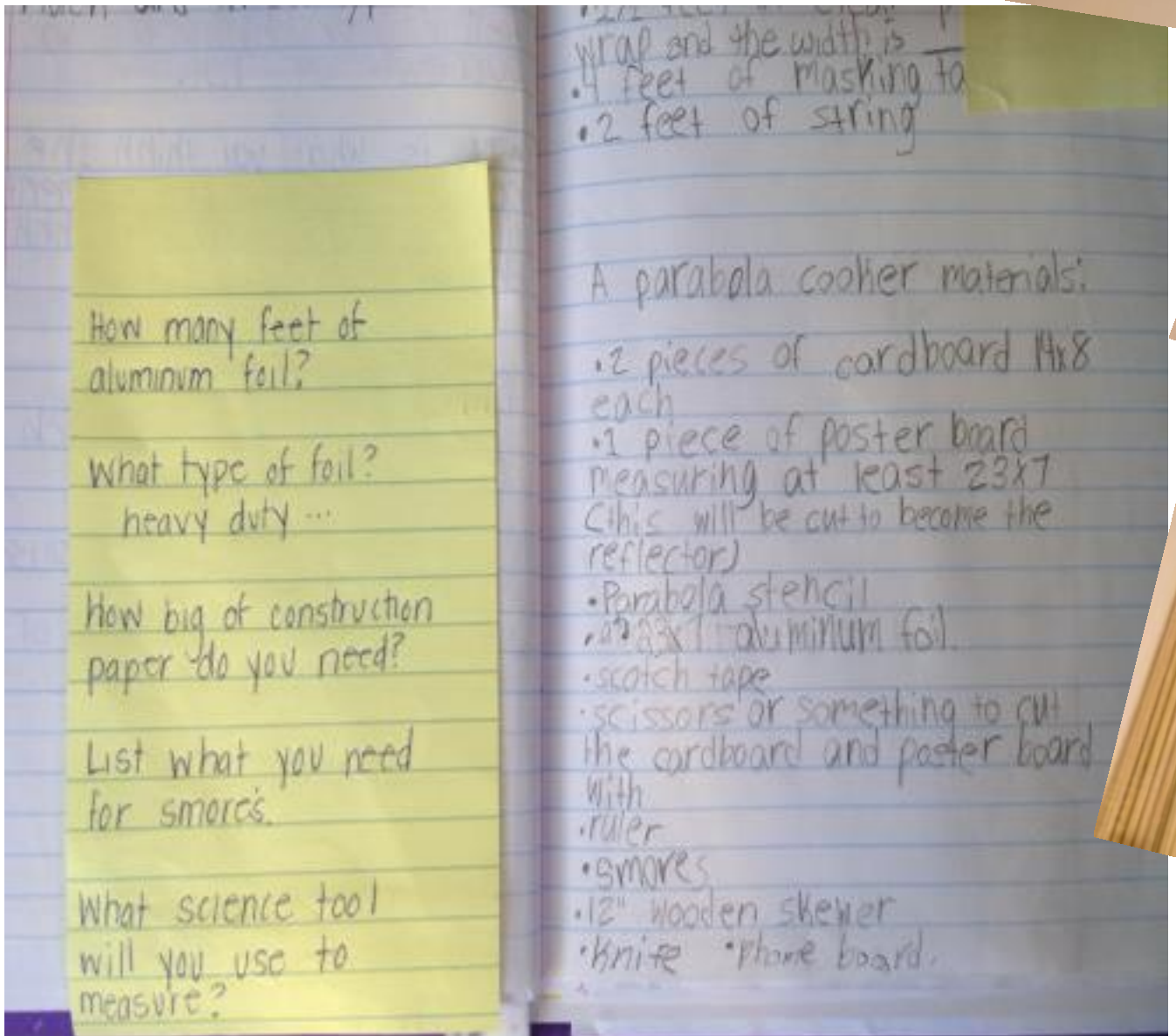
Explain in your log.







# + Materials


How many feet of aluminum foil?
What type of foil? heavy duty ...
How big of construction paper do you need?
List what you need for smores.
What science tool will you use to measure?
wrap and the width is
•4 feet of masking ta
•2 feet of string
A parabola cooker materials:
•2 pieces of cardboard 14x8 each
•1 piece of poster board measuring at least 23x7 (this will be cut to become the reflector)
•Parabola stencil
•a 23x7 aluminum foil
•scotch tape
•scissors or something to cut the cardboard and poster board with
•ruler
•smores
•12" wooden skewer
•knife •Phone board.


ALUMINUM FOIL
ALUMINUM FOIL
75
75


Big&Fluffy
MARSHMALLOWS
NET WT 16 OZ (453g)

# Essential Questions

- **What is a manipulated (independent) variable?**

- **What is a Responding (dependent) variable?**

- **What is a constant (control) variable?**

# Variables

There are 3 kinds of variables. You will list the variables for your Science Fair project.

1. Manipulated (Independent )
**What you are changing on purpose.**
**What I change . . .**

2. Responding (Dependent )
**The change you are measuring.**
**What I measure . . .**

***3.*** Held Constant (Control)
**Everything that stays the same.**
**What I keep the same . . .**

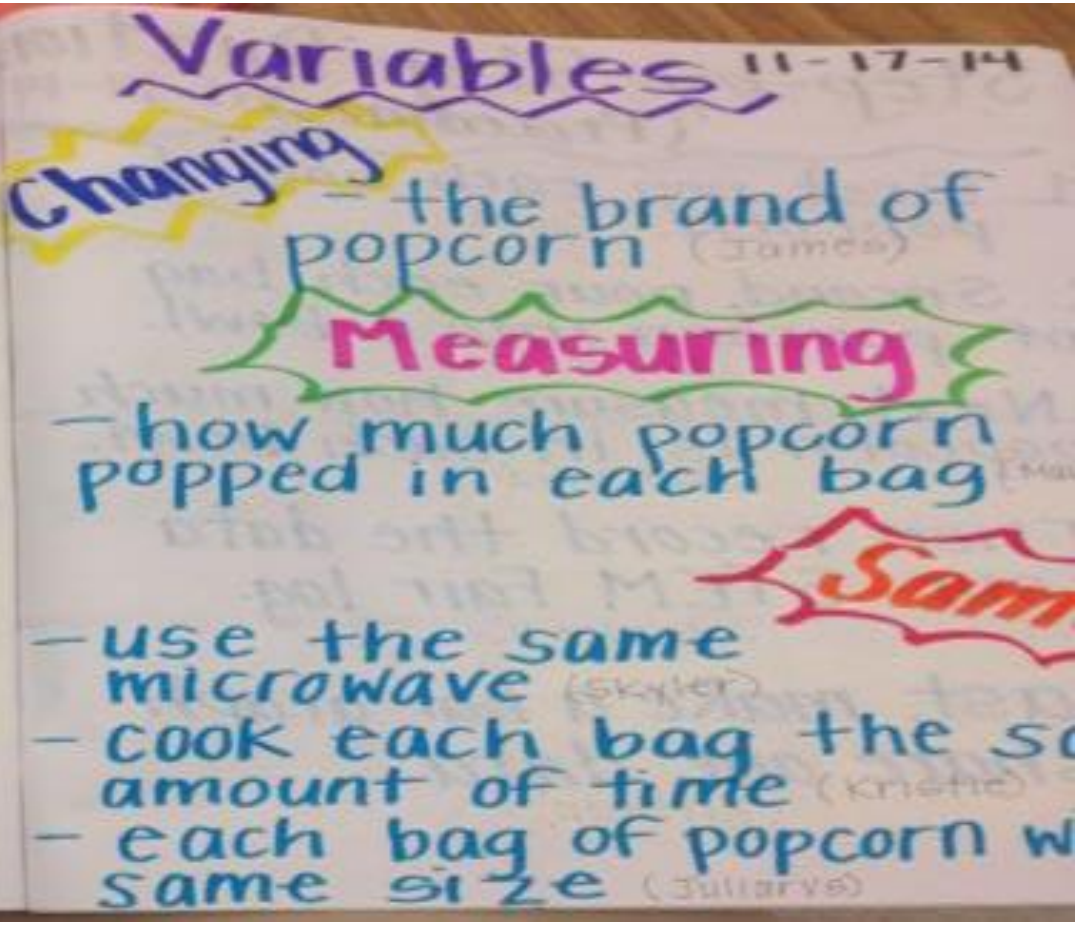
# Examples of VARIABLES:

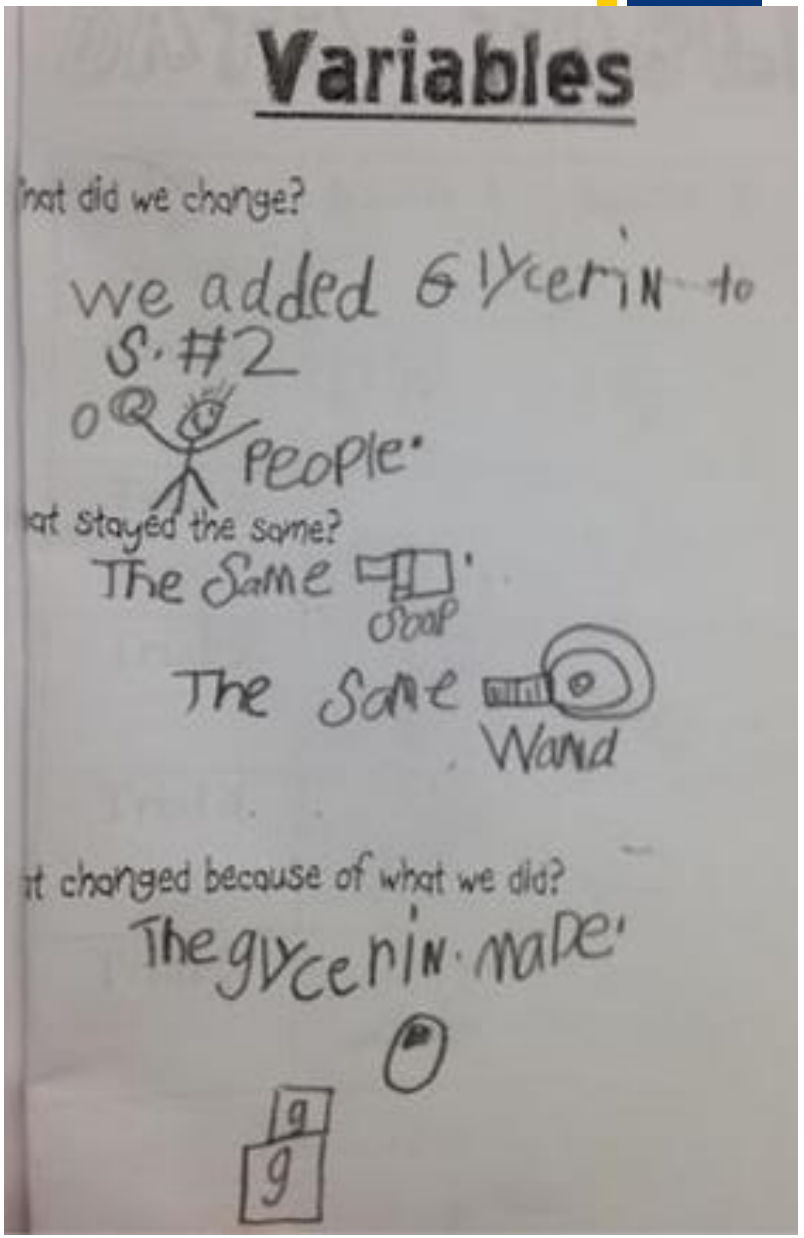
| Question<br>? | Manipulated (Independent) Variable<br>(What You Change) | Responding (Dependent) Variables<br>(What You Will Measure) | Constants (Controlled)<br>(What You Keep the same) |
|---|---|---|---|
| Do all brands of paper towels absorb the same amount of water? | Brands of paper towels | Amount of water that is absorbed by each towel | Size of paper towel<br>Amount of water poured on each paper towel<br>Temperature of the water used<br>Container towels are placed in<br>Method of pouring<br>Amount of time paper towel remains submerged |

# List your VARIABLES:

| Question<br>?<br>? | Manipulated (Independent) Variable<br>(What You Change) | Responding (Dependent) Variables<br>(What You Will Measure) | Constants (Controlled)<br>(What You Keep the same) |
|---|---|---|---|
| | | | |

# + Variables


Variables 11-17-14
Changing
- the brand of popcorn (James)
Measuring
- how much popcorn popped in each bag
Sam
- use the same microwave (Skyler)
- cook each bag the s
amount of time (Kristie)
- each bag of popcorn w
same size (Julianys)


Variables
hat did we change?
we added Glycerin to S.#2
People.
at stayed the same?
The Same
Soap
The Same
Wand
t changed because of what we did?
The glycerin made.

# Step by Step Directions

- These are like a recipe.

- Anyone who reads them will be able to duplicate the investigation and get the same results.

# Step by Step Directions

- Direction steps need to be numbered.

- The experiment needs to be **<u>done 3 or more times</u>** so you will have sufficient data to make an accurate conclusion.

- Step number one is always, “Gather materials.”

# Example of Directions

1. Gather Materials.
2. Fill cup to ½ way mark with ice.
3. Add 130 ml of tap water.
4. Swirl cup for 1 minute. (Hold by top edges of the cup.)
5. Record water temperature. (Keep thermometer in water, look at eye level.)
6. Add 2 more ice cubes.
7. Repeat steps 4 and 5.
8. Repeat Steps 2-7 four more times for a total of 5 trials.

## When you write your directions, Remember the following:

- Write them clearly so someone else may follow them and get the same (or similar) results.
- Be very specific and to the point.
- Remember to indicate how many trials are necessary.

For Example:

"Repeat steps 2-5 four more times for a total of five trials."

- Make sure to indicate when data should be collected and what kind of data.

# + Procedures

Today,
I was thinking about my step
by step directions in my STEM
Fair project? So I do not forget
these are my step by step directions,
1. Gather all materials
2. Place one box of poppys in the
sun, and one in the shade
3. Make a cover for the shade side
4. Place the Poppys in the sun
5. Check every day for growth
6. Collect data when I check for changes
(Use ruler)

# DATA

- **Data refers to the information gathered in the investigation.**

- **This is in the form of tables and charts.**

- **You can also use photographs or drawings to show the information you gathered, but pictures do not replace the data.**

# DATA

- To collect your data you will follow your step by step directions exactly.

- You will complete at least 3 trials and record the information in your log.

- You will use the data to create a data chart.

# DATA

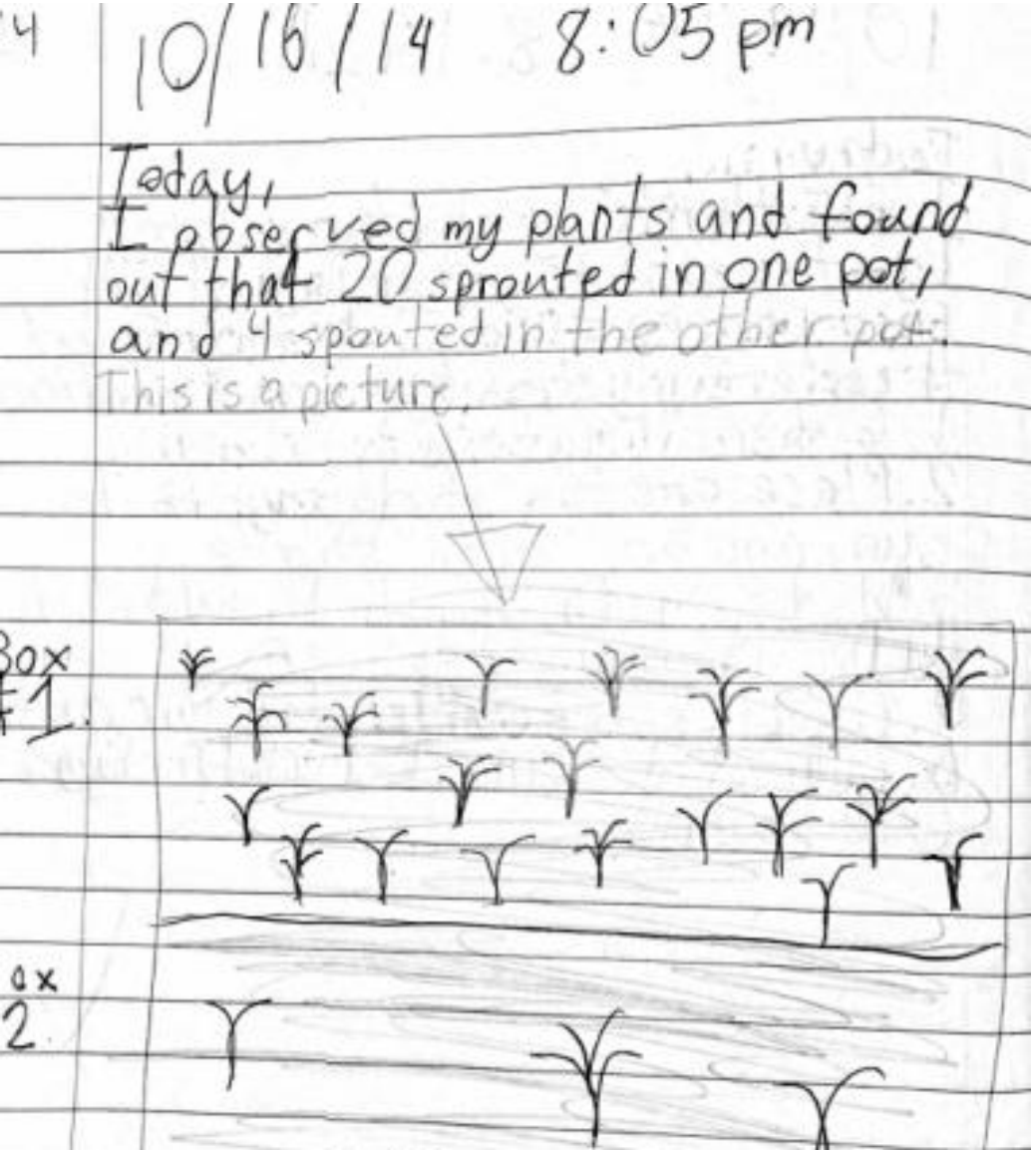
The more trials you do, the more accurate the results of your experiment will be.

Scientists often repeat experiments thousands of times.

# Distance a toy car will Roll in Meters

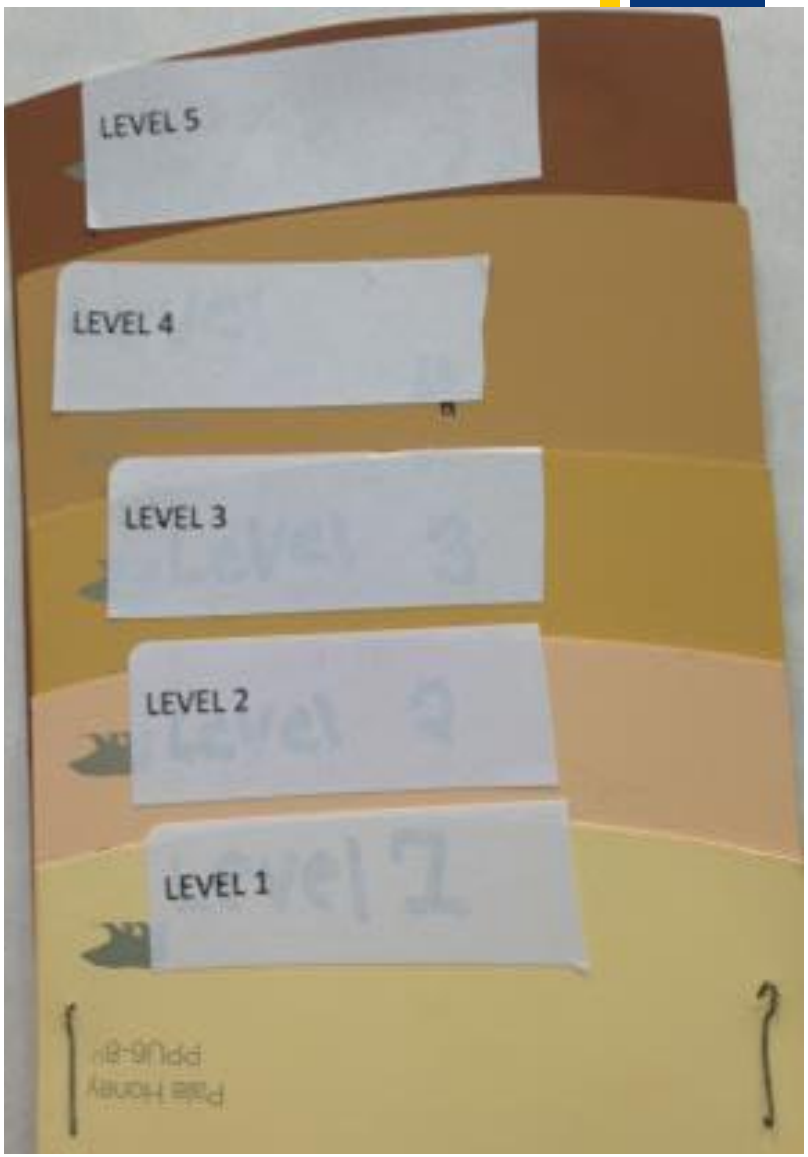
| Trial | Tile Floor | Carpet | Sidewalk |
|---|---|---|---|
| Trial 1 | 4.3 | 2.4 | 2 |
| Trial 2 | 4.4 | 2.7 | 2 |
| Trial 3 | 3.5 | 1.8 | 1.8 |
| Trial 4 | 4.5 | 2.8 | 2.5 |
| Trial 5 | 4.8 | 2.5 | 1.6 |

# + Data Collection

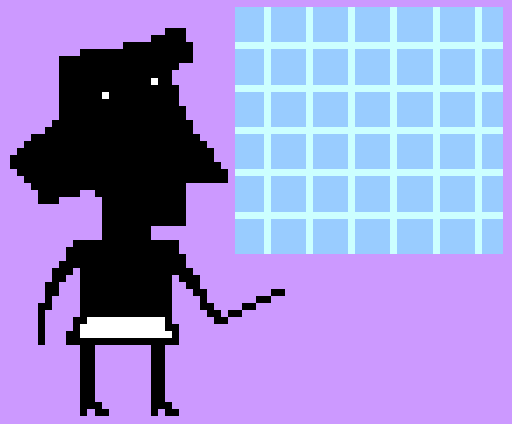



| | Trial 1 Time: 9:39 am-10:09 am | Trial 2 Time: 10:10 am-10:40 am | Trial 3 Time: 10:41 am-11:11 am | Time 4 Time: 11:12 am-11:42 am | Trial 5 Time: 11:43 am-12:15 am |
|---|---|---|---|---|---|
| Outdoor Weather Conditions | Windy Partly Cloudy 80°F | Windy Partly Cloudy 82°F | Windy Partly Cloudy Did not see the sun much during this time | Windy Partly Cloudy | Sunny Really Windy The top fell off the pizza box oven |
| Pizza Box Oven | 82°F | 82°F | 83°F | 91°F | 91°F |
| Parabola Oven | 82°F | 82°F | 84°F | 95°F | 92°F |

# Data Collection

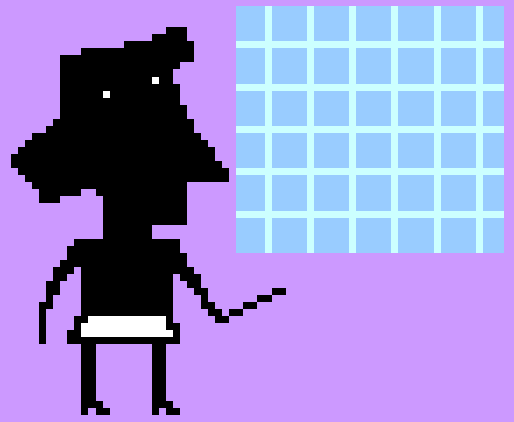
# Graph



Use a bar graph or line graph to display data.

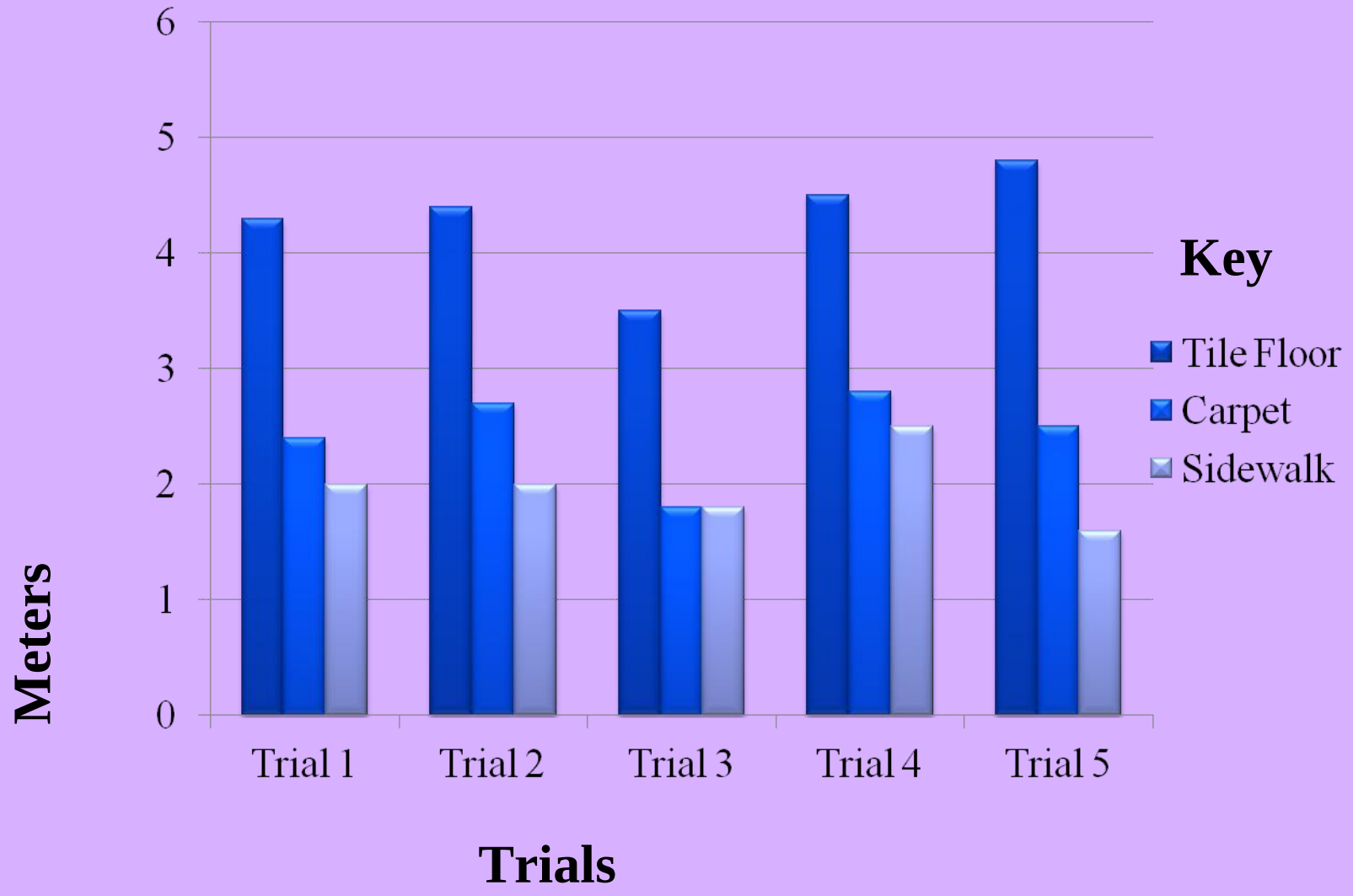
**This is the same information gathered and already recorded on your data chart.**

# Graph



- A bar graph – shows comparative data.
- A line graph – shows data over time (such as growing plants).
- Horizontal Axis: The manipulated variable (what you changed on purpose) is displayed on the horizontal axis.
- Vertical Axis: The responding variable (what happened as a result of what you changed) is displayed on the vertical axis.

# Distance Toy Car Travels When Rolled Down Ramp Onto Various Surfaces



# Data & Graphs

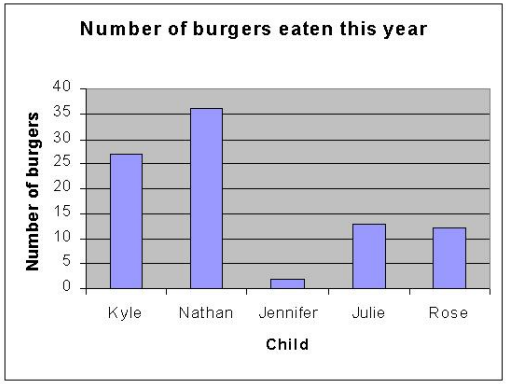
Data

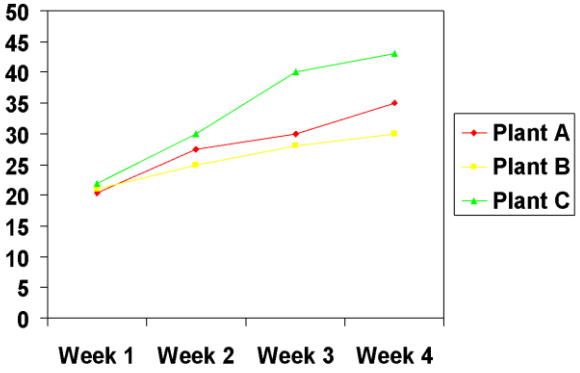
- Chart or a Table
- 5 or more trials

| BRAND NAME | Trial 1 *(ml)* | Trial 2 *(ml)* | Trial 3 *(ml)* | Trial 4 *(m)* | Trial 5 *(ml)* |
|---|---|---|---|---|---|
| Bounty | 2 | 3 | 4 | 2 | 3 |
| Super | 3 | 2 | 1 | 3 | 1 |
| All Natural | 3 | 3 | 3 | 2 | 3 |
| Clean Sweep | 4 | 2 | 3 | 4 | 4 |

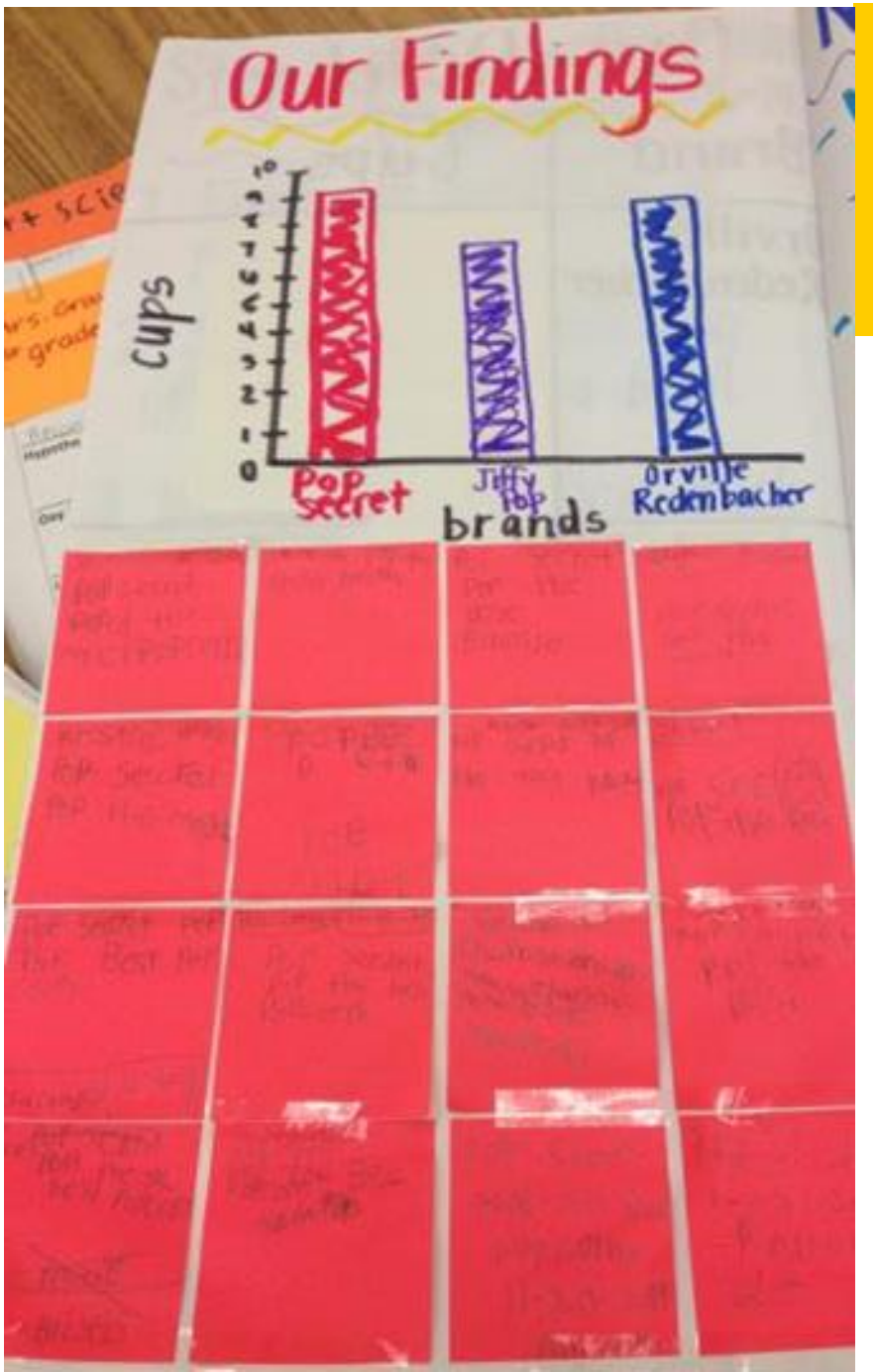
Graphs

Graphs are an organized way to display the data collected during the experiment.



# + Graph


Our Findings
cups
Pop Secret
Jiffy Pop
Orville Redenbacher
brands

# Conclusion

The analysis of the data as it relates to the original hypothesis. It should:

- Reference their Hypothesis
- Be Data Focused
- Be Comparative
- Be Reflective
- Have Implications

# CONCLUSION

My hypothesis was supported (or not supported) by the data. (Explain)

I found out that…

If I were to do this project again, I would change…because…..

The way this is connected to the real world is…

# CONCLUSION

A problem I had or unusual event was….

Describe your data in detail. What does your data mean?

Compare the results with your background information.

Explain why the experiment is important.

# Conclusion

My hypothesis was supported, the parabola oven did show higher temperatures than the pizza box oven. I think this is because the parabola oven was open and the pizza box oven was closed. The parabola oven had more reflecting material than the pizza box oven.

Collecting data was tough because, it was extremely windy outside and the ovens would not stay in place, therefore I had to tape them down. It was a partly cloudy day when I started the trials, during the fourth trial the sun stayed out longer creating higher temperatures for both ovens. During trial five a gust of wind blew the top off the pizza box oven, so I added two additional minutes to the time for both ovens.

This project could be useful to campers, survivalists, during natural disasters, and to kids that are not allowed to use the kitchen oven. Food can be cooked if left in the sun long enough in order to survive, not use electricity, or not cause danger.

If people started using Solar Energy Powered Ovens to cook, the energy crisis of the world would get better because the sun is a natural, renewable resource.

This projected is an extension of my project last year, solar cars. I know that living in Florida we have a lot of sunny days and using this energy would help our environment.

The next time I do this project I would use a Parabola oven and keeping it outside for a longer period of time.

# My Title

## Purpose

## Hypothesis

## Procedure:

### Materials

### Variables

### Step-by-Step Directions


## Data

| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
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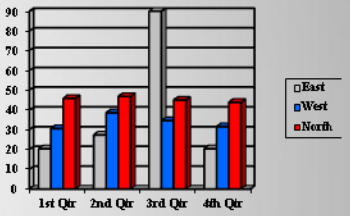
## Graph




## Conclusion

Optional: Model that fits inside the space of your trifold board.

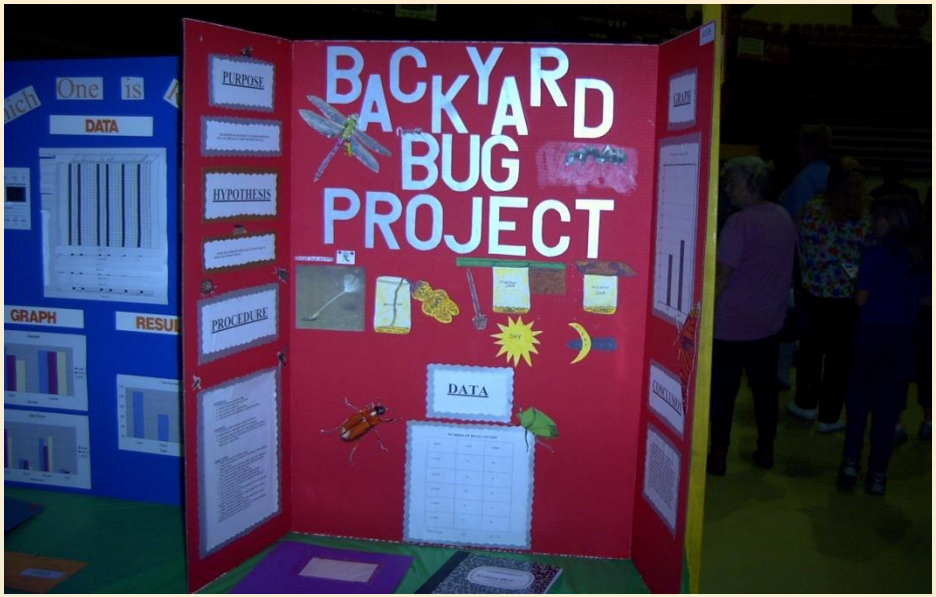
## Data Log

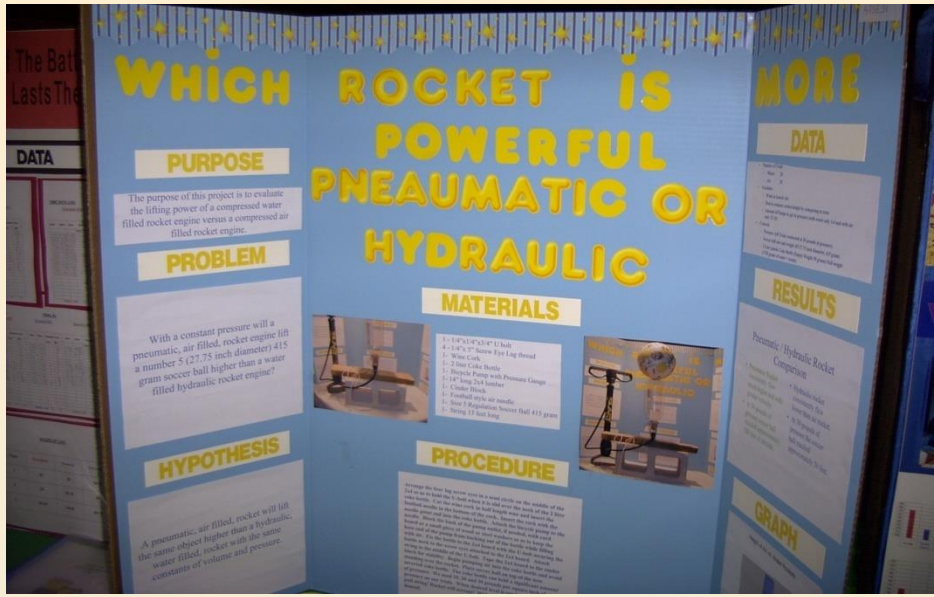
# DRAWINGS OR PHOTOGRAPHS

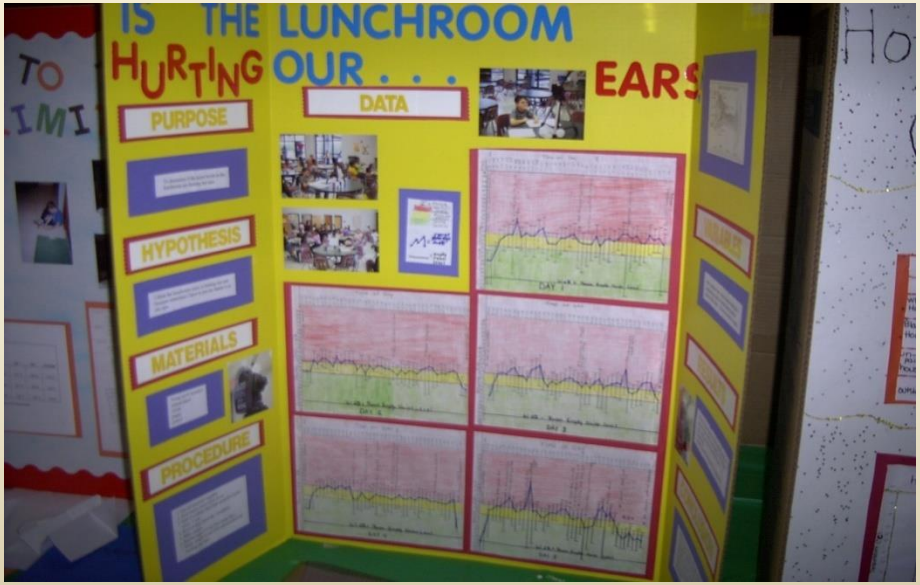
– Photographs and drawings are an excellent idea.

# Show what you have learned…



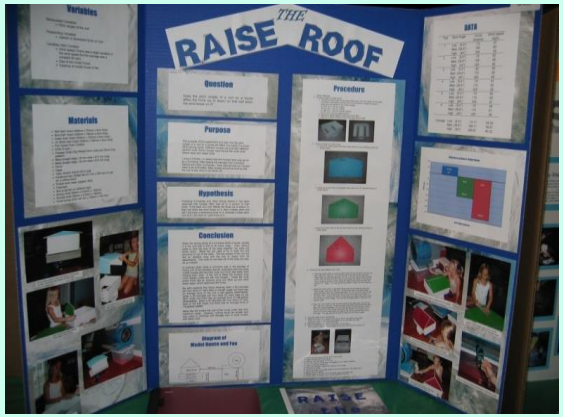

BACKYARD BUG PROJECT
PURPOSE
HYPOTHESIS
PROCEDURE
DATA
DAY
DATA
GRAPH


WHICH ROCKET IS MORE POWERFUL PNEAUMATIC OR HYDRAULIC
PURPOSE
The purpose of this project is to evaluate the lifting power of a compressed water filled rocket engine versus a compressed air filled rocket engine.
PROBLEM
With a constant pressure will a pneumatic, air filled, rocket engine lift a number 5 (27.75 inch diameter) 415 gram soccer ball higher than a water filled hydraulic rocket engine?
HYPOTHESIS
A pneumatic, air filled, rocket will lift the same object higher than a hydraulic, water filled, rocket with the same constants of volume and pressure.
MATERIALS
PROCEDURE
DATA
RESULTS
GRAPH


IS THE LUNCHROOM HURTING OUR . . . EARS
PURPOSE
DATA
HYPOTHESIS
MATERIALS
PROCEDURE
DAY 1
DAY 2
DAY 3


PURPOSE
WHAT BRAND OF ADHESIVE BANDAGE WORKS BEST?
POTHESIS

# Displays




- Display boards must be durable and self-supporting.
- Display boards must be100 cm tall, 122 cm wide, and 40 cm deep.
- All display boards/models need to have the student's first/last name and class.
- Models can be included if they fit within the center section of the trifold board.
- Photos are great!
- Dead animals, plants, and food may NOT be part of display.
- Projects involving human blood, mold, or fungus are prohibited.
- Glass items are not to be displayed.

# Ineligible Projects

- Projects involving human blood, body parts including hair, teeth, nails, or pathogenic agents (bacteria, mold, viruses, fungi, parasites) are PROHIBITED!
- Yeast is the exception and is approved.
- Projects involving weapons of any kind are PROHIBITED!

# How Can Parents Help?

- Let your child do the project.
- Assist your child in gathering the materials she/he needs.
- Assist your child in experimentation and/or data collection.
- Ask your child about their project nightly.
- Be supportive and encourage them to do their best.