The National Student Research Center
http://yn.la.ca.us/nsrc

E-Journal of Student Research:

Science

http://youth.net/nsrc/sci/sci.index.html

INDEX

The National Student Research Center
E-Journal of Student Research: Science

Volume 8, Number 3, January, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: Wheat or White - Which Bread Molds Quicker?

STUDENT RESEARCHER: Matthew Meyer
SCHOOL: Mandeville Middle School
Mandeville, LA 70448
GRADE: 5th
TEACHER: Cherie Erkel, MED.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I want to do a scientific research project to see if Bunny Bread molds faster than wheat bread if placed in a Ziploc bag. I think that the wheat bread will mold the fastest in a Ziploc bag.

II. METHODOLOGY:

First, I wrote my statement of purpose and hypothesis on bread

and mold. Then I did my review of the literature on molds, breads, and fungi. Next, I wrote my methodology. The materials I used were a pencil, paper, three pieces of white bread, three pieces of wheat bread, and six Ziploc bags. After gathering the materials, I then placed the three pieces of white bread and the three pieces of wheat bread each in six separate Ziploc bags. Next, I closed the Ziploc bags and placed them on the counter in the kitchen. I then observed the bread daily and noted changes. After the experiment was completed, I then wrote my analysis of data, summary and conclusion, and application.

III. ANALYSIS OF DATA:

Neither the white bread or the wheat bread molded after twenty days. Both types of bread got hard around the edges, but stayed soft in the middle. Both types of bread were cracking and crumbling in some areas.

IV. SUMMARY AND CONCLUSION:

I found out that the white and wheat bread did not mold after twenty days. Therefore, I reject my hypothesis which stated that the wheat bread will mold the fastest in a Ziploc bag.

V. APPLICATION:

I can apply my findings to the real world by telling my family, friends, and relatives that wheat and white bread will not mold in a Ziploc bag for at least twenty days. I will advise them to use Ziploc bags when making sandwiches for lunches or picnics. This will help prevent molding for at least twenty days.

Title: At What Temperature Will Yeast Work Best?

STUDENT RESEARCHER: Laura Williams
SCHOOL: Mandeville Middle School
Mandeville, LA 70448
GRADE: 5th
TEACHER: Cherie Erkel, M.Ed.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I want to find out at what temperature yeast will dissolve and make foam. I think it will dissolve and foam at 108 F.

II. METHODOLOGY:

First, I chose my topic. Next, I wrote my statement of purpose and hypothesis. Then I researched yeast for the review of literature. I decided how I would test the yeast. I gathered the materials that I would need. The materials were: three glasses, water, dry yeast, sugar, measuring spoons, measuring cup, a timer, two thermometers a spoon, and a ruler.

To perform the experiment, I placed one cup of water that measured 78 F in each of the three glasses. I added one tablespoonful of sugar and 1/2 of a teaspoonful of yeast to each glass. Then I stirred the contents of each glass with the spoon to help the yeast and sugar dissolve. I set the timer for 40 minutes and checked the yeast mixture every five minutes to see if foam appeared. I measured the height of the foam with the ruler. I recorded my results. I also let the yeast mixture stand longer than 40 minutes to see if the foam was still growing. I repeated the procedure above two more times with water at temperatures of 110 F and 130 F (three trials at each temperature). I recorded the results.

Ill. ANALYSIS OF DATA:

The first set of glasses contained water at 78 F. The second set contained water at 110 F. The third set of glasses contained water at 130 F I averaged the height of the foam in each glass at that temperature every five minutes for 40 minutes. After 40 minutes, the foam began to collapse.

Average Height (In Inches) of Foam
(3 trials at each temperature)

	5min.	lOmin	l5min	20min	25min	30min	35min	40min
78 F	No	No	No	No	No	No	No	No
110F	No	1/8	3/16	1/4	1/4	3/8	5/8	11/16
130F	No	No	1/8	3/16	3/16	3/8	3/8	3/8

The cold water (78 F) did not allow the yeast to dissolve completely and did not make foam. The warm water (110 F) allowed the yeast to dissolve and made the highest height of foam at about 40 minutes. The hot water (130 F) allowed the yeast to dissolve and made foam. The foam was not as high as the warm water.

IV. SUMMARY AND CONCLUSION:

I found that yeast activates at about 110 F and works the best at a warm temperature. I accept my hypothesis that yeast would work the best at 108 F.

V. APPLICATION:

This information could be used for baking bread, wine making, beer making, cancer research, making ethanol for fuel, decomposing waste, and cleaning oil spills.

Title: Will Different Densities Effect the Speed of a Clay Ball Falling In Liquid?

STUDENT RESEARCHER: Alex Dessens
SCHOOL: Mandeville Middle School
Mandeville, LA 70448
GRADE: 5th
TEACHER: Cherie Erkel, MED.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I want to know if the density of a liquid effects the speed at which a clay ball will fall in liquid. My hypothesis states that the density of a liquid will effect the speed a clay ball falls.

II. METHODOLOGY:

First, I gathered the materials. Second, I poured 30 ounces of corn syrup, 30 ounces of vegetable oil, and 30 ounces of water in measuring cups the same size. Then, I dropped three clay balls of the same circumference and weight in the three liquids. I timed the clay balls falling, using a stopwatch from when the clay ball hit the liquid to when it hit the bottom of the container. I repeated this procedure three times. Then I recorded the data.

III. ANALYSIS OF DATA:

Results of the trials were as follows:

Water:

Trial 1 = 47 hundredths of a second
Trial 2 = 47 hundredths of a second
Trial 3 = 50 hundredths of a second

Vegetable Oil:

Trial 1 = 62 hundredths of a second
Trial 2 = 59 hundredths of a second
Trial 3 = 66 hundredths of a second

Corn Syrup:

Trial 1 = 19.40 seconds
Trial 2 = 20.00 seconds
Trial 3 = 19.10 seconds

The average speed of the clay ball in water was .48 seconds. The average speed of the ball in vegetable oil was .6233 seconds, and the average speed in corn syrup was 19.50 seconds.

IV. SUMMARY AND CONCLUSION

I found out that the denser the liquid, the slower the ball falls. I therefore accept my hypothesis which states that the density of a liquid will effect the speed at which the clay ball falls.

V. APPLICATION

I now know that the denser the liquid, the slower something falls in it. If you are at a dunking booth and you get to pick the liquid you want to dunk someone in, pick a less dense liquid, because if you don't, they might not get their hair wet.

Title: Testing Gravity's Effect on Falling Objects

STUDENT RESEARCHER: Jill Honeycutt
SCHOOL: Mandeville Middle School
Mandeville, LA 70448
GRADE: 5th
TEACHER: Cherie Erkel, MED.

I. STATEMENT OF PURPOSE AND HYPOTHESIS

I want to know if objects of different weights and sizes fall to the ground at the same rate due to the force of gravity. I will be measuring the time it takes for various objects to fall to the ground from a defined height. My hypothesis states that all objects will fall to the ground at the same rate of speed due to the earth's gravitational force.

II. METHODOLOGY

First, I wrote my statement of purpose and hypothesis. Next, I gathered my materials, searching for common objects with different shapes, sizes, and weights. Materials I plan to use are a penny, a shoe, a pencil, a book, a paper clip, and a tennis ball. Next, I'm going to drop two objects at the same

time, one light and one heavy, from my balcony, which is 15 feet from the ground. I will record the rate of the fall using a stopwatch for each. I will repeat this experiment 3 times, record my data, and apply findings.

OBJECT (average)	TEST #1 (seconds)	TEST #2 (seconds)	TEST #3 (seconds)
SHOE (1.04)	1.00	1.07	1.04
PENCIL (1.03)	1.00	1.04	1.05
BOOK (1.05)	1.05	1.04	1.07
PENNY (1.05)	1.06	1.04	1.04
TENNIS BALL (1.03)	1.03	1.05	1.01
PAPER CLIP (1.06)	1.05	1.06	1.06

III. ANALYSIS OF DATA

My first observation was made dropping a heavy object (shoe) and a light object (pencil) at the same time from a height of 15 ft. from the ground. Both objects appeared to hit the ground at the same time. I repeated this with the book and the penny and the ball and the paper clip. All objects appeared to hit the ground at the same time. To see if this observation was correct, I dropped each object three separate times from 15 ft. and recorded the time necessary to reach the ground using a stopwatch. The average times for each object were as follows: shoe = 1.04 seconds, pencil = 1.03 seconds, book = 1.05 seconds, penny = 1.05 seconds, tennis ball = 1.03 seconds, and paper clip = 1.06 seconds. The attached chart shows the times of each object and their average time.

IV. SUMMARY AND CONCLUSION

In my experiment, I found that all objects regardless of size or weight fell to the ground at the same rate. The average times for each object were only slightly different with a range of 1.03 seconds to 1.06 seconds. This difference of .03 seconds could be explained by error by the observer timing each object. I accept my original hypothesis that all objects fall to the ground at the same rate due to the earth's gravity.

V. APPLICATION

This information can be useful in predicting the rate of any falling object. More importantly this information is useful to scientists who are constantly trying to defy the laws of gravity

on earth.

Title: Effects of Cold on Worms

STUDENT RESEARCHER: Kelsey Larsen
SCHOOL: Mandeville Middle School
Mandeville, LA 70448
GRADE: 5th
TEACHER: Cherie Erkel, MED.

I. STATEMENT OF PROBLEM AND HYPOTHESIS:

I would like to know if cold temperatures on a worm would effect the condition of the behavior and/or body of the worm. I think the cold will have an effect on the behavior and/or appearance of a worm.

II. METHODOLOGY:

First, I studied the behavior and appearance of my worms. Then I took two worms. I put them in a cylinder container (about 5 1/2" from top to bottom and 13 1/2" around) and filled the container half full with soil from my backyard. I put the container in my refrigerator and left it there for eight hours at 34 Fahrenheit. After those hours, I took the container out and waited for a half an hour because all worms are 'hibernating' in cold temperatures. I then recorded data on the worms (different color, strange behavior, etc.). I did this twice more. Then I did exactly the same procedure with only a change from the top of the refrigerator to the bottom (40 F). I did this three times, recording the data each time. Materials used: twelve worms, three (3) cylinder containers, a refrigerator, soil, and something to record data on.

III. ANALYSIS OF DATA:

34 F. top shelf of refrigerator

Test one
Worm one - quite slow movement, translucent
Worm two - moved slowly when touched, same coloring, blister

Test two
Worm one - appeared dead, no movement, lighter
Worm two - stretched out, moved same as before, blister

Test three
Worm one - moved slowly, translucent, pale green blister

Worm two - same movement, darker than before

40 F. bottom crisper drawer

Test one
Worm one - same behavior as before refrigerated, more translucent, lost some color
Worm two - moved same as before refrigerated, appearance same

Test two
Worm one - went to the top of the container, blister on muscle in middle of body
Worm two - stayed in same place, color a little darker

Test three
Worm one - moved faster than before refrigerated, went to bottom of container, same coloring
Worm two - somewhat sluggish, same color

Most of the worms in the 34 degree temperature were slower and moved in a sluggish manner. The worms in the 40 degree temperature were mostly the same as before. Some worms had a blister on them after the experiment and I don't know if that is a plain symbol of coldness on a worm's body or if the worms were sick.

IV. SUMMARY AND CONCLUSION:

I found that worms are affected by cold in behavior and body a small bit. According to my research, colder temperatures affect the worms more unless they were raised in cold temperatures. Therefore, I accept my hypothesis.

V. APPLICATION:

This information could be useful in fertilizing soil. It may be too cold for worms to live in (or strange blisters might affect worms) so it would be nice to know how much coldness affects a worm.

NOTE: All worms were released to habitat (backyard) after the experiment. None were seriously harmed.

Title: Which Material Is More Flame Resistant?

STUDENT RESEARCHER: Roger DeSanti
SCHOOL ADDRESS: Mandeville Middle School

Mandeville, Louisiana 70448
GRADE: 5
TEACHERS: Cherie Erkel, M.Ed.

I. STATEMENT OF PURPOSE AND HYPOTHESIS

I would like to do a scientific research project on which material (silk, cotton, wool, or flannel) is more flame resistant. Once I find the results, I will know which material will be best to use for bed spreads and sheets so if there is a fire at night, people will have better protection against the flames. My hypothesis states that silk will be more flame resistant than wool, cotton, or flannel because it has a tighter weave so less air will fuel the flame. Wool, cotton, and flannel all have a nap that I believe helps to catch the flame, but silk is smooth and the flame should pass over it more easily.

II. REVIEW OF LITERATURE

I am testing four types of material (cotton, flannel, silk, and wool) to find out which one is more flame resistant. Cotton is a very important fiber used for making clothes. It is very comfortable to wear because it keeps you cool. Flannel is made from wool, cotton, synthetic fibers or a blend of these. It keeps you warm and is soft. Silk is a material made from the threads of a silkworm spinning a cocoon. It is the strongest natural fabric. It keeps you cooler and drier than most other materials in the summer. In the winter silk keeps you warm because it is woven tighter. Wool is the hair that grows on sheep. It is cut off and made into thread that is woven into fabric. There are a lot of different kinds of wool. It is a very warm, absorbent fabric that lasts for a long time. Most wool is heavy and feels rough.

The American Burn Association has listed some facts about flame resistant and non flame resistant materials. Flame resistant materials, like polyester, do not catch fire with small flames like a match. It will shrivel away from the flame. When they do catch fire, flame resistant materials will burn slowly and will stop burning all by themselves when the flame is taken away. Non flammable resistant material, like cotton and cotton blends, will ignite with a small flame. The flames will spread rapidly. This material continues to burn even when the flame is taken away.

These four materials will be tested with a blowtorch. The heat level of a blowtorch is about the same as the flames of a bigger fire. A fire needs three things: oxygen (natural air), heat (a match to light the blowtorch), and fuel (the material I have chosen).

III. METHODOLOGY

First, I gathered all my materials:

3 pieces of silk (9 cm. by 9 cm.)
3 pieces of flannel (9 cm. by 9 cm.)
3 pieces of wool (9 cm. by 9 cm.)
matches
blow torch
metal tongs
2 stop watches
pencil
data collection form
fire pit or fire place

Next, I got a parent and went to the fire pit. I held a piece of silk between the tongs over the fire pit. I lit the blowtorch and put the flame on medium (about a two-inch flame). I touched the flame to the material at one corner. I left the flame on the material until it caught on fire. I timed how long it took to catch on fire. Then I pulled the blowtorch away from the silk and timed how long the silk continued to burn. I recorded all the data on my data collection form. I repeated this process two more times using a piece of cotton and then flannel. I then repeated the whole experiment using all three materials two more times for a total of three tests. I averaged the ignition and burn times for each of the three materials.

IV. ANALYSIS OF DATA

Flannel ignited in an average of 1.54 seconds and burned completely in an average of 32.08 seconds. Flannel was easy to flame and burned steadily without any other heat source. Silk ignited the fastest with an average ignition time of .95 seconds. But the silk did not burn. It melted as long as the blowtorch (or heat source) was on it. As soon as the blowtorch was removed the flame went out and the material quickly stopped melting in an average of about 2.15 seconds. Wool took the longest to ignite with an average of .65 seconds. It burned for an average of 3.49 seconds, burning very little of the wool, but more of the cotton stitching along the edge.

V. SUMMARY AND CONCLUSION

In all, wool performed the best with a slow ignition time and not much damage to the sample during the burning time. Silk did not flame, but it did melt which can cause a lot of damage to your skin. The flannel had the worst performance, igniting easily and burning until the whole sample was gone. I therefore reject my hypothesis which stated that silk will be more flame resistant than wool or flannel.

VI. APPLICATION

To connect this to the real world, you could use wool blankets on your bed for protection in case of a house fire. Even if you don't like to sleep with wool blankets, you should keep some in the closets to use as protection if you ever need to escape a house fire. People who sit around a campfire or in front of a fireplace will be better protected from sparks if they are wearing wool clothing. A wool mat in front of fireplaces will help protect the floor from igniting with sparks that fly from the fire.

Title: Troy's House of Flowers

STUDENT RESEARCHER: Troy Huguet
SCHOOL: Mandeville Middle School
Mandeville, LA 70448
GRADE: 5th
TEACHER: Cherie Erkel, MED.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I wanted to find out what type of water would make a marshmallow plant bloom best. I will be testing the plant with fresh water, salt water, and sugar water. My hypothesis states that I feel the marshmallow plant will bloom the most when watered with fresh water.

II. METHODOLOGY

First, I wrote my statement of purpose and hypothesis. I gathered information on plants and their growth. I wrote my review of literature. Next, I gathered the materials necessary for my experiment. I bought nine marshmallow plants in identical containers. I recorded the height and condition of each plant. I made salt water and sugar water by boiling water and adding each substance to the boiling water. I cooled the sugar water and salt water and placed them in separate clean containers. I watered three of the plants with 1/3 cup of sugar water two times per week. I watered three of the plants with 1/3 cup of salt water two times per week. I watered three of the plants with 1/3 cup of fresh water two times per week. After each watering, I recorded the height and condition of each plant.

The materials used for this experiment were: nine marshmallow plants, nine plastic containers, a 1/3 measuring cup, salt water, sugar water, fresh water, pencil, paper, and a measuring tape.

III. DATA ANALYSIS

The plants watered with salt water drooped during the first week. During the second week, the salt water plants died. Sugar water killed one of the plants during the second week and one during the third week. The last sugar water plant died during the sixth week. The fresh water plants kept growing and stayed healthy.

IV. SUMMARY AND CONCLUSION

I found out that fresh water is the best water to use for plants to grow and bloom. I accept my hypothesis because the fresh water plants bloomed the most.

V. APPLICATION

Others could use this information to grow a healthy floral garden.

The National Student Research Center
E-Journal of Student Research: Science

Volume 8, Number 4, February, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: The Effect Of Jumping On A Horse Rider's Heart Rate

STUDENT RESEARCHER: Melissa Marechal
SCHOOL ADDRESS: Lycee Jean Auguste Margueritte
Place Galland 55100 VERDUN
France
GRADE: 11
TEACHER: Miss Guerin Valerie

1) STATEMENT OF PURPOSE AND HYPOTHESIS

The heart can speed up and slow down its pumping action depending on the needs of the body. It's easy to count the pumping or pulse. You just have to feel the heartbeat at one of the pulse points around your body: the neck, the crook of the arm, the back of the knee, the front

of the ankle, and the wrist. The pulse is where the arteries throb as waves of blood are pumped through different parts of our body.
I would like to find out if a horse rider's heart rate is changed before jumping and after jumping. My hypothesis is that greater amounts of activity will increase the heart rate.

2) METHODOLOGY

With the help of some of my riders' friends, I checked the accuracy of my hypothesis by placing two fingers lightly along the side of their neck, near from their throat to count the beats of their pulse for 15 seconds. I repeated the experiment 3 times on each rider before they jumped and after they jumped.

EQUIPMENT

-a stopwatch.

-horses and their riders.

-a place where riders can jump.

3) ANALYSIS OF DATA:

DATA OF EACH EXPERIMENT FOR 20 RIDERS

Rider	Heart Rate Prior To Jump	Heart Rate Just Before Jump	Heart Rate Just After Jump
1	19	20	26
2	20	23	27
3	19	22	27
4	20	22	26
5	20	23	26
6	18	21	25
7	19	20	24
8	20	23	26
9	19	22	27
10	19	21	25
11	18	20	24
12	18	20	25
13	19	21	26
14	17	21	23
15	19	20	24
16	17	18	24
17	18	22	26
18	17	20	27
19	18	19	24
20	19	20	26
Average	18.65	20.9	25.4

My data show that the heart beats much faster immediately after jumping and also just before jumping.

4) SUMMARY AND CONCLUSION:

The heart speeds up its pumping because the body requires more oxygen during physical activity. Further more, we saw that the pulse also sped up just before jumping because of the fact that the rider was anxious.

5) APPLICATION:
So, riders should try to calm down before jumping. It would help them to concentrate. This advice is suitable for all sports persons, whatever their sport is.

Title: The Effect of B12 Vitamin On Mice's Metabolism

STUDENT RESEARCHERS: Vanessa Neau and Gaelle Metayer
SCHOOL ADDRESS: Lycee Notre Dame
Rue Principale
49310 La Salle de Vihiers
France
GRADE: Lower 6th Form
TEACHER: T. Richard

I. Statement of Purpose and Hypothesis
We have studied the effects of the B12 vitamin on mice's metabolism. We have supposed that a mouse which has absorbed some B12 vitamin has got a respiratory intensity more important than a mouse which hasn't absorbed any B12 vitamin.
II. Methodology
In order to assess the metabolisms of the two mice which have absorbed some B12 vitamin and the metabolism of a mouse which hasn't taken any B12 Vitamin, we have given some B12 vitamin to the 2 first mice with their usual food. The third mouse hasn't take any B12 vitamin, so as to be used as a control mouse. Then we have measured the respiratory intensity of the three mice. We have put the mice in an airtight box for three minutes with a probe used to measure the quantity of dioxygen.
III. Analysis of Data
Our data indicate that the respiratory intensity of the two mice doped with B12 vitamin is over three times higher than the respiratory intensity of the control mouse.
IV. Summary and Conclusion
Having studied the effect of B12 vitamin on mice's metabolism, we have noticed that the mice which have absorbed some B12 vitamin have a respiratory intensity higher than the respiratory intensity of the control mouse. So we can deduce that the B12 vitamin has got some effect on the mice's metabolism. Indeed the B12 vitamin increases respiratory intensity.
V. Application
These experiments have enabled us to notice that the B12 vitamin has got an influence on mice. So we can assume that it has an influence on people.

Title: Effect Of The B12 Vitamin On Mice's Muscular Activity

STUDENT RESEARCHERS: Emilie BAUMARD, Adeline HUMEAU, and Melanie PERIDY
SCHOOL ADDRESS: Lycee Notre Dame
Rue Principale
49310 La Salle de Vihiers
France
GRADE: Lower 6th Form
TEACHER: T. Richard

I. Statement of Purpose and Hypothesis
Mice food is essentially composed of vegetables. So, they can't absorb any B12 vitamin which comes from food of animal origin. We can suppose that a mouse, who has absorbed some B12 vitamin, has got a muscular activity higher than a non-vitamined one.
II. Methodology
We will have 3 mice with nearly similar morphologies, coming from the same family, put in the same cage and fed in the same way. Then 2 of them will be made to absorb 1 mg of B12 vitamin by dilution.
So, we will need 1 mortar for crushing the B12 tablet, 1 pipette, 1 magnetic agitator, and 1 chronometer to measure the duration of the physical effort carried out.
III. Analysis of Data
Have a look at the board summing up the time in seconds when mice have exercised over a 2-minute period:

Mice	Exercising Time (Sec.)
Control Mouse	21.02
"Chipie"	21.16
"Choupette"	24.96

First, we can notice that one of the 2 vitamined mice have really run more than the non-vitamined mouse (21.02 sec. and 21.16 sec. opposed to 24.96 sec.). Consequently, we may say that the B12 vitamin influences the vivacity and dynamism of mice.
IV. Summary and Conclusion
Thus, the B12 vitamin influences the vivacity and dynamism of mice. These results confirm our hypothesis which stated that the vitamined mice have a muscular activity higher than a non-vitamined one.
V. Application
These results can be used to compare with other animals which may react in the same way as these mice when they absorb any B12 vitamin.

Title: The Effect Of Vitamin C On Gerbils

STUDENT RESEARCHERS: Edith Bouet, Thomas Alusse, Laehha Naud, and Lawrence Monnier
SCHOOL ADDRESS: Lycee Notre Dame
Rue Principale
49310 La Salle de Vihiers
France
GRADE: Lower 6th Form
TEACHER: T. Richard

I. Statement of Purpose and Hypothesis
We know the C-vitamin increases human physical activity. We wonder how it acts on gerbils. Our hypothesis is that the C-vitamin does increase their activity.
II. Methodology
To test our hypothesis, we carried out a double protocol:
First, we took a control gerbil which hadn't taken any C-vitamin and another one which had taken C-vitamin a quarter of an hour before we made the experiment. After that, we measured their physical activity for two minutes inside a labyrinth (walking, running, grooming ...).
Second, we took a control gerbil without C-vitamin, three days before we carried out the experiment. We made this second experiment in the same way as the first one.

For the second protocol, we reversed every other week the control gerbil and the gerbil under the effect of the C-vitamin in order to check that one wasn't naturally stronger than the other one.
III. Analysis of Data
First, the control gerbil was active for 44.16 seconds and it covered 25 zones while the gerbil under the effect of the C-vitamin was active for 41.95 seconds and covered 21 zones. The C-vitamin had little effect in a quarter of an hour.
Second, the control gerbil was active for one minute and one second and covered 30 zones. The gerbil under the effect of the C-vitamin was active for one minute and 9 seconds and covered 34 zones. So we can say that the C-vitamin acts on gerbils when taken several days before.
IV. Summary and Conclusion
So the C-vitamin is effective when it is absorbed for a long duration. However gerbils can be naturally strong. Moreover, we assume that the vitamin quantity absorbed wasn't sufficient. That's why the C-vitamin hasn't any effect on a little duration, but the C-vitamin acts on the gerbil when it is taken several days before.
V. Application
Thus, if we want the C-vitamin to have an effect on man, it must be taken for a long duration. But one must ask a doctor to know about the duration of treatment which must be undergone.

Title: **Does Loud Music Affect The Way Students Learn Their Lessons?**

STUDENT RESEARCHER: Solene Platel
SCHOOL ADDRESS: Lycee Margueritte
Place Galland
5510O VERDUM FRANCE
GRADE: 11
TEACHER: Miss Valerie Guerin

I. Statement of Purpose and Hypothesis
Noise can be irritating, even harmful. Heavy traffic at a cross-roads, an aeroplane taking off, even certain kinds of pop music can hurt the ears and give you a headache. I tried to find out if loud music could also affect the way students learn their lessons.
II. Methodology
To investigate the effect of environmental noise on memory, I devised a simple test and I tried it on all the pupils in my class (19 members). To study the effect of noise on memory, I asked my friends to learn a list of words (A) silently and another list (B) in a noisy atmosphere. After that, I questioned them to see how many words they had memorized in each case.
Equipment:

personal stereos and music

a chronometer

2 lists of 10 words each

The experiment, carried out on the 19 students of my class, consisted of:

1. Installing the tested student at a table with a personal stereo on his/her ears.

2. Giving him/her the words of list A, asking him/her to memorize all of them if possible (silent atmosphere).

3. Writing down the number of words memorized 30 seconds later.

4. Switching on the personal stereo, setting the volume on (loud) and repeating the previous steps with the words of list B.

5. 30 seconds later, switching off the personal stereo and writing down the number of words that the student has memorized.

My independent variable is the sound environment. My dependent variable is the number of words memorized. My constants are:

1. The number (10) and the difficulty of the words (current words) given in each list.

2. The duration of memorization (30 sec).

3. The type of music listened to (rock music), its volume (loud).

4. The time allowed for students to remember the words memorized (15 sec).

III. Analysis of Data

NUMBER OF WORDS MEMORIZED

Name of Students	Stereo Off	Stereo On
Romain	10	4
Celia	8	2
Dorothee	9	7
Melanie	7	2
Geoffroy	8	5
Cindy	10	6
Elodie	6	5
Armelle	9	4
Marjorie	6	5
Cecile	9	6
Claire	8	5
Camille	7	6
Amelie	8	6
Frederick	6	7
Laurent	10	6
Mathieu	10	8
Benjamin	4	6
Audrey	9	7
Fanny	8	9
Average	8	5.6

My experiment shows that without listening to music, the students managed to memorize an average of 8 words. With music on, it became particularly more difficult since they just managed to memorize an average of about 5.6 words.
IV. Summary and Conclusion
The results clearly show that loud music affects the capacity of memorization.
V. Application
I think it would be useful to design a little leaflet for students who use personal stereo devices. This leaflet could explain to them that very loud sounds may affect their memory and sometimes cause vibrations which are so important that they forever damage their eardrums.

Title: What's Your Type Of Memory?

STUDENT RESEARCHER: Melanie PRIVE
SCHOOL ADDRESS: Lycee Jean-Auguste MARGUERITTE
13 Place Galland
55100 VERDUN
FRANCE
GRADE: 11
TEACHER: GUERIN Valerie

I. Statement of Purpose and Hypothesis
As the exams are nearing, a lot of pupils wonder whether they should start revising their lessons by reading them or listening to a recording of them. I think that most of them remember their lessons better when they read them.
II. Methodology.
To check my hypothesis, I tried to find out if my school friends were able to remember a list of words when I read them in a loud voice (Hearing Memory) or when they read them themselves (Visual Memory).
Equipment:

Two lists of words (List 1 and List 2).

Variables:

Independent variable - the method of learning.

Dependent variable - the number of remembered words.

Constants:

- the amount (10) and the difficulty of the proposed words in each text.

- the number of listening and reading periods for each list (5 times).

- the time allowed to remember the words (20 seconds).

My experiment, carried out with 33 pupils, was made up of the stages below:

- A loud and a clear uninterrupted reading of List 1 to the pupil lasting 30 seconds (about 5 readings of the list)'

- Making a note of the remembered words.

- Distribution of List 2 with 30 seconds allowed to the pupil to read it.

- Making a note of the remembered words.

III. Analysis of Data
After having completed my experiment, I collected the results in a table and I made a bar graph.

NUMBER OF PUPILS FOR WHOM.....
.....A >> B 4
.....A > B 10
.....A = B 7
.....A < B 10
.....A << B 2
A: Number of remembered words in List 1.
B: Number of remembered words in List 2.
>>: More than 2 words of difference.

The data also show that about 12% of my school friends have a very good hearing memory, about 30% of them have quite a good hearing memory, about 21 % remembered as many words from List 1 as from List 2, about 30% of the pupils have a good visual memory, and only 6% have a very good visual memory
IV. Summary and Conclusion.
This experiment showed that most of my school friends have as much hearing memory as visual memory, which invalidates my hypothesis.
V. Application.
This type of experiment is only testing short-term memory (useful for last-minute revisions!). I think that it would be interesting to complement it by additional research about long-term memory, which is the most required for exams.

Title: The Writing Speed Of Right-handed And Left-handed People

STUDENT RESEARCHER: Dorothee PARE
SCHOOL ADDRESS: Lycee Jean-Auguste MARGUERITTE
13 Place Galland
55100 VERDUN
FRANCE
GRADE: 11
TEACHER: GUERIN Valerie
I. Statement of Purpose and Hypothesis
A widespread idea states that left-handed people are unskillful clumsy and awkward, whereas right-handed people are more dexterous and clever. According to this belief, people think that left-handed people are slower than right-handed people when they are writing.
I would like to find out whether my right-handed friends write faster than my left handed friends. My hypothesis states that there is no real difference between the writing speed of right-handed and left-handed people.
II. Methodology
Equipment-

· a stopwatch

· an unseen document in English (17 lines)

· as many right-handed friends as left-handed friends

Procedure:

1) 1 began by handing out a sheet of paper with the text printed on it to my friends (the printed side was face down on the desk).

2) When they were ready, I pressed the stopwatch on and I said 'Go' ! Then my friends all turned over their sheets at the same time and they started recopying the text.

3) The writers copied out the text as fast as possible.

4) As soon as they had finished, they said 'Stop' ! They put up their hands and I noted their performances on a chart. The writers had to write fast, but legibly.

Parts of the experiment-

· Independent variable: the writing hand (right hand or left hand)

· Dependent variable: the writing speed

· Constants: the text, the writing material (pen and paper), the working conditions (sitting at a desk, in silence)

III. Analysis of Data

Copy Speed Of StudentS
(In Minutes ' and Seconds ")

LEFT- HANDED		RIGHT- HANDED	
Sophie MANGIN	5' 59"	Dorothee PARE	6' 35'
Celine BLANC	6' 24"	Sarah DELANDRE	5' 37"
Celine DUBAUX	6' 50"	Katia BOULANGER	6' 02"
Ophelie PISKORSKI	5' 50"	Jeannine PARE	7' 34"
Claire TRUPCEVIC	6' 03"	Claire MOUROT	6' 11"
Stephanie GROSS	6' 14"	Claire CHENON	6' 42"
Jean-Pierre LANEQUE	8' 13"	Fannie GRANDRIERRE	5' 47"
Florence MERCIER	6' 10"	Melanie PRIVE	6' 18"
Liz ELLIOTT	7' 05"	Dominique PARE	8' 01"
Estelle DIEUDONNE	6' 30"	Laure THIEBAUX	6' 46"
Julie KUTSCHRUITER	6' 10"	Aline WEISS	4' 45"
Guillaume SCHNEIDER	7' 09"	Valerie LECLERC	6' 39"
Mylene PEZEL	5' 47"	Celine FOIN	6' 30"
Berangere BARON	6' 05"	Lucille SCHOCH	6' 05"
Claire PICQUOIN	7' 25"	Valerie GUERIN	6' 07"

Virginie ROGIREL	8' 30"	Alice LEGRAND	6' 41"
Geoffroy BINENDIJK	7' 34"	Romain GUIDERT	5' 18"
Geoffrey DYRDA	6' 42"	Jacques PICARD	10' 02"
Romain NOEL	7' 01"	Michelle PICARD	9' 56"
Edouard BOULANGER	6' 58"	Claudine LANEQUE	9' 56"
Benjamin RONDEAU	5' 48"	Mathieu PANORYIA	10' 14"

I tested 21 left-handed people and 21 right-handed people. My data show that:

1. only one right-handed writer copied out the text in less than five minutes

2. two thirds (14 writers) of my left-handed and right-handed friends spent between 5 and 7 minutes recopying the same document. They all write at the same speed.

3. one third (7 writers) of my left-handed friends spent between 7 and 9 minutes, whereas just 2 of my right-handed friends spent this same time recopying it.

4. four right-handed people wrote the text in more than 9 minutes and 0 left-handed people

IV. Summary and Conclusion
As soon as I have collected all my data, I analyzed them. Then I realized that the graph was almost homogeneous for right-handed and left-handed people.
According to my results, I can affirm that left-handed people write as fast as right-handed people. The performances of the writers prove my hypothesis which stated that there's no real difference between the writing speed of right-handed and left-handed people. So I accept my hypothesis
V. Application
Finally, it's unnecessary to prevent left-handed people from using their left hand. Left-handedness is not a fault since left-handed people can write as fast as right-handed people in accordance with my data.
So my findings can help the parents of little left-handed children who think that left-handed people have more difficulties in school and who worry about them. They are not worse students than right-handed children. It's just a preconception! There's no reason to oblige them to use only their right hand. They can use their left hand to write.
But, another question stays in my mind : do left-handed people write as well as right-handed people? It's another idea of experiment for further research...

Title: **Broken Bones Survey**

STUDENT RESEARCHER: Laure LAMORLETTE
SCHOOL ADDRESS: Lycee Jean-Auguste MARGUERITTE
13 Place Galland
55100 VERDUN
FRANCE
GRADE: 11
TEACHER: GUERIN Valerie
I) Statement of purpose and hypothesis

I would like to find out which bone is most frequently broken in the human body. I suppose that itmust be a particularly breakable bone and exposed to shocks, for example ribs or wrist bones.
II) Methodology
To find the answer to my question, I carried out a sample survey on about a hundred pupils from my school, all in grade 11. They helped me by completing this survey:

> "To help me to conduct my Biology Science Project, I would be grateful if you could complete this questionnaire."
>
> 1. Circle your age: 14 15 16 17 18 19
>
> 2. Circle your sex: M F
>
> 3, Have you ever broken a bone? Yes No
>
> 4. If so, state which one(s) and how many times each ?

III) Analysis of Data
Among the pupils polled, 47% declared they had already fractured one bone (1 boy 3 times and 2 girls 3 times). The bones most frequently broken are, in decreasing order, fingers (30%), the upper arm (27%), wrist (9%), and ankle (8%).
IV) Summary and Conclusion
These results do not confirm my hypothesis since it is finger bones that are most broken. As a matter of fact, phalanxes are particularly exposed in different sports a lot of pupils play in school, such as volley-ball or basket-ball, which explains a high frequency of fractures for this category of bone.
V) Application
I have been amazed to find, in the course of my survey, that very few pupils knew where the main bones were, whilst others thought they did and were often mistaken. A good idea would be to create a poster showing bones, telling pupils the function of bones and how useful they are. It could also explain how we can care for our bones by eating appropriate food as part of our diet.

Title: **It's Better Having Two Eyes!**

STUDENT RESEARCHER: Celia SEYWERT
SCHOOL ADDRESS: Lycee Jean-Auguste MARGUERITTE
13 Place Galland
55100 VERDUN
FRANCE
GRADE: 11
TEACHER: GUERIN Valerie

I. Statement of Purpose and Hypothesis:
I would like to know what is the advantage of having two eyes rather than only one (other than for esthetic reasons). In fact, I think that we could better estimate the distance which separates us from objects when we use both eyes.
II. Methodology:

To check my hypothesis, I tested the precision with which my friends scored basket ball goals using both eyes and with one eye covered.
-MATERIAL USED: basketball, basketball goal, headband to hide eyes
-PROCEDURE: During a basketball training session, I asked my friends to try to score goal successively with:

1) their two eyes opened

2) a headband hiding the right eye

3) a headband hiding the left eye

Everybody took three successive shoots each time (that is to say nine shootings all in all for each player).
In this series of experiments:
The independent variable was the hiding one of the two eyes.The dependent variable was the exactness of shooting (goal scored or not).The constants: distance separating the player from the goal (2.5 m), the type of ball used for everybody, the skill level of the players in basketball, approximately identical.
III. Analysis of Data:
My data show that most of my friends have better results when both their eyes are open. 92% succeed when they haven't a headband, only 37% succeed when they have their right eye hidden, and 55% succeed when they have their left eye hidden.
THE EFFECT OF HIDING AN EYE ON THE EXACTNESS OF THE SHOOTING

Eye Hidden or Not	Goals: Trial 1	Goals: Trial 2	Goals: Trial 3	Average	Performance (%)
Without Headband	22	27	27	25	92%
Right Eye Hidden	10	11	10	10	37%
Left Eye Hidden	12	14	15	14	55%

IV. Summary and Conclusion:
The results of my experiment were plain: most of my friends had a lot of difficulty adjusting their aim when they had an eye hidden (either the left eye or the right eye). I conclude that only the use of our two eyes lets us judge distances correctly.
V. Application:
I would like to expand my study by trying to determine if for a right-handed person (respectively left-handed) it is more constricting to have the right eye or the left eye hidden.

Title: How To Sow Seeds?

STUDENT RESEARCHER: Melinda Sor
SCHOOL ADDRESS: Lycee Prive Externat Notre-Dame
Grenoble, France
GRADE: 6 (French Grade 1)
TEACHER: Jean Peyrard

I. Statement of Purpose and Hypothesis:
I suppose that the density of sowing influences the germination of seeds and different flowers beds.
II. Methodology:
I have collected 10 cm pots, soil and sand, tomatoes, peas and radish seeds.
I made different sowings of seeds with different densities. I made a squaring in a mould and I planted a seed in each intersection. Then I covered them with compost and I watered them. I left them to germinate for four weeks in a tepid room.
III. Analysis of Data:
I calculated the density of sowing while dividing the number of sowed seeds by the surface used (in sq. dm). I achieved the following results:

Seeds	Group	Density	% Issue	Results
tomato	1	1, 2/dm2	50%	significant
tomato	2	3, 3/dm2	50%	significant
tomato	3	8/dm2	38%	significant
tomato	4	20/dm2	62%	significant
Peas	1	3, 2/dm2	91%	non significant
Peas	2	4/dm2	100%	non significant
Peas	3	9/dm2	89%	non significant
Peas	4	40/dm2	100%	non significant
radish	1	2, 6/dm2	100%	non significant
radish	2	7/dm2	76%	non significant

The rate of issue is the rate of seeds which have grown. I can see that some results are not significant: the divergence between densities are not sufficiently important.
IV. Summary and Conclusion:
In regard to the significant results, I can say that all the plants don't react in the same way. In tomatoes, a high density of seeds seems to increase the rate of germination.
V. Application:
It is important to know the ideal density of sowing for a plant in the agricultural practice to obtain the best produce.

Title: **Dental Survey**

STUDENT RESEARCHER: Romain HENRY
SCHOOL ADDRESS: Lycee Jean Auguste MARGUERITTE
13 Place Galland
55100 VERDUN
FRANCE
GRADE: 11
TEACHER: Miss Valerie GUERIN

I. Statement of Purpose and Hypothesis:

Very few of my friends have perfect teeth. I tried to know why some have good teeth and other not. My hypothesis was that dental health is related to their dental habits. To test my hypothesis, I asked them some questions concerning their dental hygiene.

II. Methodology:

To show the presence of plaque I used the red dye erythrosin. First, I asked each student to rub a little Vaseline on their lips to prevent them from being stained by the dye. Then I gave a disclosing tablet (containing erythrosin) to suck. After they washed out their mouth with water, I examined their teeth and estimated the surface of plaque (stained red areas).

My questionnaire gathered the following information:

1. Number of teeth with filings.
2. Number of extracted teeth.
3. Number of visits to the dentist last year.
4. Number of times you clean your teeth each day.
5. Average number of sweets you eat each day.
6. Number of times you changed your toothbrush since six months.

III. Analysis of Data:

THE INFLUENCE OF THE DENTAL HYGIENE ON THE TEETHING STATE

No. of Stains	Q1	Q2	Q3	Q4	Q5	Q6
12	7	17	4	0	5	0
15	3	0	5	1	2	0
13	5	8	10	16	4	13
0	4	1	6	12	11	6
0	6	3	0	1	8	2
0	2	1	2	0	0	1
0	3	0	3	0	0	3

IV. Summary and Conclusion:

Dental hygiene is important to prevent tooth decay. We can see that if people had a better dental hygiene they shouldn't have so many problems and they would have beautiful teeth. If you pay attention to your teeth, they will take care of your smile.

V. Application:

To improve their teeth, students should: reduce the number of sugary foods and sweet drinks, brush their teeth and gums regularly with a fluoride toothpaste, change their toothbrush as soon as the bristles become soft and bent, and visit the dentist regularly to have their teeth and gums checked

The National Student Research Center
E-Journal of Student Research: Science

Volume 8, Number 5, March, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: Taking Movies to Heart

Student Researcher: Jennifer Oberg
School: Shepherd Elementary
Shepherd, Montana
Grade: 6th grade
Teacher: Mrs. Joni Peterson

I. Statement of Purpose and Hypothesis:

Will the speed of the human pulse change as a reaction to viewing different types of movies scenes?

II. Methodology:

1. Making sure they were age appropriate, I took different movie scenes, each three minutes long and put them together on one videotape. The scenes were violent, scary, happy, funny and calming:

a. Violent - Jurassic Park and The Shining
b. Scary - Jurassic Park and Cliffhanger
c. Happy - Sound of Music and Lilies of the Field
d. Funny - Bean and Rocketman

2. I got the parental permission of 6th grade students to participate.
3. I asked 6th graders what they are allowed to watch at home and what kind of movies they like.
4. Then the transmitter was strapped around the student's chest and the receiver on the wrist.
5. After that, I instructed the student to get comfortable and to not talk or move while viewing the video. I discovered that moving and talking affected the pulse rate.
6. The student then viewed the movie and I watched the pulse receiver during each scene to see if it changed.
7. The highest and lowest pulse rate for each scene was recorded.
8. I then compared the pulse rates of each student and graphed the results.

III. Analysis of Data:

The pulse rates rose while watching funny, violent and scary scenes, but dropped while watching happy and calm scenes. Although the pulse rate changes, it did not change enough to pose a threat to ones health.

Please note the following high and low pulse rates for each student.

Student #	Low	High	Difference
1	90	103	13
2	78	129	51
3	66	96	30
4	66	75	9
5	62	95	33

Student #4 is allowed to watch some rated R movies and likes scary movies the best. As you read my table you will realize that this student has only a 9-point difference between the high and the low pulse rate, this was the smallest difference.

IV. Summary and Conclusion

The student with the highest pulse rate is student #2 who also had the largest difference between the high and the low. The student's favorite kind of movie is comedy and least favorite is violent, this student is also able to watch R rated movies.

I partially accept my hypothesis. I said that violent and scary movies would have the greatest effect on your pulse rate. While the violent and scary movies did produce a high pulse rate, the

funny scenes had the greater effect. The other half of my hypothesis was correct, happy and calm scenes did have the lowest effect on the pulse rate.

I believe those students who watch a lot of violent and scary movies will not react to them. Therefore, their pulse rates will not increase as much as a student who doesn't watch violent and scary movies.

V. Application

You can watch any movie and your pulse rate won't rise or lower so much that it will put a threat to your heart rate.

Title: How's It Going?

Student Researcher: Josh Greenfield
School: Shepherd Elementary
Shepherd, Montana
Grade: 6th grade
Teacher: Mrs. Joni Peterson

I. Statement of Purpose and Hypothesis:

The purpose of this experiment is to figure out which surface the Hot Wheels car will go faster on. I think the car will go fastest on the plywood surface.

II. Methodology:

1. Make a ramp out of plywood.
2. Buy a Hot Wheels car.
3. I used the following surfaces to test the Hot Wheels car on: green drawer liner, plywood, carpet, both sides of a tablecloth and sandpaper.
4. Ask someone to assist you, give them the car and tell them to hold onto it until you tell them to let go.
5. On go, start the stop watch and record until the car comes to a complete stop. Hit the stop button
6. Record results.

III. Analysis of Data:

The car on the plywood went 0.59 seconds, the drawer liner went 0.60 seconds, the sandpaper went for 0.64, the blue side of the tablecloth went for 0.66 seconds, the white side for 0.68 seconds, and the carpet went for 2.5 seconds.

IV. Summary and Conclusion:

The Hot Wheels car went fastest on the plywood surface, therefore my hypothesis was correct. The flat surface of the board gave more surface area for the car to ride along.

V. Application

This is helpful information for tire companies to know to make

tires for different surface. I plan on sharing this information with Mr. Peel, our school's director of transportation. The school's buses have a problem with tires wearing out too soon and I think this information
could save the district money.

Title: Evaporating Water

Student Researcher: Desarae Lynch
School: Shepherd Elementary
Shepherd, Montana
Grade: 5th
Teacher: Mrs. Yvonne Rome

I. Statement of Purpose and Hypothesis:

The reason I'm doing this is to see which kind of water evaporates faster, plain water, sugar or salt. I think the salt water will evaporate faster.

II. Methodology:

1. I gathered all my materials together.
2. I labeled the three glasses.
3. I put equal amounts of water in the three glasses.
4. I put 1 teaspoon of salt in the glass that said salt and stirred until dissolved.
5. I put 1 teaspoon of sugar in the glass that said sugar and stirred until dissolved.
6. I sat the glasses on a shelf.
7. I measured the amount in each glass and recorded amounts.
8. I kept track of the water for 2 weeks each day with a ruler. Each time I measured I recorded the amount left in each glass.

III. Analysis of Data:

I did a graph illustrating the two weeks measurements.

IV. Summary and Conclusion:

The plain water evaporated first and then the sugar water and finally the salt water.

V. Application

I would share this with homeowners because if they would want to attract hummingbirds then they would want to use sugar water.

Title: Hey Look, Wind

Student Researcher: Lorene Knowlen
School: Shepherd Elementary
Shepherd, Montana

Grade: 5th
Teacher: Mrs. Yvonne Rome

I. Statement of Purpose and Hypothesis:

Does wind change direction? I think that the wind changes its direction everyday.

II. Methodology:

I took a paper cup, a board, and a pencil with an eraser, a pin, two shapes and a straw. I taped the cup to the board. Then I took a pencil with an eraser and put it through the cup. Then I pushed the pin into the middle of the straw and pushed the pin through the eraser. Finally, I taped the shapes to the end of the straw.

III. Analysis of Data:

The wind direction can change in just a few hours, as I had observed with my creation.

IV. Summary and Conclusion:

Wind is air pressure and warm air takes the place of cold air. The is just moving the air around.

V. Application:

This information would help the Shepherd community because the farmers need to know the wind direction in order to properly cover the haystacks with tarps.

Title: How Does Barometric Pressure Affect The Temperature?

Student Researcher: Greg McClure
School: Washington Woods Middle School
Holt, Michigan
Grade: 6
Teacher: Mrs. Barbara Lindquist,

I. Statement of Purpose and Hypothesis:

I wanted to find out how barometric pressure affected the weather. Barometric pressure is how the air presses down or atmospheric pressure. By looking at the pressure I thought you would be able to know what the temperature, humidity, and precipitation would be like. My hypothesis stated that you could not predict the weather by barometric pressure readings by themselves.

II. Methodology:

I first thought of a way to record my data. I then watched the weather channel at 7:30 am each morning for one week to get the barometric pressure and temperature readings. After I got all

of my information I prepared my data using line graphs. I then compared the results.

III. Analysis of Data:

I saw on my graphs that barometric pressure and temperature are related. When the pressure went up the temperature went down. The clouds, though, may make a small difference. The clearer the night sky, the colder the day will be.

IV. Summary and Conclusion:

As the barometric pressure got higher the temperature got lower. I have concluded that you can predict the temperature by the barometric pressure. Therefore, I reject my hypothesis.

V. Application:

NowI know that you can predict the temperature by looking at the barometric pressure. If my other investigations go the same, I could tell the weather just by looking at the barometric pressure. Also if you were tracking for a very long time you may be able to see trends like global warming.

Title: Will Different Fluids Affect The Way You Think?

Student Researcher: Greg Rudawski
School Address: Washington Woods Middle School
Holt, MI 48842
Grade: 6
Teacher: Barbara Lindquist, M. A.

I. Statement of Purpose and Hypothesis:

I wanted to find out more about the way different drinks affect the way you think. My last experiment was done with foods; now I would like to see if fluids will have the same effect. My hypothesis states that the orange juice would help you get more accurate answers and a faster answer time than water. I think that because orange juice has more nutrients than water.

II. Methodology:

I first read the nutritional value labels on the orange juice and on the water bottle. They clearly state that water has no nutrients, but orange juice does.

Every day after I get home from school (about 4:15 PM), I'll drink six ounces of orange juice or water (measured in a measuring cup). Next, I'll set the timer on the stove for 15 minutes and wait. After the timer goes off, I do 15 math problems like 7x6x7 mentally. I'm timed by a wrist watch (digital watch). Then I'll wait a couple of hours and repeat the process.

When I was doing this experiment, and after I drank the juice or water, I was not allowed to eat or drink anything else. I could

eat after the fifteen minutes was up and I had completed the test. Then the information was typed upon a computer. This experiment was done over an eight day period.

III. Analysis of Data:

The data showed that the average number of correct problems for orange juice was 13.142 and the average for water was 13.125. Therefore the accuracy for orange juice was higher than the accuracy of water. The average time for orange juice was 5:6:28. The average time for water was greater at 6:26:8. This means my hypothesis was correct. Orange juice helped me process information faster and more accurately than water.

IV. Summary and Conclusion:

I accept my hypothesis. I found out that orange juice was more accurate and faster than water but not by much. The orange juice was only .640 faster than water and . 017 more accurate. Some limitations in my study were that I only tested orange juice 7 times and water 8 times, and I could have done it longer. Another limitation is that I didn't only drink orange juice and water, I ate fruits and other foods during the day.

V. Application:

I learned not to drink water before taking a math test, but to drink orange juice and eat many other nutritional foods. So I advise people who go to school to eat nutritious food to help them get better grades. My findings may make school a little bit easier for someone who is having trouble with their school work.

Title: Will Turtles Be Attracted To A Different Type Of Food?

Student Researcher: Jeff Fritts
School Address: Washington Woods Middle School
Holt, M 148821
Grade: 6
Teacher: Barbara Lindquist, M. A.

I. Statement of Purpose and Hypothesis:

I wanted to find out more about how my turtle would react to a different type of food. My hypothesis stated that I didn't think that he would react well to any other food then his "Wordley" reptile food.

II. Methodology:

First, I took my turtle and a bowl which measured about seven and one fourth by nine inches. I filled the bowl with about one inch water. I put the turtle in with a meal worm and the next day I did the same thing, but I put a piece of ground sirloin meat in the bowl. I did it again ,but put a piece of turtle food from the store. The worm, meat, and food pieces were all about one inch in size. I used a timer to see which thing he

would eat the fastest.

III. Analysis of Data:

The turtle ate the worm and the meat very fast for a turtle. The store bought stuff took longer to eat because it kept falling apart.

IV. Summary and Conclusion:

I found out that he still likes the store bought stuff, but likes meal worms and raw meat also. I rejected the hypothesis because he did like the new foods and ate them quicker than the "Wardley" reptile food.

V. Application:

Someone might find a turtle in a street or a stream. The best thing to do is to leave it alone, but if it is injured, feed it some worms or ground sirloin meat.

Title: What Molds Fastest And What Molds The Most In Ten Days?

Student Researcher: Samantha Schrauben
School Address: Washington Woods Middle School
Holt, MI 48842
Grade: 6
Teacher: Barbara Lindquist, M. A.

I. Statement of Purpose and Hypothesis:

I wanted to find out more about mold. Food and other substances mold if they are left someplace too long. I wanted to know if the texture and/or softness of a material mattered in what molded first and more. I wanted to know if a piece of bread or a cracker would mold the fastest and the most. My hypothesis stated that the piece of bread would mold fastest and first because of it's texture and because it is much softer than a cracker. Crackers are crunchy and I don't think crunchy things would mold quite as fast as soft things.

II. Methodology:

I tested my hypothesis by putting a piece of bread and a cracker into a small shoe box and I covered it with some plastic wrap and taped it to the bottom of the box. I then put it into a small and dark closet where it stayed for ten days. I checked it every now and then and looked to see what had happened and if any mold had appeared.

III. Analysis of Data:

When I checked the bread and cracker throughout the ten days I found that neither one of them had any mold on them. The bread appeared to be very hard and kept getting harder every day that I continued to check it. The cracker, on the other hand, appeared to be pretty much the same; nothing had really changed.

The bread or cracker were not very edible and would not taste good if you took a bite out of one of them.

IV. Summary and Conclusion:

Neither the bread or the cracker molded after the ten days. I thought that the bread would mold in the first or the second day. Neither one of them molded, so my first question can't be answered. My hypothesis was rejected. Nothing molded. I think that this happened because no air got to the bread or the cracker and it might have something to do with being in the dark.

V. Application:

I learned that things don't always mold in a short period of time, but they do get hard. I also learned that if you have some bread sitting out for a few days it probably won't mold, but it will be a little hard and might not taste too great. This information might even help you know if you should still eat a piece of bread in a few days or if it is no good and should be thrown out.

Title: Which Paper Airplane Design Will Fly the Best?

STUDENT RESEARCHER: Scott Schultz
SCHOOL ADDRESS: Washington Woods Middle School
Holt, MI 48842
GRADE: 6
TEACHER: Barbara Lindquist, M. A.

I. STATEMENT OF PURPOSE AND HYPOTHESIS

I wanted to find out more about how paper airplanes fly. Specifically, I wanted to discover if my design would fly the best. My hypothesis stated that my design would travel the farthest.

II. METHODOLOGY

First, I gathered my materials. My materials were: paper, pencil, poster board, book on paper airplanes, and a ruler. Then I made airplanes. Then I threw each one and measured how far they went.

III. ANALYSIS OF DATA

After my investigation, I found that I need a new design. My graphs and charts show that winglets are the best. Therefore, my hypothesis was rejected. My design traveled the shortest distance.

IV. SUMMARY AND CONCLUSION

In summary, I learned that I need a new design. If I did this over, I would do the following things differently: make a new design.

V. APPLICATION

What I learned can affect the world because it could help people design airplanes that fly better.

Title: How Well Do Dogs Smell? Can Dogs Smell Better Than Me?

Student: Kris Kline
School: Washington Woods Middle School
Holt, Michigan

Grade: 6
Teacher: Mrs. Lindquist

I. Statement of Purpose and Hypothesis:

I wanted to know more about a dogs ability to smell. My hypothesis stated that a dog can smell better than me.

II. Methodology:

To test my dogs smelling ability, I put together a varying types of sealed container of varying difficulty and timed how long it took the dog to find dog treat. I used cheese treats for the positive reward.

III. Analysis of Data:

For the containers I used 1) basket up side down, 2) cracker box, 3) a lunch box, and 4) cardboard box.

1. First container was basket turn upside down with a treat. It took Shadow 4 seconds to find the treat.

2. Second container was a cracker box with a cheese treat. It took Shadow 15 seconds to find the treat.

3. Third containers was a playing card box. It took Shadow 6 seconds to find the treat.

I then test myself, being blind folded to see if I could find the cheese with my noise.

1. First container was basket upside down with cheese treat. I picked the wrong basket and it took me 60 seconds to make my choice.

2. Second container was a cracker box with the cheese treat. I picked right, it took me 70 seconds.

3. Third container was a playing card box with the cheese treat. It took me 60 second to make my choice and I was wrong.

IV. Summary and Conclusion:

Shadow had three right picks with an average of time of 7. 5

seconds each. I had one right pick with an average time of 63 seconds. My conclusion is that dogs seems to have a better sense of smell.

V. Application:

I think this is why we see so many dog today working at airports looking for drugs. We also see many dogs looking for lost people because of their the sense of smell.

Title: Where Dust Collects Most In My House

Student Researcher: Josh Looman
School Address: Washington Woods Middle School
Holt, MI 48842
Grade: 6
Teacher: Barbara Lindquist M. A.

I. Statement of Purpose and Hypothesis:

I wanted to find out where the most dust collects in my house. My hypothesis stated that I thought my basement would collect the most dust because of the furnace which circulates air from all over the house. Some dust would be in that air.

II. Methodology:

The materials I used were: 3" by 5" index cards, Vaseline, and a Popsicle stick. First, I took the index cards and put the Vaseline on the Popsicle stick and then I spread the Vaseline on the index cards. Then I put the cards in all thirteen rooms of my house and let them set for a week in a half.

III. Analysis of Data.

My graph shows the rooms and how much dust was in that room. My data showed that there was more dust in the basement like I predicted.

IV. Summary and Conclusion:

I found out that my basement collected the most dust because of the air circulation. I accepted my hypothesis.

V. Application:

I learned that most basements have a lot of dust because of the air circulation with the furnace. If you have allergy's and an unfinished basement you should put a dust trap or two in your basement. This would make the world better if you have allergies.

Title: Which Cookie Sheet Bakes Cookies Fastest: Brick,

Aluminum, Or Stainless Steel?

Student Researcher: Marcy Herwaldt
School: Washington Woods Middle School
Holt, MI 48842
Grade: 6
Teacher: Barbara Lindquist

I. Statement of Purpose and Hypothesis:

I wanted to find out more about how cookies bake. I wanted to see which cookie sheet would bake chocolate chip cookies the quickest. My hypothesis stated that the cookies would bake quickest on the stainless steel cookie sheet because that's the kind my family uses mostly.

II. Methodology:

First, I came up with my question. Next, I got three cookie sheets: a brick, a stainless steel, and an aluminum. Then I set the oven to 375 degrees Fahrenheit and mixed the dough. I put three cookies on each of the trays and put them in the oven. I set the timer for ten minutes per tray and timed every extra minute after that they took to bake.

III. Analysis of Data:

When I baked the cookies I found that the aluminum tray baked quickest. The cookies on that tray took nine minutes to bake. On the stainless steel tray the cookies took eleven minutes to bake. The cookies on the brick took the longest amount of time to bake. It took them fifteen minutes.

IV. Summary and Conclusion:

I found that cookies baked on the aluminum tray baked faster than the cookies baked on the stainless steel tray or the brick. At first, I thought that the cookies would bake quickest on the stainless steel tray. Now, after conducting this experiment I found my hypothesis to be incorrect and actually they bake fastest on the aluminum tray.

V. Application:

I think that you can learn from my experiment. I think it proves that you need to try new things. It shows that you're not always correct and need to try different things to find an answer.

The National Student Research Center
E-Journal of Student Research: Science

Volume 8, Number 6, April, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: Do Plants Breathe, Too?

Student Researcher: Jeffrey Sonnenberg
School: Washington Woods Middle School
Holt, Michigan
Grade: 6
Teacher: Mrs. Barbara Lindquist

I. Statement of Purpose and Hypothesis:

I wanted to find out about the effects of air pollutants on a plant's ability to breathe. To live, plants take two gases from the air. They use carbon dioxide to make food by a process called photosynthesis and they use oxygen as fuel for the energy that helps them breathe. Now I want to see how a plant reacts when air pollutants are present. My hypothesis states that I could affect a plant's ability to breathe and grow by exposing air pollutants to different areas of a plant's leaves.

II. Methodology:

To test my hypothesis, I took three bean plants of the same size and placed them on a windowsill so they would all get the same amount of sunlight and temperature. I labeled the plants "A", "B", and "C." I rubbed petroleum jelly on the topside of all the leaves on Plant A, on the underside of all the leaves on Plant B, and left Plant C as it was. I watered the plants every other day with one ounce of tap water. I measured the height of the plants and observed the leaf coloring every seven days for 28 days.

III. Analysis of Data:

After 7 days, Plant A grew 1/4 inch, Plant B grew 1/8 inch, and Plant C grew 1/2 inch. The coloring of the leaves showed no difference.

After 14 days, Plant A had grown another 1/8 inch, Plant B another 1/12 inch, and Plant C another 1/2 inch. The coloring of the leaves of Plant A were a lighter green, the leaves of Plant B were beginning to curl under and be wilted and had a yellowish tint to them, and the leaves of Plant C were a deep dark green.

After 28 days, Plant A had grown another 1/8 inch, Plant B showed no growth, in fact, the leaves were curled under and had wilted below the edge of the pot, and Plant C had grown another 1/2 inch. The coloring of the leaves of Plant A were a pale green, the leaves of Plant B were brownish/yellow, and the leaves of Plant C stood tall and were a deep dark green.

IV. Summary and Conclusion:

In summary, Plant C continued a steady rate of healthy growth, plant A continued to grow, however, at a slower unhealthy rate, and Plant B showed little growth and began to die. I concluded that a plant's ability to breathe and grow is affected by the exposure of pollutants to different areas of its leaves. I found out that air enters the plant through the stomata on the underside of the leaves. When the air is polluted, not allowing the plant to breathe through the stomata, photosynthesis cannot take place and the plant dies. When an air pollutant covers the top of the leaves of a plant, photosynthesis is slowed down, the plant grows very little, is unhealthy, and would also die after awhile. I accept my hypothesis. I was able to affect a plant's growth be preventing it from breathing by applying an air pollutant to specific areas of a plant's leaves.

V. Application:

In my study, I learned that without plants, animals and human beings could not live. Plants provide us with food, oxygen, medicines, building materials, candy, drinks, industrial products, and paper. The effects of air pollutants on plant life affects everything. When the life cycle of plants is endangered by air pollutants, when forests and plant life in certain areas are torn up or destroyed, we are affected as well. It is very important for every human being to do whatever they can to reduce air pollution and protect plant life on this earth of ours.

Title: Which Freezes Faster?

Student Researcher: Ian A. Coburn
School Address: Washington Woods Middle School
Holt, MI 48842
Grade: 6
Teacher: Barbara Lindquist, M. A.

I. Statement of Purpose and Hypothesis:

My question is how fast do two different liquids freeze. I wanted to find out more about liquids turning into solids. My hypothesis is that the orange juice will freeze faster and would take about 1 1/2 hours for the orange juice to freeze.

II. Methodology:

I conducted my experiment by filling two glasses with two different liquids. Milk and orange juice were the two liquids. Each glass was filled up three-quarters of the way up. Each glass was placed into the freezer at 12:00 noon. The glasses had about 6 to 8 inches of space all around. Every half-hour to an hour I took a look at the glasses. When one of the glasses looks frozen and could be tipped over without spilling, I recorded the time and let the glasses sit out for a while until they were defrosted and started the experiment again.

III. Analysis and Data:

In the second experiments that I conducted I found that the orange juice froze first. This tells me that the orange juice must have a lot of water in it so the orange juice will solidify faster. My bar graph shows that in the first experiment, both liquids froze at the same time. My hypothesis was not too far off on the second try.

IV. Summary and Conclusion:

I concluded that the orange juice overall will freeze faster. I think I can accept my hypothesis because the orange juice froze at 1 1/2 hours. One limitation was the milk supply because we were almost out so I had to cut back on the amount limiting the orange juice to 75% of a glass. Another limitation was the space in the freezer.

V. Application:

People will know what temperature to set the refrigerator when keeping milk in it. Because doing this experiment will tell people what temperature it freezes at.

Title: How Long Does It Take For Helium Molecules To Seep Out Of A Balloon?

STUDENT RESEARCHER: Sam Hardy
SCHOOL ADDRESS: Washington Woods Middle School
Holt, MI 48842
GRADE: 6
TEACHER: Barbara Lindquist, M. A.

I. STATEMENT OF PURPOSE AND HYPOTHESIS

I wanted to find out more about balloons. Specifically, I wanted to discover how long it took for the molecules to seep out of the latex balloon. My hypothesis stated that it would seep out in 20 hours.

II. METHODOLOGY

First, I gathered my materials. My materials were: a latex light balloon filled with helium and a measuring tape. Then I measured the circumference of the balloon each day for one week.

III. ANALYSIS OF DATA

After my investigation, I found that most of the helium had escaped from the balloon by the end of one week. My graphs and charts show each day of the week that I measured the balloon. After one day, the balloon had fallen to the floor, but it was still mostly full. The circumference had only decreased by 2 inches. Each day, the balloon got smaller. But it took a week until it was almost flat. Therefore, my hypothesis was incorrect.

IV. SUMMARY AND CONCLUSION

In summary, I learned that the latex balloon wouldn't float for very long, but it still kept most of its size. If I did this over, I would try to keep the temperature the same because when I took the balloon outside it got smaller. I would use more than one balloon.

V. APPLICATION

My findings can help people because I learned that latex balloon don't last that long. They keep their size for a few days, but they don't stay floating long. If you need balloons to stay up for more than one day, latex balloons aren't a good idea.

Title: Do Certain Liquids Have Fat In Them?

Student Researcher: Meghan Montville
School: Washington Woods Middle School
Holt, MI
Grade: 6
Teacher: Mrs. Lindquist

I. Statement of Purpose and Hypothesis

I wanted to find out if certain liquids have fat in them. My hypothesis stated that milk would have fat in it. Orange juice with calcium would not have fat in it and caffeine free Sprite would have fat in it.

II. Methodology

I developed my question from a science fair I went to. The lady there did one liquid and I wanted to find out if other liquids had fat in them. First, I put milk on a smaller plate so that it covered the entire bottom of the plate. I then put four colors of food dye in separate areas of the milk. I then got a toothpick and dipped in some dish soap. I put the toothpick in dish soap because the soap will repel the fat in a liquid. The food coloring in the liquid will spread out with the fat when I put the toothpick with dish soap in the food dye. I didn't put much dish soap on the toothpick, just enough so that it covered the tip of it.

III. Analysis of Data

I did my experiment two times with the milk and I also did my experiment with orange juice and Caffeine free Sprite. The soap and food coloring in the milk expanded a lot more than it did with the orange juice and Sprite. (I also learnedthat you have to use lighter liquids with this experiment otherwise you can not see the food coloring.)

IV. Summary and Conclusion

The food coloring expanded because the milk does have fat in it. Milk has fat in it because it comes from an animal and animals have fat on and in them. In my experiment, I used liquidsthat we use almost everyday. If I did the same experiment with other liquids that come from animals, I am sure I will find the same results. So I accept my hypothesis that milk has fat in it.

V. Application

Now I know that milk has fat in it and why it does. You should drink at least a glass of milk everyday for strong, healthy bones. Milk has good things in it, too. Such as calcium and vitamins that make it harder for us to break our bones.

Title: What Kinds Of Liquids That We Drink Contain Acids Or Alkalis?

Student Researcher: Tiffany Heuhs
School: Washington Woods Middle School
Holt, Michigan
Grade: 6
Teacher: Mrs. Barbara Lindquist

I. Statement of Purpose and Hypothesis:

I wanted to find out more about acids and alkalis because my mom

just found out she is allergic to them. Through some research, I found out that acids and alkalis are two important groups of chemicals. They are dangerous when they are strong but weaker kinds are found in lots of everyday things including food and drinks. Now I want to find out what kinds of liquids that we drink contain acids and alkalis. My hypothesis states that milk and Diet Coke will contain an alkali and that lemonade and orange juice will both contain an acid. Mineral water will have neither an acid nor an alkali. Mineral water will be neutral.

II. Methodology:

After I developed my statement of purpose, I read up on my acids and alkalis experiment. Before I began my experimenting, I had to make an acid indicator from a red cabbage. I boiled 1/2 a red cabbage cut up in water and used a strainer to collect the cabbage water. I poured the cabbage water into two ice cube trays and put them in the freezer to make ice cubes out of them. I filled five tall glasses, one with Diet Coke, one with milk, one with lemonade, one with orange juice, and one with mineral water. I dropped two indicator ice cubes into each glass and observed the liquids.

III. Analysis of Data:

The Diet Coke turned a dark purple color. The milk turned a very light purple color. The lemonade tamed a very bright reddish - pink color. The orange juice turned a cloudy reddish - pink color. The mineral water turned a purple color.

IV. Summary and Conclusion:

What I learned from my research for this experiment is that if the liquid turns the acid indicator a reddish - pink color, then it is an acid. If the liquid turns a blue - green color, then it is an alkali. If the indicator stays purple, the liquid is neutral and is neither an acid nor an alkalis.

In my experiments, the lemonade and the orange juice contained an acid since they both turned a reddish - pink color. Nothing turned a blue - green color so none of the liquids contained an alkali. The Diet Coke, mineral water, and milk all turned a purple color so they were neutral and did not contain an acid nor an alkali. Therefore, I had to reject part of my hypothesis. I thought that the Diet Coke and milk would both contain an alkali but they were neutral. I have accepted my hypothesis for the orange juice (acid), lemonade (acid), and the mineral water (neutral).

V. Application:

Now I know a few kinds of liquids that we drink that contain acids, such as lemonade and orange juice. I learned from my family doctor that even though the acids found in these two liquids are weaker kinds of acids, some people are sensitive to them and may actually have a reaction if too much is digested at once. The most common reactions are cancer sores in the mouth and stomach aches. From this, I know that some people need to be careful with what they choose to drink and that they need to make healthy choices for themselves.

Title: Will Plants Grow Faster In The Morning Or Afternoon Sun?

Student Researcher: Tyler Holtz
School Address: Washington Woods Middle School
Holt, MI. 48842
Grade: 6
Teacher: Mrs. Barbara Lindquist

I. Statement Of Purpose and Hypothesis

I wanted to find out if plants would grow better in the morning or in the afternoon sun. I planted marigolds. Then I put two cups in my sister's room in the morning sun and two in the afternoon sun. I wanted to prove that it might matter where you plant your plants. My hypothesis stated that the plants in the afternoon sun would grow faster.

II. Methodology:

I got four cups. I put three fourths of a cup of potting soil in each one. I put two marigold seeds in each cup. Each cup received the same amount of water, one eighths of a cup. Each cup received the same amount of fertilizer, one fourths of a teaspoon. I grew them for 27 days. They sprouted in eight days after I planted them. I fertilized them every 9th day.

III. Analysis of data:

I put two cups in the morning sunlight and two In the afternoon sun and treated them the same. They both sprouted at the same time. But, the afternoon plants are growing higher and faster. The ones in the afternoon sun have four leaves and the morning only three.

IV. Summary and Conclusion:

I found that the ones in the afternoon sun grew the most. My analysis shows that if you grow them in the afternoon sun they might be bigger. I accept my hypothesis because I thought the afternoon sun is up longer.

V. Application:

My findings could tell you that things grow better in the afternoon sun. It could help people grow more crops. It could keep people from starving by growing crops faster.

Title: How Much Of An Ice Cube Will Melt In Different Locations In The House?

STUDENT RESEARCHER: Sarah Smith
SCHOOL ADDRESS: Washington Woods Middle School
Holt, MI 48842
GRADE: 6
TEACHER: Barbara Linquist, M. A.

I. Statement of Purpose and Hypothesis:

My topic is about finding out how 2 equal sized ice cubes will melt in different locationin my home. I wanted to find out more about how fast the ice cubes would melt in the locations I put them in. My hypothesis stated that the ice cube placed in the partial sun would melt faster than the one placed in the kitchen with no sun.

II. Methodology:

I testedmy hypothesis by putting 2 ice cubes in separate cups at the same time. I placed one ice cube in a cup and set it on the kitchen counter where there was no sun at all. I placed the other ice cube in a cup and put it in front of the sliding glass door. It had little to partial sunlight. I waited for one hour to see what the results of my experiment would be. The materials that I used were 2 plastic cups, 2 ice cubes, and one measuring teaspoon.

III. Analysis of Data:

The data that I collected indicated that my hypothesis was incorrect. After waiting for I hour I checked both cups with equal ice in them. I found that the ice cube in the kitchen with no sunlight was melting faster than the one sitting in front of the sliding glass door. I was very surprised to find out thatthe ice cube with no sunlight had melted faster than the one with little or partial sunlight.

Both of the ice cubes, after 1 hour, had still not melted, but one was doing better than the other. My bar graph clearly shows that the ice cube with no sunlight melted faster than the one with partial sunlight.

IV. Summary and Conclusion:

I found out that the ice cube in the kitchen melted quicker because to my surprise the kitchen was a warmer place. My Mother had turned on the oven to bake a cake and the heat was coming out of the oven and making the kitchen warmer. It was melting the ice cube quicker than the other. The other cup with ice in it had also melted, but not quit as much and the one in the kitchen.

I accept my hypothesis knowing now that the heat from the oven was helping melt the ice cube. I didn't plan for this to happen. I really thought that the results would be the other way around than they were.

V. Application:

I've learned that whenever you have a drink with ice cubes in it, you should set it someplace cool where there is no sunlight, but do not set your cup by anything hot like an oven. The ice cubes will melt much faster closer to heat.

I think my study with ice will help people to think about where they might put their cups down, if they want to keep their drinks cold. That way, people can save their ice cubes much longer.

Title: What Are The Sprouting Characteristics Of Certain Types Of Birdseed?

Student: Michelle Nash
School Address: Washington Woods Middle School
Holt, Michigan
Grade: 6
Teacher:Barbara Lindquist, M. A.

I. Statement of Purpose and Hypothesis:

I wanted to find out if the birdseed we use to feed the birds outdoors in the winter would actually grow if I planted them. I also wanted to find out how many of the seeds would grow and what the plants would look like. I wanted to know what the characteristics of the plants would be. I had a time limit of 6 days to make my observations. My hypothesis stated that since they were all seeds, they would all grow.

II. Methodology:

The brand of birdseed is Krislin. The seeds were White Millet, Red Millet, Thistle, Rape Seed, Oats and Canary Grass. I made a miniature green house out of a plastic container. I poured the seeds from the can onto a paper plate and counted out 10 seeds of each type. I placed the 10 seeds on wet folded up paper towels, one for each type and put them in the green house. I sat them on a heat register the first night to keep them warm. I wanted to have 12 hours of sunlight on the seeds. I had to use a plant grow light for the early morning and late afternoon to extend the sunlight. I covered the container to keep the moisture in. I checked the seeds each morning and afternoon to see how they were doing. After the seeds sprouted, I planted some of each type in peat pellets to watch them grow.

III. Analysis of Data:

The first morning, March 16, two of the Red Millet seeds already had a tiny sprout on them. There were no sprouts on any of the other seeds. On the next morning, March 17, all of the Red & White Millet seeds had sprouted, 7 of the Rape Seeds had sprouted. The other four types had done nothing. The Canary Grass seeds sprouted on March 19th.

Some of all the seed types finally sprouted except for the Thistle seeds and the Oats. I continued to keep the new seedlings covered at night to keep them warm until some of them grew too big to be covered.

IV. Summary and Conclusion:

My investigation answered my Central Question about the sprouting characteristics of birdseed. I found that not all of the types of birdseed would sprout in the 6 day time limit. The

Oats actually fell apart. The Thistle seed needed more time. I did determine which kinds would sprout first, how many would sprout and what the seedlings would look like. I also learned about a process called photosynthesis, which makes plants grow.

V. Application

Birdseed is easy to grow, given the right conditions. You could plant some birdseed in the spring and harvest the seeds in the fall. Or you could leave the birdseeds on the plants and let the wild birds eat them during the winter right off the plant. Some of the seeds will fall to the ground and sprout again the next spring.

Title: What Do My Dogs Prefer To Eat?

Student Researcher: Rachel Porter
School Address: Washington Woods Middle School
Holt, MI 48842
Grade: 6
Teacher: Barbara Lindquist

I. Statement of Purpose and Hypothesis:

I wanted to find out more about what my dog likes to eat. The choices are vegetables, apples, dog food, meat, Cheerios, and a half of a donut. My hypothesis states that she will eat the dog food first. This is the order that I think she will eat them in: dog food, apples donut, Cheerios, meat, and then vegetables.

II. Methodology:

I tested my hypothesis by setting vegetables, apples, dog food, meat, Cheerios, and a donut on plates on the floor. We cut the food into small pieces. The dog food was dry. We set the plates in a row. We let her choose what she wanted to eat.

III. Analysis of Data:

For the first time that I tested my dog on what she likes, she ate the foods in a certain order. This is the order that she ate them in: donut, meat, Cheerios, apples, dog food. She did not eat the vegetables.

The second time I tested her she ate them in this order: meat, donut, apple, Cheerios, and vegetables. She did not eat the dog food.

IV. Summary and Conclusion:

I reject my hypothesis. I found out that my dog likes to eat meat and donuts. And that she could care less about vegetables and dog food. I think one of the reasons she did not eat the dog food is because she normally eats the dog food.

V. Application:

The research that I did will help me and my dog. This will make my home a better place for me to live because I won't have to worry about what to buy for treats. My dog will also like it because she likes that treat.

Title: Which Temperature Of Water Freezes Faster: Hot, Warm, Or Cold?

Student Researcher: Jason Bennett
School: Washington Woods Middle School
Holt, Michigan
Grade: 6
Teacher: Barbara Lindquist, M. A.

I. Statement of Purpose and Hypothesis:

I wanted to find out what temperature of water would freeze the fastest under the same conditions. My hypothesis states that cold water will freeze faster than warmer liquid because it is already cold.

II. Methodology:

First, Ilabeled three plastic lunch baggies: H = Hot water, W = Warm water, and C = Cold water. The next thing I did was fill each baggie with exactly 6 ounces of tap water at varying degrees. The hot water was 130 F; the warm water was 100 F; and the cold water was under 100 F. (The exact temperature could not be determined as my thermometer did not go down past 100 F.) I then put the baggies in the freezer on their sides laying flat. The baggies were placed all on the same surfaces in the freezer. I then checked their conditions after every 15 minutes.

III. Analysis of Data:

After the first 15 minutes, condensation appeared on all three baggies. The hot water appeared to have more condensation than the others. After 30 minutes, there was thin, brittleice forming inside all the baggies. All baggies appeared to have the same amount of ice formation. After 45 minutes, the cold and warm water baggies were equal in having the same amount of ice formation. The hot water, although thin ice had formed, was not progressing as fast as the other two. After 60 minutes, the cold and warm baggieswere frozen solid and I could not put my finger through the ice. The hot water had frozen also, however, there were some weak spots where I could stick my finger through the ice. After 75 minutes, the hot was completely frozen.

IV. Summary and Conclusion:

My conclusions were very surprising. I thought the cold water would freeze far earlier than the warmer waters. This did not happen. The warm water froze at approximately the same speed as the cold water and the hot water was not far behind. Therefore,

I reject my hypothesis as water freezes around the same time period despite a water temperature differential of 30 - 60 degrees. Larger water temperature differentials could effect the freezing ability. Also, different holding containers could also effect the freezing ability.

V. Application:

I now know that when I am asked to fill up the ice cube tray at home, I don't have to wait for cold tap water in order to have it freeze fast.

The National Student Research Center
E-Journal of Student Research: Science

Volume 8, Number 7, May, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: **Rate Of Plant Growth In Different Types Of Soil**

Student Researcher: Jennifer Hudson
School Address: Beach St. Middle School
West Islip, NY 11795
Grade: Sixth
Teacher: Mrs. Markham

I. Statement Of Purpose & Hypothesis:
What is the difference in the rate of seeds sprouting and growing using 3 different types of soil? I think the seeds in the potting soil will sprout first and grow quicker than the seeds in the Perlite and sand.

II. Methodology:
The materials used were: three paper cups, potting soil, Perlite (an all natural mineral soil), sand, Teddy Bear sunflower seeds, and water. I filled one paper cup with potting soil, one with Perlite, and one with sand. Then I put the seeds into the different soils and pushed them down so they were covered. Then I added water.

III. Analysis Of Data:
After watering the seeds every two days, I found out on the sixth day that the seed planted in the Perlite had started to sprout first. On the eight day, the seed in the potting soil sprouted. The seed in the sand did not sprout at all.
IV. Summary and Conclusion:
I realized that my guess was wrong. To my surprise, the seeds in the Perlite sprouted first rather than the seeds in the potting soil.
V. Application:
My research can be used in the world today. Organic soils such as Perlite enhance natures own minerals which help aid in plant growth. By using natural soils, we can reduce and maybe even eliminate the need of harsh chemical based fertilizers.

Title: **Subliminal Messages**

Student Researcher: Abbey Marshak
School Address: Edgemont Jr./Sr. High School
Scarsdale, New York
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:
At first I had a lot of trouble picking an experiment. After a lot of searching for ideas, I decided that I wanted to see whether the subconscious could have an impact on the conscious aspect of a person's mind. My hypothesis stated that subliminal messages would have an impact on a person's decisions.
II. Methodology:
To set up this experiment I used a four-track recorder, mood music, and my voice. The four-track recorder let me combine four recordings on one tape. I combined the mood music and my voice saying the subliminal message. To actually do this experiment I needed five different crayons including green. I also needed a tape player, to play the tape, and an isolated area with no distractions where the person should be tested.
To begin this activity I made a recording. On this recording I had mood music and in very high and low pitches, messages that say "You are thirsty. You want orange juice." And "You like the green crayon the best." I combined all of these things so that they were on one tape.
To conduct my experiment I had two different groups. I had a control group and a manipulated group. The control group was asked what their favorite color crayon is out of 5 and they were asked what they would like to drink. They were asked these questions without any suggestions. To make my experiment a little more interesting I had one message coinciding with an activity asked to do, and the other message just a random thing.
The manipulated group was sitting down listening to the tape made. The controlled variables for the manipulated group was the atmosphere, they were sitting on the floor of my basement with a clipboard in their lap, the fact that they had crayons and paper in front of them and they were asked to draw, and the message itself being played. At the end of the time listening to the music they were asked the same questions as the control group.
The responding variable was the response to a particular question. I graphed the results and came to conclusions whether the subliminal message actually went through to the persons conscious.
III. Analysis of Data:
Crayons

	Red	Blue	Yellow	Green	Orange
Control	3	9	0	3	0

Manipulated	2	9	0	3	1

Juices

	Grapefruit	Apple	Cranberry	Lemonade	Orange
Control	1	3	0	5	6
Manipulated	0	0	1	7	7

The above data table indicates that there is no significant difference between the choices of the manipulated and control groups.

IV. Summary and Conclusion:

I disproved my hypothesis in this experiment. From my information gathered, I realized that there is no significant pattern in the responses as a result of the subliminal message. When I was testing the results of the manipulated group, the results did not show anything more than opinion in taste of each person.

V. Application:

I can not apply my information found to everyday life. Although, through doing this experiment, I have begun to get interested in how people develop different favorites. I now want to know how we choose favorites and why majorities of the people like one color better than another color. I also want to know whether it is a genetic influence. I feel that I have learned through this experiment that even though some things don't work out, they will turn up O.K. in the end. This is because when my experiment didn't work as hoped it would, I still continued with it and I was able to draw conclusions.

Title: **The Effect of Light on the Productivity of Ants**

Student Researcher: Amelia Skolnick
School: Edgemont Jr./Sr. High School
Scarsdale, New York
Grade: 7
Teacher: Mr. Rubenstein

I. Statement of Purpose and Hypothesis:

I wanted to know more about living things and their environments. I thought ant farms would be a good, unique experiment. I tested three different ant farms, one in light, one in the dark, and one which was a control that got a normal dawn to dusk day. My hypothesis was that the farm in the light would be the most productive, because the ants would have more light to see what they were doing.

II. Methodology:

As I stated before, I set up three ant farms to test to see which one would be the most productive. I ordered the ant farms, then set them up one by one. Each farm was given a pound of sand, 6 ounces of water every two days, and 2-3 grains of their special food once a week. Each ant farm held about 25-30 ants. I observed the ants daily, and wrote down on my data charts the day, amount of tunnels, the length of tunnels, and the amount of dead ants for each individual farm. I took pictures of the ants every Wednesday and Saturday. Each farm had the same amount of food, water, sand, ants, feeding time, and temperature. I placed one farm in the light indirectly under a lamp, the lamp was left on all day. The farm in the dark was placed under a large towel. The control was a farm placed in the center of the room near a window.

III. Analysis of Data:

After collecting my data over a span of about 20 days, I figured out that the farm which was placed in the dark was the most productive, disproving my hypothesis.

IV. Summary and Conclusion:

In conclusion, I figured out that ants are most productive in the dark. This is probably because an ant's normal habitat is underground, which is constantly dark. The controlled farm with the ants in it was the next productive, and the ants in the light were the least productive.

V. Application:

My science experiment proved that every animal species work differently and more efficiently in their own environment. While humans may work better in light, and bats better in dark, they both have their own style which they have adapted to over the years. These facts are very interesting and I have enjoyed studying them.

Title: **How Much Water Do Plants Absorb?**

Student Researcher: Akie Yabuuchi
School: Edgemont Jr./Sr. High School
Scarsdale, NY 10583
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:

I wanted to know more about how plants absorb water. I wanted to find out if the number of leaves affected the amount of water a plant absorbed. I also wanted to find out how much water the plants absorbed per hour. My hypothesis stated the more leaves a plant has the more water will be absorbed. My other hypothesis stated the more sunlight the plants are exposed to, the more water they will absorb.

II. Methodology:

First, I wrote my statement of purpose, conducted a review of the literature about plants, and developed my hypothesis. I then got a box, fourteen straws, water with red food coloring, two kinds of plants (two of each kinds), tape, and a thermometer. I put the straws together by inserting one straw into the other. I taped it so it wouldn't leak. I tested to be sure that the straws did not leak. I did this process until I made seven straws shaped like a U. Then I put the red colored water into all of the straws and taped them it onto the box. I then put the plants in, one with most of the leaves taken off, the other with half of the leaves taken off, and the last one left alone. The manipulated variable was the number of leaves and the different places that I conducted the tests. I conducted three tests in each of three locations at daytime and three at night. I put marks on each of the straws every hour and measured how many millimeters the plants sucked in an hour. I recorded the data on my data sheet. Next, I conducted an analysis of my data. Finally, I accepted or rejected my hypothesis and wrote my summary and conclusion. Then I applied my findings to the world outside my classroom.

III. Analysis of data:

My data were reasonable. I noticed that, in a sunny place on a nice day, the absorption was less than the shady place on a sunny day. The absorption was even less on rainy days. I also noticed that for more leaves on a plant, more water is absorbed. This was true for most of the trials.

IV. Summary and Conclusion:

Both plants had nearly the same results. They both had more absorption if they had more leaves. I found out that in a shady place on a sunny day, the plants absorbed the most water. In a sunny place on a sunny day, the absorption was in the middle and, on a rainy day, the plants didn't really absorb any water. To my surprise, the plants in the shady place absorbed more water than in the sunny place. However, this may be due to the difference in moisture of the air between the two days since I could not conduct the testing on the same day. There was a slight inaccuracy in this data. The plant with medium number of leaves absorbed more water

than the plant with lots of leaves, but mostly my data was correct. Therefore, I accepted my hypothesis, which stated that the more leaves a plant has, the more it will absorb the water.

V. Application:

There is a type of farming called hydroponics. This method of growing is used in areas where people want to grow crops, but they have no soil to grow them on. Instead they grow them in water. That is when my data becomes useful. By looking at my data you can approximate how much water to give the plants so the plants don't die from too little or too much water. I hope my data will be useful for this new method of growing crops.

Title: **The Decay of Teeth in Various Solutions**

Student Researcher: Bobby Noll
School Address: Edgemont Jr./Sr. High School
Scarsdale, NY
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:

I wanted to find out more about tooth decay. My hypothesis stated that teeth soaked in toothpaste and fluoride would take longer to develop a cavity, than teeth soaked in a soda solution.

II. Methodology:

I tested my hypothesis by placing teeth and various solutions into small containers as follows:
A) 2 teeth in soda
B) 2 teeth in fluoride
C) 2 teeth in mouth wash
D) 2 teeth in Hydrogen Peroxide
E) 2 teeth in toothpaste
F) 1 tooth in water

The manipulated variables were the different solutions and the responding variable was the rate of decay on a scale of one to ten. The controlled variables were the size of the container, amount of solution, and source of teeth.

III. Analysis of data:

The data I collected indicate that the best substance to fight tooth decay is toothpaste, therefore everyone should brush their teeth on a regular basis. The data also indicate that if a person eats a lot of sugary foods and does not brush their teeth they will develop cavities. In this experiment, the data I collected were as follows: the 2 teeth in the soda didn't start to decay until the fifth and eighth day. The teeth in the fluoride didn't start to decay until the eleventh and twelfth day. The teeth in the toothpaste didn't start to decay until the twentieth day. The other teeth developed no cavity. The teeth in the mouthwash developed cavities on the thirteenth and fifteenth day. Finally the 2 teeth in the hydrogen peroxide decayed on the tenth and thirteenth day of this project.

IV. Summary and Conclusion:

I found out that the toothpaste worked very well in helping to prevent cavities and so did the water. The teeth in fluoride didn't hold up as well as I thought they would. I would reject my hypothesis because the fluoride did not prevent the decay of the teeth as well as I thought it would. I think that part of the shortcoming of this project might be the condition of the teeth in the beginning of the project. I had no way of knowing if all the teeth were healthy when I started the project except by visual inspection.

V. Application:

In this project I have concluded that the toothpaste is the best way to control cavity and tooth decay. I also found out that the 2 teeth in Hydrogen Peroxide were covered in plaque and therefore very yellow in the beginning of the project and became bright white and looked clean towards the end of the experiment. I think that people should take care of their teeth. If they eat sugary foods, they should brush their teeth and maybe even apply Hydrogen Peroxide to their teeth to brighten them up.

Title: **Pyramid Power - Myth or Fact?**

Student Researcher: Liam Cronin
School Address: Edgemont Jr./Sr. High School
Scarsdale, N.Y. 10583
Grade: 7
Teacher: Maria Russo

I. Statement of Purpose and Hypothesis:
I wanted to find out more about the theory of Pyramid Power and whether it is true. People who believe in Pyramid Power believe that the shape of a pyramid somehow magnifies energy and focuses it on whatever is inside. My hypothesis stated that food or plants left inside a clear pyramid would stay fresher or grow taller than food or plants left in a clear cube or left out in the open. (I did not, however, think that the difference would be significant.)
II. Methodology:
A. Calculating size:
My experiment first involved background research, both historical and mathematical. The theory of Pyramid Power is based on the Egyptian structure known as the Great Pyramid of Cheops, or Khufu. In order to test the theory as accurately as possible, I wanted my pyramids to be built exactly to scale.
I learned that The Great Pyramid's base forms almost perfect right angles. Each side of the base is 365 cubits-the number of days in a year. Since one cubit is 18" (1.5 feet) that made each side of the base 547.5 feet (365 x 1.5). The height of the Great Pyramid is one billionth of the distance from the earth to the sun. Since the earth is 93,000,000 miles from the sun that makes the height of the Great Pyramid .093 miles or 491.04 feet (5280 feet in one mile x .093). Rounded off, that is 490 feet.
I now knew the base and the inner height of the Great Pyramid. My calculations, which follow, show the two-step process I used to figure out the distance from each corner to the top. That figure came out to be 624.5 feet.
The dimensions of the Great Pyramid were, base: 547.5 feet; corner to top: 624.5 feet; and inner height: 490 feet. In order for my pyramid to be in the same proportion, I divided these numbers by 100. This gave me a pyramid with a 5 1/2" base, which was too small. So I divided by 50, making the base 10.95" and the distance from the corner to the top 12.49". Rounded off, my final dimensions were, base: 11"; distance from corner to top: 12.5"; height from top down to center of base: 9.8".
B. Calculating volume:
Because I wanted to compare the effect of the pyramid against the effect of a cube, I wanted them to have the same volume. The volume of my pyramid was X.
X= 1/3 height x base area
X= 1/3 (9.8 x 11 squared)
X= 1/3 (9.8 x 121)
X= 1/3 (1185.8)
X= 395.3 cubic inches

The volume of a cube is length x width x height, with all three numbers being the same. So I needed the cubed root of 395.3. Through trial and error (and a calculator) I figured out that 7.34 x 7.34 x 7.34 = 395.4. Therefore, each side of my cube would be 7.34".
C. Construction:
Using clear plastic, foam board, floral wire, and tape, I constructed four pyramids with 11" bases and 12.5" from each corner to the top, and four cubes, each 7" X 7" X 7". I placed two bananas into pyramid #1, cube #1 and plate #1. I placed three strawberries into pyramid #2, cube #2 and plate #2. I placed two slices of French bread into pyramid #3, cube #3 and plate #3. Finally, I placed a pot of soil with flower seeds into pyramid #4, cube #4 and plate #4. Although the cubes and pyramids were sealed, I made it possible to open the ones with the seeds in order to mist them.
The controlled variables were: the bread slices all came from the same loaf, the bananas all came from the same bunch, and the strawberries were chosen so that they all appeared equally fresh.
Items were added to all structures on the same day, and they were all kept in the same environment. The manipulated variables were the different structures and items inside them. The responding variable for strawberries was % mold, for the plant was height in inches, and for the bananas was the % of spots.

III. Analysis of Data:

With regard to the bread, there was no difference between the pyramid, the cube, and the plate. I had chosen fresh French bread because it has no preservatives in it. But none of the bread grew any mold at all. The pieces just got stale.
With regard to the seeds/plants, the open plate grew the slowest the first week, then the cube; the pyramid grew the fastest and tallest the first week. But during the second week the plant leaves in the pyramid began to touch the slanted plastic sides and gradually parts of the plant died off.
With regard to the bananas, judging by the number of brown spots on the peels, the pyramid did the best, then the cube, and then the uncovered plate (the uncovered plate had the most brown spots). This held true for the entire time of the experiment.
However, on the ninth day, mold appeared on the stem of the bananas in the pyramid and in the cube, but not on the plate. I don't know if mold on the woody stem indicates the relative freshness the way that brown spots usually do. Perhaps when I peel the bananas at the end of the experiment I will get a better idea.
The strawberries were the most interesting food to watch. The ones on the open plate shriveled smaller and smaller each day, turning darker and darker with black mold that seemed to grow into the strawberries rather than out of them. The strawberries in the cube did not shrivel, but started growing mold the second day; this mold was light gray and airy and fuzzy. The mold eventually grew to the sides of the plastic cube and started to grow up them. The strawberries in the pyramid didn't shrivel either, and they didn't start growing mold until the third day. This mold was thick and dark and dense and stayed confined to the area of the three strawberries. (My mother said it looked like a dead mouse!)

IV. Summary and Conclusions:

It would appear from the data and from my observations that the bananas and the plant did better in a pyramid shaped structure, at least initially. The pyramid made no difference to the bread, and although the strawberries reacted differently in the pyramid, I couldn't really say whether the reaction was better or worse. My hypothesis that food or plants left inside a clear pyramid would do better than food or plants left in a clear cube or left out in the open, was only partially proven.
In conclusion, I would say that the use of pyramids and their "power" or energy seems most promising with regard to plant life, especially if some variables are changed, such as using bigger pyramids or regulating the humidity more.
I accept my hypothesis on a limited basis, but feel that more research needs to be done.

V. Application:
If the pyramid power theory had worked on a grander scale, then people could have used pyramid power as a basis for plans to build greenhouses or to keep food fresh at home and in the stores. I think this would have helped farmers and consumers and maybe even help world hunger.

Title: **The Effect of Eggshell on Plant Growth**

Student Researcher: Mallika Devarapalli
School: Edgemont Junior/Senior High School
Scarsdale, New York
Grade: 7
Teacher: Mrs. Russo

I. Statement of Purpose and Hypothesis:
I wanted to know the effect of egg shell on plant growth. I want to find out whether eggshell accelerates plant growth when it is added to the soil. My hypothesis stated that the plants in eggshell would grow faster than the plants in soil.

II. Methodology:
First, I wrote my statement of purpose, conducted my review of the literature, and then I wrote my hypothesis. I bought six big pots and planted three tomato plants (not seeds) in the three pots and three sweet banana plants (not seeds) in three pots. I mixed soil and eggshell in two pots and I planted four tomato plants in one pot and four sweet banana plants in other pot. I only added soil to the other two pots and I planted four tomato plants in one pot and six sweet banana plants in other pot. Finally, for the last two pots, I just added eggshell without soil and planted four sweet banana plants in one pot and four tomato plants in other pot.
My controlled variables are light, temperature, water, and humidity. My manipulated variable is type of soil and eggshell. The responding variable was the growth of each plant which I measured every day for fourteen days. I recorded my observations and measurements on my data chart and wrote a summary and conclusion.

III. Analysis of data:
The data showed that both tomato plants and sweet banana plants in soil mixed with eggshell grew faster and higher than the plants in other pots. Three tomato plants planted in eggshells only, died. Final data for my tomato plants were: Growth in Eggshell: died, died, died, 2.1; Growth in only soil: 2.6, 2.7, 3, 2.8; Growth in Eggshell + soil: 4.3, 4.3, 4.2, 4.2. Final data for my Banana plants were: Growth in Eggshell: 2.3, 2.7, 2.9, and 3.2. Growth in only soil: 3.5, 3.7, 3.6, 3.4 and Growth in Eggshell + soil: 4.9, 4.8, 5, 5.

Tomato Plants

Eggshell	died	died	died	2.1
Soil	2.6	2.7	3.0	2.8
Eggshell + Soil	4.3	4.3	4.2	4.2

Banana Plants

Eggshell	2.3	2.7	2.9	3.2
Soil	3.5	3.7	3.6	3.4
Eggshell + Soil	4.9	4.9	5.0	5.0

IV. Summary and Conclusion:
My experiment showed that eggshell has an important role in plant growth. Initially the growth was the same for both plants in only soil and plants in soil mixed with eggshell. Later

the plants in soil mixed with eggshell grew faster. I think my findings indicate that eggshell can be added to soil for improving plant growth.

V. Application:

The results of my experiment gives a clue that something in the eggshell is important in the process of plant growth. It is necessary that my experiment should be done in a broader range with a different controlled variables and manipulated variables. It is also important to observe for side effects to the plants in the long run. This information can be applied by farmers to help their crops grow faster by adding eggshell to the soil.

Title: **Antacid Experiment**

Student Researcher: Melissa Finell
School Address: Edgemont Jr./Sr. High School
Scarsdale, NY 10583
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:

What effects do antacids have on stomach acid? Is there a difference between brands of antacids? My hypothesis stated that antacids would reduce the acidity of the stomach acid and that some brands of antacids would work better than others.

II. Methodology:

My materials were: four different antacids, HCL, two Pyrex measuring cups, a graduated cylinder, water, pH paper, a funnel, and a medicine dropper. My controlled variables were: the amount of stomach acid, the amount of antacid, the amount of time between pH readings, the brand of pH paper, and the concentration of the stomach acid. My manipulated variable was the brand of antacid. The responding variable was the change in pH.

I decided to test four antacids. These antacids were: Pepto-Bismol, Fast Relief Mylanta, Fast Relief Maalox, and the CVS brand. After researching in the library, I learned that stomach acid has a concentration of about 0.5% HCL. The HCL that I bought was a concentration of 31.45% HCL. To make a simulated stomach acid, I diluted my HCL with distilled water, to a concentration of 0.5% HCL. For each trial, I poured 100 ml of the simulated stomach acid into a clean Pyrex measuring cup. After trial and error, I found that using a dose of 3 ml per teaspoon of the dosage recommended on the antacid's bottle, showed a change of pH in time and therefore enabled me to compare the results of different antacids. I called this the sample dose. For each antacid, I poured the sample dose into 100 ml of the simulated stomach acid. Every thirty seconds for ten minutes, I measured the pH of the mixture with pH paper and recorded the results.

III. Analysis of Data:

A	B	C	D	E
ANTACID EXPERIMENT				
		PH		
Time (min)	CVS	Maalox	Mylanta	Pepto-Bismol
0.5	1	1	1	1
1	1	1	1	1
1.5	1	1	1	1
2	1	1	1	1
2.5	1	1	2	1
3	2	1	2	1
3.5	2	1	2	1
4	2	2	2	1
4.5	2	2	2	1
5	2	2	2	2
5.5	2	2	2	2
6	2	3	3	2
6.5	2	3	4	2
7	4	4	4	2
7.5	4	5	4	2
8	4	5	4	2
8.5	4	5	4	2
9	4	5	5	2
9.5	4	6	6	2
10	4	6	6	2

There were some differences in how well the antacids worked. With the CVS brand, for the first two and a half minutes, the pH stayed at one. Then it moved to two for the next four minutes. For the last three and a half minutes, the pH was four. With the Fast Relief Maalox, the pH stayed at one. For the next two minutes, the pH was two. For the next minute, the pH was three. It was four for thirty seconds, and then it was five for two minutes. It was six for the last minute. Mylanta was similar to Maalox. For the first two minutes, the pH was one. It was two for the next three and a half minutes, and then it was three for thirty seconds. Next it was four for two and a half minutes, and five for thirty seconds. It was six for the last minute. Pepto-Bismol was the slowest. It had a pH of one for the first four and a half minutes, and a pH of two for the last five and a half minutes. All of them worked differently but they all affected the stomach acid by making it less acidic.

IV. Summary and Conclusion:

Antacids reduce the acidity of stomach acid. Some antacids work better than others. My hypothesis was correct. Fast Relief Maalox shows quicker results than the other three. Next is Fast Relief Mylanta, then CVS Brand, and then Pepto-Bismol. For all of the antacids that were tested, the changes in pH were gradual.

V. Application:

This information would be very useful to consumers with stomach problems such as: heartburn, ulcers, etc. It is important for them to know which brand of antacid will help them the most. It is also important for them to know for obvious price reasons. Are they paying more because it works well or because it's a brand name? With the Maalox and Mylanta, consumers are paying for a good quality antacid. With the Pepto-Bismol they are paying more because it's a brand-name antacid.

The National Student Research Center
E-Journal of Student Research: Science

Volume 8, Number 8, June, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: Fixing The Y2K Millennium Bug

STUDENT RESEARCHER: Rajin Shahriar
SCHOOL ADDRESS: Hedrick Middle School
Lewisville, TX 75067
GRADE: 7th
TEACHER: Casey Hall

I. STATEMENT OF PURPOSE AND HYPOTHESIS:
The purpose of this project was to investigate the Y2K problem for home computers and apply a suitable fix to solve the problem. If there was a program (software) that could run when the computer boots up, recognized the incorrect date and time, and adjusted it before the user could see it, then the Y2K transition problem would be solved. Updating the system BIOS could also eliminate the problem. There are expansion cards available that "act" like the BIOS and effectively "become" the BIOS of the system. As for the Y2K bug in the software system itself, the only choice is to replace the software with a newer version. My hypothesis states that most home computers can be rescued from the Y2K bug using software patches.
II. METHODOLOGY:
Materials:

a. 3 old computers with a: (1) BIOS made before 91, for AMIBios BIOS (2) BIOS made before 96, for Award BIOS
b. 3 new computers with a: with a (1) BIOS made before 91, for AMIBios BIOS (2) BIOS made before 96, for Award BIOS
c. 1 display monitor
d. A Y2K Fix (such as one at "http://www.wsnet.com/~designer/holmesfx/".)
Research:
I searched different web sites looking for information about the Y2K problem. In this process, I had to investigate related concepts such as BIOS, RTC, system clock, and DOS operating system. I had to look for possible fixes for the problem. In addition, I also read some magazines collected from the local library.
Procedure of experiment:
Part I: Investigating Rollover to the Year 2000.
1. Connect the first computer to the monitor.
2. Turn on the computer. Go to command prompt.
3. Type date and press enter. This time, when it says, "Enter new date:" type "12-31-99" and press enter. This will change the system clock to December 31, 1999.
4. Type time and press enter. When it says, "Enter new time:" type "23:59:45" and press enter. This will change the system time to 12:59:30 PM. We need to do this because we will reboot the computer to see if the changes are retained by the system.
5. Reboot the computer by pressing the ALT, CTRL, and DEL buttons at the same time.
6. Go to command prompt again.
7. Type date and press enter. Record the date.
8. Type time and press enter. Record the time.
9. Disconnect the monitor from the computer.
10. Connect the next computer to the monitor. Repeat steps 2-9. Do this until you collected date time data from all the computers.
Part II: Installing a Y2K Fix
1. Download the software Holmesfx.com from:http://www.wsnet.com/~designer/holmesfx/
2. Copy the holmesfx.com file to a floppy disk.
3. Connect the first computer to the monitor.
4. Type copy a:*.* c:*.* and press enter. This will copy all the files into drive C.
5. Type edit autoexec.bat and press enter. This will bring up a blue window. It is the DOS editor.
6. On the top of the editor window, type Holmesfx.com. Then press ALT, then F, then S, then ALT, then F, and then X. You will be back to the command prompt. This will make holmesfx.com start-up every time you start the computer.
7. Disconnect the computer from the monitor.
8. Connect the next computer to the monitor. Repeat steps 2-8. Do this for all the computers being studied.
Part III: Testing the fix
Repeat Part I: Investigating Rollover to the Year 2000.

III. ANALYSIS OF DATA:

Without Y2K Fix:

Computer #	Initial Date \ Time	Final Date \ Time
1	12-31-99 11:59:00 PM	1-1-00 12:00:06 AM
2	12-31-99 11:59:03 PM	12-31-99 12:00:04 PM
3	12-31-99 11:59:02 PM	1-1-00 12:00:01 AM

4	12-31-99 11:59:04 PM	12-31-99 12:00:08 PM
5	12-31-99 11:59:07 PM	1-1-00 12:00:05 AM
6	12-31-99 11:59:06 PM	12-31-99 12:00:09 PM

With Y2K Fix:

Computer #	Initial Date \ Time	Final Date \ Time
1	12-31-99 11:59:01 PM	1-1-00 12:00:02 AM
2	12-31-99 11:59:02 PM	1-1-00 12:00:06 AM
3	12-31-99 11:59:06 PM	1-1-00 12:00:01 AM
4	12-31-99 11:59:09 PM	1-1-00 12:00:05 AM
5	12-31-99 11:59:07 PM	1-1-00 12:00:09 AM
6	12-31-99 11:59:06 PM	1-1-00 12:00:08 AM

IV. SUMMARY AND CONCLUSION:

It appears from this study that most home computers can be rescued from the Y2K bug using both software and hardware patches. I also found out, form this particular experiment, computer # s 2, 5, and 6 were non Y2K compliant. That was so because computer # s 2, 5, and 6 had older BIOS. By applying Y2K fixes to the non compliant computers, the Y2K problem was solved.

V. APPLICATION:

I listed some of these fixes in the results section. The easiest one is to apply a software fix that will remember the date for all practical purposes. It seems that the home computers worldwide are not in real danger because most of them were made after 1985. There are many Y2K solutions to choose from. The most important, however, is to educate the home users about this problem so that they can choose the right solution.

Title: **Water Evaporation of Plants**

Student Researcher: Miho Iino
School: Edgemont Jr./Sr. High School
Scarsdale, New York
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:

I wanted to know more about the process of transpiration of plants. Transpiration is the evaporation of water through the leaves of plants. Plants absorb water through their roots and lose it through transpiration. The water evaporates from the stomata, which are tiny pores. I wanted to find out where the water evaporates from or what part of the plant had the most

stomata. My hypothesis stated that the back side of the leaves had the most stomata, so water would evaporate the most from the back side.

II. Methodology:

First, I wrote my proposal, conducted some library research on photosynthesis, and developed my hypothesis. I then got eight stems with eight leaves, each about the same size. I had two stems that had Vaseline on the front side of all leaves, two that had Vaseline on the back side of all leaves, two that were left untouched, and two that didn't have leaves. I got eight 20 ml test tubes, water, and oil. The manipulated variable was the location of the coating placed on the leaves. The responding variable was the amount of water lost. The controlled variables were the size of the plants, the size of the test tubes, the amount of water and oil, the temperature, the location, and the amount of sunlight. I put 18 cm of water from the bottom of each test tube and put one stem of plant per test tube.

Next, I put 0.5 cm of oil on top of the water to make sure water wouldn't evaporate from anywhere else other than the stomata. I put these test tubes on my windowsill and kept them there for five days. I recorded the total loss of water each day on my data chart. Next, I conducted an analysis of my data. Finally, I accepted or rejected my hypothesis and wrote my summary and conclusion. Then I applied my results to the world outside my classroom.

III. Analysis of Data:

I observed that stems' lose of water everyday and my data showed that the stems that had nothing added onto the leaves, lost the most water. Then the stems which had Vaseline on the front side, which enabled the water to evaporate only from the back side, had the second most amount of loss. The stems that were left untouched lost up to 6.4 cm in five days. Compared to that, the stems that had no leaves lost only 0.8 cm. The stems with Vaseline on the front lost 5.35 cm and the stems that had Vaseline on the back lost 4 cm in five days.

IV. Summary and Conclusion:

The stems that had nothing on the leaves had the greatest loss of water. The stems which had Vaseline on the front side, had the second greatest loss of water. So there was a greater loss of water which evaporated from the back side than from the front side. This shows that there are more stomata on the back side of the leaves. I also found out that transpiration does not occur on the stems because there was hardly any loss on the stems without the leaves. I accepted my hypothesis because transpiration occurred mostly on the back side of the leaves.

V. Application:

I can apply this information to my life in the following way. My Mom does flower arrangement. Sometimes there are special occasions such as a flower arrangement show. When my Mom arranges the flowers, I can tell her that she should not cover the back side of the leaves because photosynthesis will stop when the flow of water does not go smoothly. Then all the flowers would die.

Title: **Color Choice - Preference or Programming?**

Student Researcher: Marissa Lalli
School Address: Edgemont JR/SR High School
Scarsdale, New York
Grade: 7
Teacher: Maria Russo

I. Statement of Purpose and Hypothesis:

I wanted to discover if gender or personality impacted color choice and preference. I've always wondered if color choice was pre-determined genetically resulting in the stereotypical selections of blue for boys and pink for girls or if it is affected by surroundings, personality or gender. I assumed that color choice was a personal thing depending on your character. To define personality, I used the Myers-Briggs study.
Under my hypothesis, individuals with bright personalities would choose bright, lively colors while more inner, thoughtful personalities would choose more muted, pastel shades.
Therefore, "Introvert" and "Extrovert" color selections would reflect the two extremes because extroverts focus on the outer world of people and things while introverts focus on the inner world of impressions and ideas.
I predicted "Sensors" would tend toward muted colors because they favor concrete information of the present versus "Intuiters" who focus on the bright possibilities of the future and therefore would select bright colors.
Next, the "Thinkers" would lean toward clear, concrete, bright colors but "Feelers" would select less clear, more muted shades.
I hypothesized that organized "Judgers" would choose muted colors while flexible, spontaneous "Perceivers" would frequently choose brighter colors.
Finally, I hypothesized that girls would select muted pastels while boys would pick bright colors.

II. Methodology:

First, I selected a topic of interest to me and conducted some basic investigation on the Internet, which helped me to define human personality types by the Myers-Briggs approach.
Next, I decided to frame my study around color selection and its link to two manipulated variables, namely gender and the four personality indicators as defined by Myers-Briggs. .
Then I gathered or created the controlled variables including the color stimuli (paint chips of 6 colors on the color wheel and their pastel versions), and my survey which included various product categories for "coloring" which I wrote and distributed to the similarly aged (all adolescent) sample. I then developed my starting hypotheses. After collecting the surveys, I organized the responding variable of data charts from my color surveys. From these data charts I created graphs, compared the findings to my original hypotheses and drew conclusions.

III. Analysis of data:

From the identical completed surveys I gathered the results and organized them into data charts & graphs of:
Overall Color Preference by Sample Surveyed
Color Preference by Gender- the most frequently chosen colors (among all choices) by boys and girls.
Personality Type by Gender the incidence of the four personality indicators
Color Preference by Personality- 4 graphs of color selections among the four-personality indicator measures Extroverts vs. Introverts
Sensing vs. Intuition

IV. Summary and Conclusion:

Contrary to my hypotheses, the data strongly shows that Blue, followed by red and light blue are the most popular color choices regardless of either gender or personality measures.
Blue, Light Blue and Red were the top three color choices chosen by the total sample surveyed, regardless of gender, consistent with my Internet finding that blue is the most popular color overall among Americans
Girls' and boys' color preferences were almost identical around nearly every color, contrary to my original hypothesis with only a few exceptions: Blue was overwhelmingly popular among boys while girls although still selecting blue as their first choice, also liked purple and the pastels which were unpopular among boys

Again disproving my detailed hypothesis by the four Myers-Briggs personality indicators, opposite personality types DID NOT vary their color choices and closely followed the general pattern
It is interesting to note that certain personality patterns resulted among the sample surveyed with girls and boys displaying opposite characteristics on 3 of the 4 measures except for "Thinking" in which they were quite similar.
The main limitation of my study was the small male sample size. In order to compensate for this, I converted all of my data to percentages. Another limitation is that all the subjects were similar in that they attend the same school, live in the same community, and have similar social experiences and backgrounds.

V. Application:

My study indicates that predicting behavior or stereotyping by gender or personality is not accurate in relation to color preferences. But it does strongly indicate that product manufacturers and marketers should investigate and understand which colors are best suited for their products and preferred by their current and future customers. Since research has shown that color communicates emotion, creates moods and affects energy level, smart marketers know that manipulating color selections creates an appropriate personality for their products and can influence purchasing decisions. This can result in business success by causing consumers to select their product more often than competing products.

Title: **Bones and the Effect of Different Liquids on Their Strength**

Student Researcher: Scott Barsky
School Address: Edgemont Jr./Sr. High School
Scarsdale, New York 10583
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:

I wanted to see the effect of different types of liquids on the strength of bones. The strength is the hardness of the bone. The harder the bone, the less flexible it is. My hypothesis was that vinegar would have the greatest effect on the bone strength. This made sense because vinegar is a substance that eats away at other substances because it is acidic. I also suspected that milk would make the strength better.

II. Methodology:

First, I picked my topic idea and planned out how I would do my experiment. I then collected all my liquids and the jars to put the bones in. I purchased chicken with bones and boiled them in water. I then took the chicken off the bones and put the bones in the different jars and closed the lids. I then put them all into the refrigerator.
The manipulated variables were the different types of liquids, which included bleach, orange juice, milk, vinegar, Cola soda, and water. The responding variable was the different bone strengths. The controlled variables were all the steps in the set-up, bones from the same chicken, boiled for the same amount of time, same jar, and amount of liquid. I watched the bones for 12 days, testing the strength every day by bending the bones and seeing how flexible they were. I used a scale from one to ten and all the bones started at 10. The more flexible the bone was, the lower the number. I recorded the flexibility on a computer and just kept updating the sheet. Then I analyzed the data and made a display board that included my conclusion, data, graphs, pictures and the actual bones.

III. Analysis of Data:

I observed all of the bones and tested their strength. I found that milk added to the strength and because the scale only went up to 10, the bone soaked in milk was a ten plus. The bones soaked in the other liquids, except water, were mostly all five's and six's. The strength of the bones soaked in water stayed the same and remained at ten. After a few days, the bone in vinegar broke.

IV. Summary and Conclusion:

The milk added to the strength of the bones and the vinegar did the most damage. All of the other liquids had about the same effect on the bones. The milk added to the strength of the bone, because it has calcium in it, which the bones are able to absorb. This is how the bone in milk became stronger. The vinegar is an acid so it is able to dissolve substances. This means that it eats away at the bone, making it lose strength. Therefore, I accepted my hypothesis, which stated that milk would increase strength and vinegar would decrease the strength the best.

V. Application:

I can apply this information to my life in two ways. I love dogs. I can soak bones in milk and give it to dogs. This would save me money on bones and would decrease the money spent on the dog. Paleontology is also something I enjoy studying. This information could be used to find a way to preserve bones. If scientists found out how the milk made the bones stronger, museums could make them last for a longer time.

Title: **The Effect of TV on Human Eyes**

Student Researcher: Sipra Rathi
School: Edgemont Junior/Senior High school
Scarsdale, NY
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:
I wanted to know if TV had any affect on human eyes. I had heard many people say that watching too much TV can be harmful to your eyes. So, I decided to see if this was a myth or true. My hypothesis was that TV did not have any affect on the human eye.

II. Methodology:
I decided to test my hypothesis by interviewing 100 people about their TV habits. I chose 50 people with glasses and 50 people without. I then compared the data to reach a conclusion. The children I interviewed were all ages 12 to 13 years old, that was my controlled variable. I started by asking them what their age was. Then I asked how much TV they watched a day, the manipulated variable. Finally, I asked them about the condition of their eyes, which was the responding variable. After collecting all this data, I analyzed it.

III. Analysis of Data:
The results showed that people with glasses watched an average of 1 hr 40-min of TV a day, and people without glasses watched an average of 50 min per day. It was also found that 50% of children with glasses watched over 2 hrs of TV, while 8% of children without glasses watched over 2 hrs a day. I also found that only 6% of children with glasses watched no TV vs. 26% of children without glasses.

Age	Glasses	Hours of T.V.			Age	Fine eye	Hours
1. 12	glasses				1. 13	fine eye	1
2. 12	Glasses	1hr			2. 12	fine eye	2
3. 12	Glasses	0 hr			3. 12	fine eye	0 hr
4. 13	Glasses	4hrs			4. 12	fine eye	0 hr
5. 12	Glasses	2hrs			5. 13	fine eye	1
6. 13	Glasses	2hrs			6. 13	fine eye	1
7. 13	Glasses	3hrs			7. 13	fine eye	3
8. 12	Glasses	0.5 hr			8. 13	fine eye	1
9. 12	Glasses	2hrs			9. 13	fine eye	3
10. 12	Glasses	4hrs			10. 13	fine eye	1
11. 12	Glasses	3.5hrs			11. 13	fine eye	1
12 12	Glasses	2hrs			12. 13	fine eye	1
13. 12	Glasses	0.5hr			13. 13	fine eye	0 hr
14. 13	Glasses	2hrs			14. 13	fine eye	1
15. 13	Glasses	0hr			15. 13	fine eye	0 hr
16. 13	Glasses	1hr			16. 13	fine eye	1/2
17. 13	Glasses	2.5hrs			17. 13	fine eye	1
18. 13	Glasses	1hr			18. 13	fine eye	1/2
19. 13	Glasses	0.5hr			19. 13	fine eye	1/2
20. 13	Glasses	1hr			20. 13	fine eye	1/2
21. 13	Glasses	1.5hr			21. 13	fine eye	1
22. 12	Glasses	2.5hrs			22. 13	fine eye	1/2
23. 12	Glasses	1hr			23. 13	fine eye	1
24. 12	Glasses	1hr			24. 13	fine eye	1
25. 13	Glasses	3.5hrs			25. 13	fine eye	1/2
26. 13	Glasses	0.5hr			26. 12	fine eye	0 hr
27. 12	Glasses	0.5hr			27. 12	fine eye	1
28 13	Glasses	3hrs			28. 12	fine eye	0 hr
29. 12	Glasses	2.5hrs			29. 12	fine eye	1/2

30. 13	Glasses	2.5hrs			30. 12	fine eye	0 hr
31. 12	Glasses	0.5hr			31. 12	fine eye	1/2
32. 12	Glasses	1hr			32. 12	fine eye	1
33. 12	Glasses	0hr			33. 12	fine eye	0 hr
34. 13	Glasses	4hrs			34. 12	fine eye	1
35. 12	Glasses	2hrs			35. 12	fine eye	1hr
36. 12	Glasses	2hrs			36. 12	fine eye	1
37. 12	Glasses	0.5hr			37. 12	fine eye	1
38. 13	Glasses	3hrs			38. 12	fine eye	1
39. 13	Glasses	2hrs			39. 12	fine eye	2
40. 13	Glasses	1.5hr			40. 12	fine eye	1
41. 12	Glasses	2hrs			41. 12	fine eye	1
42. 12	Glasses	0.5hr			42. 12	fine eye	1
43. 13	Glasses	1hr			43. 12	fine eye	0 hr
44. 12	Glasses	1.5hr			44. 12	fine eye	1
45. 13	Glasses	3hrs			45. 12	fine eye	0 hr
46. 12	Glasses	2hrs			46. 12	fine eye	0hr
47. 13	Glasses	2hrs			47. 12	fine eye	1
48. 12	Glasses	0.5hr			48. 12	fine eye	1/2
49. 12	Glasses	0.5hr			49. 12	fine eye	0 hr
50. 12	Glasses	3.5hrs			50. 12	fine eye	0 hr

IV. Summary and Conclusion:

The data lead me to unquestionably believe that TV does have an adverse affect on the human eye. This proves my hypothesis wrong. The reason I concluded this was because my data clearly showed that over 98% of the time people with glasses watched more TV than people without.

I know that there are lots of chance issues concerning my study and the 50 people I interviewed with glasses might not all have glasses because of their TV habits. Other factors like genetics, and nutrition might have played a role on their eyes. I think, to eliminate more of the chance factor, I could have a bigger sample size, more people, and varied group ages. But I also know that the data I collected showed a statistical difference and was not purely coincidental.

V. Application:

I learned from this project that I should be more aware of the amount of TV I watch because it does have a great impact on my eyesight. I realize that this study might also make other people aware of the effects of TV and hopefully they will take this into consideration the next time they feel like sitting in front of TV for 6 hrs. If the public is informed about the negative impact of TV watching on eyesight, parents may be more likely to regulate the amount of time children spend watching TV.

Title: **Blood Pressure of Physically Fit and Physically Un-fit People**

Student Researchers: Cyndi Benedict, Julie Mead, Laura Hendrickson, and Jill Anderson
School Address: Parker High School
Janesville, WI 53545
Grade: 9
Teacher: Mrs. Lippincott

I. Statement of Purpose and Hypothesis:
We wanted to find out if people who are in sports have a lower heart rate than people who are not in sports do. Our hypothesis states that the more active you are the lower your heart rate will be.

II. Methodology:
First, we took our resting pulse. Then we each ran for five minutes and after the five minutes we took our pulse rate.

III. Analysis of Data:
People more active in sports had lower heart rate than people who do not participate in any at all.

Names	Weight	Before running a mile...	After running a mile ...
Jill runner	95 lbs.	70 bpm	96 bpm
Cyndi runner	75 lbs	80 bpm	114 bpm
Laura golfer	105 lbs	70 bpm	156 bpm
Julie not active	125 lbs	100 bpm	198 bpm

IV. Summary and Conclusion:
If you are active in a sport, you would probably have a lower heart rate than if you were not active in anything.

V. Application
If you don't want to have a higher chance of having a heart attack, you should be as active as you can. To keep your heart rate at a healthy pace, you could walk or run regularly. A few different changes you could make to the experiment would be: bike instead of run; power walk instead of run.

Title: **Pulse Reactions**

Student Researchers: Ruth Ledger & Rachel Tadt
School Address: Parker High School
Janesville, WI 53545
Grade: 9
Teacher: Mrs. Lippincott
Mrs. Newton

I. Statement of Purpose and Hypothesis
We wanted to see if listening to different types of music would effect people's pulse. Our hypothesis stated that people's pulse would change with the music.

II. Methodology

We tested our hypothesis by testing different people's pulse while listening to seven different selections of music. Our materials consisted of a section of jazz music, a section of rock music, slow contemporary, rap, country, hard rock, and an oldie for thirty seconds. First, we stated the person's age and name, and then we checked their regular normal pulse for thirty seconds. Second, we tested the person's pulse listening to the first song for thirty seconds. Third we tested the person's pulse listening to the second song for thirty seconds, and so on. Finally, one minute after each test, we checked the person's pulse for thirty seconds listening to no music at all.

III. Analysis of Data

In our research project each person's pulse changed with the music. Their pulses quickened as the music did. It showed listening to calmer music slowed down a person's heart rate, and listening to more up beat music caused a person's heart rate to go up.

IV. Conclusion & Summary

We found that listening to different types of music affected a person's heart rate. When a person listens to faster music, heart rate is faster. When he or she listens to slower music his/her heart rate is slower. We accepted our hypothesis.

V. Application

Having too high or too low a heart rate can cause problems. When these problems arise, a diagnosis could possibly be to change the type of music the patient listens to. If their heart rate was high, they could listen to softer, calmer music. If a person's heart rate is low, they could listen to faster more up-beat music. The same is true for listening to softer or classical music when you're studying or trying to concentrate.

The National Student Research Center
E-Journal of Student Research: Science

Volume 9, Number 1, July, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: How Well We Identify Food By Taste Alone?

STUDENT RESEARCHER: RUGHOO Lakshmi and HEILIETTE Sabrina
SCHOOL NAME AND ADDRESS: Jean-Aguste Margueritte
13, Place Galland
55100 VERDUN
France
GRADE: 11
TEACHER: Miss Valérie GUERIN

I) Statement of Purpose and Hypothesis:

Our experiment is related to one of our main senses: the sense of the taste. We would like to know how well we can identify food by taste alone without the help of smell or sight. Our

hypothesis is that the taste of food depends not only on its taste, but also on its smell because when we have a cold and our nose is blocked, we find that foods have no taste.

II) Methodology:

To check our hypothesis, we used flavored drinks as a test food because they come in a variety of flavors and they have the same texture (therefore students will not be able to use touch information to distinguish the different items).

Material:

- 5 plastic cups: one full of water, one full of grenadine syrup and water, one full of orange syrup, and water one full of strawberry syrup and water, one full of lemon syrup and water tap water

- different flavored drinks: grenadine, orange, strawberry, lemon

- 5 tea spoons, a scarf

We had 25 classmates serve as our guinea pigs.

Variables:

- independent variable: type of soda

- dependent variable: success rate in percent (number of students who identified the drinks/ total number of students)

Constants:

- the number of trials allowed to the subjects to identify the soda (2), the concentration of the various drinks

Procedure:

Prepare all drinks in the same way. Put 5 teaspoons of one syrup in a plastic cup, add 15 cl of water and stir the liquid with the tea spoon. Set the 5 cups on a table. Always keep your cups in the same order for all your classmates. Ask your guinea pig to be blindfold by the scarf and to block his or her nose so that he or she cannot see or smell the soda. Hand a cup to the person who is given instruction to drink the soda and identify it. After making the identification, the person is made to drink some water to wash out the taste of the previous drink. Repeat steps 4 and 5 for the other drinks. Repeat the procedure for all the sodas without blocking the persons' nose.

III) Analysis of Data:

Type of Soda	**Identification Success Rate**	**Identification Success Rate**
	Taste Alone	Taste + Smell
Grenadine	20%	48%
Orange	20%	40%
Strawberry	28%	60%
Lemon	16%	80%

When the sodas are smelt, their tastes are more easily recognized. Actually, we can notice for each drink, that there are at least twice as many people who can recognize the taste whuke

drinking and smelling the soda than drinking it with eyes blindfolded and nose blocked. For example, grenadine, which involves 20% for the first category and 48% for the second category, and lemon which involves five times as many people in the second category with 16% and 80%.

IV) Summary and Conclusion:

Our experiment shows how difficult it can be to identify foods and other tasty substances by taste alone without the help of smell.

V) Application:

Some of our classmates only identified the sodas after seeing them. Actually, what food looks like seems to have a strong influence on how we think it will taste. Children for instance often do not want to eat certain foods, not because of their flavor, but because of the way they look (strange-sharped, colored, etc.). However, in the modern world, most foods are specially grown and prepared. There is no excuse for not eating our vegetables (even spinach).

Title: Do Boys and Girls Have Similar Smelling Skills?

STUDENT RESEARCHER: Natacha Bérard and Ophélie Piskorski
SCHOOL NAME AND ADDRESS: Lycée Jean Auguste Margueritte
13 place Galland
55107 Verdun
FRANCE
GRADE: 11
TEACHER: Miss Valérie Guérin

1. Statement of Purpose and Hypothesis

The variety of smells we can identify is amazing, but most are too weak for the human nose to detect. Furthermore, we would like to know if we, girls, can detect the same smells as boys. In other words, do boys and girls have similar smelling skills? Our hypothesis is that boys or girls have the same tasting abilities.

2. Methodology

Materials

- 3 items with distinctive smells inside: banana(weak smell), onion(middle-strong smell), and munster cheese(strong smell)

- 15 boys and 15 girls who will test all the different substances;

Procedure

Step 1 : enclose the items in plastic containers so that the odors do not mix.

Step 2 : punch holes in the top of the containers to eliminate the need for a blindfold.

Step 3 : ask the subjects to identify the items they smell.

Variables

- Independent variable : Gender(male or female)

- Dependent variable : Success rate in percent(number of students who identified the item by smell / total number of students)

Constants

- the type of container

- the quantity of banana / onion / cheese enclosed in each container

- the time allowed to the subject to identify the smell

3. Analysis of Data

Percentage of Identification

GENDER	Weak Smell	Middle-Strong Smell	Strong Smell
MALE	20%	50%	73%
FEMALE	33%	86%	93%

We can clearly notice a difference between the two genders; in particular, in the case of middle-strong smell where subjects are exposed to the same onion odor. Here 86% of women who had smelled the ingredient identified it whereas only 56% of men detected it. So, we must notice that females have a more acute sense of smelling than males.

4. Summary and Conclusion

Contrary to what we had expected, this experiment shows some differences between men and women' smelling abilities. It seems that women have a sharper sense of smelling than men for some yet unexplained reasons.

5. Application

It appears that further research comparing the smelling abilities of boys and girls is needed because the differences observed could be related more to individual differences than to gender. Maybe we should suggest this topic of research to our friends who will be in grade 11 next year and ask them to work on the differences between people who smoke and do not smoke.

Title: Test Your "Sidedness"

STUDENT RESEARCHERS: Laëtitia KRIANINE
Nathalie BOURGOIS
Anne-Laure DORMOIS
Eugénie VENTURINI
SCHOOL NAME AND ADDRESS: Lycée Jean-Auguste MARGUERITTE
13 Place Galland
55107 Verdun
France
GRADE: 11
TEACHER: Miss Valérie GUERIN

I. STATEMENT OF PURPOSE AND HYPOTHESIS

Most of our friends are right-handed. We would like to know if they also prefer to use their right foot, eye and ear for most tasks. Our hypothesis is that right-handed (resp. left-handed) students are also right-footed, right-eyed and right-eared (resp. left-footed, left-eyed and left-eared).

II. METHODOLOGY

After having checked our classmates for handedness (See: Procedure A) we tested them for footedness (See: Procedure B), eyedness (See: Procedure C) and earedness (See: Procedure D).
We asked 30 friends to serve as our experimental subjects. In our experimentation, the independent variable is the part of body and the dependent variable is the percentage of right-handed (resp. left-handed) students who use the right-side (resp. left-side).

PROCEDURE A: Right hand / Left hand

Materials: pen or pencil and paper, paper and scissors, cup with water, fork or spoon, and food

Experiment 1: We asked our subject to write his or her name to see which hand was used to write.
Experiment 2: We asked our subject to cut a circle out of a piece of paper to see which hand was used to hold a pair of scissors when cutting.
Experiment 3: We gave a ball to our subject and asked him or her to throw it to see which hand was used to throw an object.
Experiment 4: We observed which hand our subject used to bring the food to his or her mouth (that is to say which hand holds the fork or spoon)
Experiment 5: We observed which hand our subject used to pick up a cup of water to drink.

PROCEDURE B: Right foot / Left foot

Materials: ball, stairs, and coin

Experiment 1: We observed which foot our subject used to kick a ball.
Experiment 2: We had our subject stand with both feet flat on the ground in front of stairs and asked him or her to step up the first step. We noticed which foot was first lifted up.
Experiment 3: We put a coin on the floor and asked our subject to step on it to see which foot was used.

PROCEDURE C: Right Eye / Left Eye

Materials: cardboard tube, paper with small hole

Experiment 1: We gave our subject an empty paper towel tube to see which eye our subject first put up to the tube.
Experiment 2: We cut a smell circle out of a piece of paper. We gave this paper to our subject and asked him or her to look with both eyes through the hole in the paper at a distant object. We asked our subject to bring the paper closer and closer to his or her face while still looking at the distant object. We observed which eye finally reached the hole in the paper.

PROCEDURE D: Right Ear / Left Ear

Materials: Small box

Experiment 1: We spoke very quietly to our subject and see which ear he or she decided to use to listen to our whisper.
Experiment 2: We took a small box and asked our subject to identify what was inside the box by putting an ear up to the box. We observed which ear he or she decided to use.
Experiment 3: We asked our subject to try to listen through a wall to see whether he or she used the right or left ear .

III. ANALYSIS OF DATA

	Sidedness Test	
Part of body	Percentage of right-handed	Percentage of left-handed
	who use the right...	who use the left...
...foot (1)	81%	29%
...eye (2)	71%	56%
...ear (3)	73%	44%

According to our results, 81% of right-handed students are also right-footed, 71% of right-handed students are also right-eyed, and 73% of right-handed students are also right-eared.

According to our results, only 29% of left-handed students are left-footed, 56% of left-handed students are left-eyed and 44% of left students are left-eared.
IV. SUMMARY AND CONCLUSION
Our hypothesis was almost right because most right-handed people are also right-footed, right-eyed, and/or right-eared.
As for left-handed people, there is no link between their dominant hand and the dominant foot, ear, eye which are preferred.
However we can notice that our study was made on only a small number of subjects (because left-handed people are more difficult to come by). It would be better to do our study again on a bigger scale to obtain significant results.
V. APPLICATION
The background research that we have carried out for our experimentation have brought us to consult different work about the origin of handedness. We can state that the reason or reasons for hand (foot, ear, eye) dominance are still unknown.

Title: Short Term and Long Term Memory

STUDENTS RESEARCHERS: Mathieu FRANCART, Alexandre LAFLOTTE, and Mylène WILLAUME
SCHOOL NAME AND ADDRESS: Lycée Jean Auguste Margueritte
13, place Galland
55107 VERDUN
France
GRADE: 11
TEACHER: Miss Valérie GUERIN
I. Statement of Purpose and Hypothesis:
Our brain has an incredible and very selective ability to remember. It is said that there are several types of memory. We would like to check this assertion. Our hypothesis is that we have at least two types of memory processes: 1) a short-term memory which deals with information that we have just received, and 2) a long-term memory for former events.
II. Methodology:
Materials: a list of 20 usual words (e.g. apple, car, book), paper and pencils for our subjects to write down what they remember
We recruited 35 students to serve as an experimental subjects.
Procedure: We read to the students a list of 20 words at a rate of one word every second. They were told to remember as many of these words as possible. Immediately, after reading the list, we asked them to write down the words that they remembered. We collected their list of words to analyze the results of our memory study. To know if there was better recall of words that there were read first or last, we assigned a position to each word of our list; then we calculated the percentage of recall for each of the 20 words (for example if 14 students out of 35 remembered the word "apple", then "apple" (word number 1), had a percent recall of 40%).
Variables:
Independent variable: word position,
Dependent variable: percentage of recall.
Constants: The words used in the list, the time allowed to return the remembered words (20 seconds).
III. Analysis of Data :

	A	B
1	MEMORY TEST	
2	Words Position	Percentage of Recall
3	1	51 %
4	2	60 %
5	3	43 %
6	4	6 %
7	5	36 %
8	6	30 %
9	7	18 %
10	8	24 %
11	9	42 %
12	10	33 %
13	11	15 %
14	12	3 %
15	13	33 %
16	14	6 %
17	15	48 %
18	16	39 %
19	17	51 %
20	18	51 %
21	19	45 %
22	20	87 %

Words read first and words read last are remembered better than words read in the middle of the list.

IV. Summary and Conclusion:

Our hypothesis was true. This experiment provides evidence that there are two types of memory processes. Memory is good for the words read last because they are still in short term memory. Memory is good for the words read first because they made it into long term memory. I should be noted that it is possible that some words on our list were very easy to recall for other reasons. Everyone found the word "frog" easy to remember because we studied it just before in our Biology course!

V. Application:

As its name suggests, short-term memory has a very limited time span. It could be interesting to demonstrate with a new set of students. We could ask our subjects to remember the same set of words as before, but immediately after reading the list try to distract then for about 30 seconds. Will distraction cause them to forget the words at the end of the list?

Title: Does Fat Insulate an Animal?

STUDENT RESEARCHER: Stephen Levy
SCHOOL: Mandeville Middle School
Mandeville, Louisiana
GRADE: 5th
TEACHER: Mrs. C. Erkel, M.Ed.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I wanted to do a scientific research project to see if the layer of fat under an animal's skin helps to keep it warm. My hypothesis stated that the fat an animal has will keep it warmer than if it did not have a layer of fat.

II. METHODOLOGY:

First, I stated my purpose. Second, I reviewed my literature. Then I developed a hypothesis. Then I wrote my methodology. Next, I made a list of materials which were: 1) a cup of lard, 2) two bulb-type thermometers, 3) two 10 ounce cups, 4) a timer, 5) a data collection form, 6) a pencil, and 7) a freezer. I made my data collection form.

Next, I filled one of the cups with lard. I put one thermometer into the cup filled with the lard so that the bulb of the thermometer was in the center of the lard. Next, I stood the second thermometer in the second (empty) cup. I read the temperature on each thermometer and recorded each temperature on my data collection form. Then I put both cups in the freezer. I read the temperatures shown on each of the thermometers every three minutes for 30 minutes and recorded my temperature findings on my data collection form. I repeated the whole procedure two more times. I analyzed my data, wrote my summary and conclusion, and applied my findings to the real world.

III. ANALYSIS OF DATA:

In trial one, both thermometers started with a temperature of 72 degrees Fahrenheit. After 30 minutes in the freezer, the thermometer with no insulation of fat registered 26 degrees Fahrenheit and the thermometer with insulation had a temperature of 68 degrees Fahrenheit. In trial two, both thermometers started with a temperature of 73 degrees Fahrenheit. After 30 minutes in the freezer the thermometer with no insulation of fat registered 5 degrees Fahrenheit and the thermometer with insulation had a temperature of 67 degrees Fahrenheit. In trial three, both thermometers started with a temperature of 74 degrees Fahrenheit. After 30 minutes in the freezer, the thermometer with no insulation of fat registered 0 degrees Fahrenheit and the thermometer with insulation had a temperature of 67 degrees Fahrenheit.

IV. SUMMARY AND CONCLUSION:

In all three trials, the fat kept the thermometer warmer than the thermometer with no fat. Therefore, I accept my hypothesis that stated that the fat an animal has will keep it warmer than if it did not have a layer of fat.

V. APPLICATION:

Now that I know that a layer of fat keeps an animal warmer, I can wear some sort of insulation of clothing to keep warmer when it is cold outside. I'm not going to smear fat all over my body before going outside into cold weather, so I can research a material that has a similar k-value to animal fat to find a good insulation material.

Title: Which Freezes Faster... Fresh Water or Salt Water?

STUDENT RESEARCHER: Matthew Meyer
SCHOOL: Mandeville Middle School
Mandeville, LA
GRADE: 5th
TEACHER: Cherie Erkel, MED

I. STATEMENT OF PURPOSE & HYPOTHESIS:

I wanted to find out which type of water, fresh water or salt water, freezes the fastest. My hypothesis states that fresh water will freeze the fastest.

II. METHODOLOGY:

The materials needed are a freezer, water, salt, a pencil, a measuring cup, two containers of the same size, a data collection form, a toothpick, a teaspoon, tape, a timer, and a marker.

First, you need to gather all the materials. Next, using the measuring cup, pour 1/4 cup of water into each container. Label one of the containers by writing "fresh water" on a piece of tape and placing it on top. Label the other container "salt water". Then pour one teaspoon of salt into the container of water labeled "salt water" and stir. After that put the containers next to each other in the freezer. Using a timer, check the containers every 5 minutes by poking the

toothpick in the water. When the toothpick does not penetrate the water it is frozen. Write down on the data collection form how long the salt and fresh water took to freeze in five minute intervals. Repeat these procedures for two more trials.

III. ANALYSIS OF DATA:

In the experiment, the fresh water started to freeze and completely froze before the salt water. As the water froze, I observed that the fresh water froze in sheets and the salt water froze in little pieces. In Trial I, the fresh water completely froze in 180 minutes and the salt water completely froze in 240 minutes. In Trial 2, the fresh water completely froze in 175 minutes and the salt water completely froze in 265 minutes. In Trial 3 the fresh water completely froze in 175 minutes and the salt water completely froze in 365 minutes. The average amount of time for the fresh water to completely freeze was 176 minutes and the salt water's average time was 290 minutes. In all three trials, the fresh water started to freeze and completely froze about the same time. The salt water started to freeze and completely froze at different times.

IV. SUMMARY AND CONCLUSION:

I found out the fresh water froze faster than the salt water. Therefore, I accept my hypothesis, which stated that the fresh water would freeze faster than the salt water.

V. APPLICATION:

I can apply my findings to the real world by telling family and friends that if you want to freeze something faster, use fresh water. Also, if you want to melt something faster use salt water. By sprinkling salt on a wet roadway in freezing weather, it may slow down the time in which ice forms on the roadway. This would help to make traveling safer.

Title: **The Stroop Interference Effect and Gender**

STUDENT RESEARCHER: Laura Williams
SCHOOL: Mandeville Middle School
Mandeville, LA
GRADE: 5th
TEACHER: Cherie Erkel, MED.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

Will there be a difference between males and females when testing color recognition times and word reading times using the Stroop interference effect? My hypothesis states that there will be a difference between males and females in color recognition times and word reading times using the Stroop interference effect.

II. METHODOLOGY:
MATERIALS:
10 male subjects, 10 female subjects, 1 stopwatch, 1 notebook to record results, 1 pen, 34-3"X5" index cards, 1 purple marker, 1 green marker, 1 red marker, 1 orange marker, 1 yellow marker, 1 blue marker, 1 black marker, 1 calculator

PROCEDURE:

1. Count out two separate sets of 17 cards. Take one set of cards and use the black marker to write the names of the following colors on 16 of the cards. Write one word on each of the 16 cards. Write the following words: red, yellow, blue, orange, green, purple, red, yellow, blue, yellow, blue, red, green, purple, orange and green. The extra card is a cover card. This is the control set of cards.

2. Using the second set of 17 cards and the six different colored markers (purple, green, red, orange, yellow, and blue), prepare the second set of cards. Write a color word on each card according to this list. The other card will be a cover card.

WORD	MARKER COLOR
red	yellow
yellow	blue
blue	red
orange	green
green	purple
purple	orange
red	green
yellow	purple
blue	orange
yellow	red
blue	yellow
red	blue
green	orange
purple	green
orange	purple
green	red

3. Each set of cards is read separately. Have each subject read the set of black and white cards first. Then use the colored set of cards for recognition of the color of the word written on the cards. The subject must state the color of the marker not the word written on the card. Finally, read the colored set of cards for the word written on the cards. The subject must read the cards as quickly as possible. Use the cover cards to prevent the subject from starting too soon. Tell the subject when to begin reading each set of cards and time with a stopwatch. They must correct any mistakes that are made in reading. Stop the stopwatch when they have finished reading each set of cards and record the results. Do not allow the subject to repeat the tests because the subject can learn to read the cards faster with practice. This skill can be learned.

4. Separate the reading results into male and female categories. Average the results of each test for males and females. Then compare the results to determine whether males or females performed each test most efficiently.

III. ANALYSIS OF DATA

1. The average reading time of the black and white cards for males was 18.902 seconds. The average reading time of the black and white cards for females was 14.532 seconds. The female test group was faster by an average of 4.37 seconds.

2. The average reading time for reading the colors on the colored set of cards for males was

24.240 seconds. The average time for reading the colors on the colored set of cards for females was 20.636 seconds. The female test group was faster by an average of 3.604 seconds.

3. The average reading time for reading the words on the colored set of cards for males was 20.082 seconds. The average reading time for reading the words on the colored set of cards for females was 13.922 seconds. The female test group was faster by an average of 6.16 seconds.

4. Female subjects were faster in all reading tests.

5. All subjects had an increased reading time when asked to recognize the color of the word rather than read the word on the colored set of cards. This is the result of interference within the brain.

IV. SUMMARY AND CONCLUSIONS:

I accept my hypothesis that there is a difference in color recognition and word reading times between male and female subjects. In my experiment, the female subjects were faster in recognizing the colors and in reading the words than the male subjects. According to the Stroop Effect, male subjects should be better at reading the words and female subjects should be better at recognizing the colors. My experiment's results did not agree with the Stroop Effect results. All subjects were faster at reading the words than recognizing the colors. This result agrees with the Stroop Effect results.

V. APPLICATION:

This experiment can be used to understand how the brain works. There are differences between male and female brains. It also may help us to understand if the differences in the brains of males and females is due to genetic differences or from what we are taught. Teachers could use this information to teach more effectively. Would girls and boys do better in school if they were in separate classes and taught by different methods?

Title: **Want A Lift?**

STUDENT RESEARCHER: David Hotard
SCHOOL: Mandeville Middle School
Mandeville, LA
GRADE: 5th
TEACHER: Cherie Erkel, M.Ed.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I wanted to find out what effect the curve on the top of a wing would have on the lift of the wing. My hypothesis stated that the greater the curve of the top of the wing (the longer the length of the top of the wing) the greater the lift.

II. METHODOLOGY:

I stated my purpose, reviewed the literature, and wrote my hypothesis. I designed my "wing lift test stand" and gathered the materials: nails, plastic straw, coat hanger, hair dryer, silver

paint, index cards, clear tape, masking tape, pencil, scissors, protractor, various pieces of wood, and woodworking tools: drill, saw, sander and hammer.

First, I designed, and with my Dad's help, constructed the "wing lift test stand." The test stand consisted of 2 vertical rods (made from a coat hanger), approximately 10 inches high and 2 inches apart. Two rods were necessary to keep the wing(s) from rotating around a single vertical rod. A brace was added at the top of the vertical rods to make sure they were straight and remained 2 inches apart. A straw one-inch high was placed around each vertical rod to hold the wing(s) above the base of the test stand. A holder was made for the wind source (a hair dryer) to allow the "angle of attack" of the wind on the wing to be controlled and measured. The "wing lift test stand" was assembled from coat hangers, straws, various pieces of wood and placed on a 6-inch x 12-inch plywood base, and then painted "aluminum."

Next, I constructed three (3) test wings out of index cards, each with a little longer length for the top wing. The bottom length of each wing was 2 1/2 inches; the top length of the three wings was increased by 1/8 inch, 2/8 inch and 3/8 inch.

I placed each of the wings in the "wing lift test stand," and experimented with the best angle of attack for the wind from the hair dryer using a scale on the "wing lift test stand." I determined that the best angle of attack was 5 degrees.

I conducted my experiment by placing each wing in the "wing lift test stand" and turning on the hair dryer to create the wind with an angle of attack of 5 degrees. I did this three times for each wing and measured the lift of the wing using a ruler. I recorded the results on my data collection form and analyzed it. I wrote my summary and conclusion, accepted or rejected my hypothesis, and applied what I learned to explain things that I have observed in the outside world.

Ill. ANALYSIS OF DATA

The results were as follows:

Wing	Test 1	Test 2	Test 3	Test 4
1/8 inch	2 in	2 5/8 in	2 in	2 5/8 in
2/8 inch	3 in	2 7/8 in	3 in	2 23/24 in
3/8 inch	3 3/8 in	3 in	3 in	3 11/24 in

The wing with the least curve, or the shortest length on the top of the wing, rose the least, or about 2 inches. The wing with the intermediate curve, and the intermediate length on the top of the wing, rose an amount in between the other two wings, or about 3 inches. The wing with the greatest curve, or the greatest length on the top of the wing, rose the most, or about 3 inches.

IV. SUMMARY AND CONCLUSION:

I found that the wing with the greatest curve, or the longest length on the top of the wing, had the highest lift. Therefore, I accepted my hypothesis that the greater the curve of the top of the wing (the longer the length of the top of the wing) the greater the lift.

V. APPLICATION:

Since my Mom is a flight attendant and flies on a lot of airplanes, I am glad that I now understand how the airplane lifts into the air. I can explain this principle to family and friends that might be flying.

Title: What Effect Does Acid Rain Have On Radishes and Onions?

STUDENT RESEARCHER: Brittany Dehart
SCHOOL: Mandeville Middle School
Mandeville, Louisiana
GRADE: 5
TEACHER: Cherie Erkel, M.Ed.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I wanted to know what effect does the amount of acid rain have on two bulb vegetables (radish and onion). I will pour 5 cc, 30 cc, and 45 cc of acid rain solution on a radish and an onion. Then I will observe the effect that the acid rain has on the vegetables within a time frame of 24 hours. My hypothesis states that 45 cc of acid rain solution will have the greatest effect and show more deterioration on the radish than the onion.

II. METHODOLOGY:

I wrote my statement of purpose and review of literature on acid rain. Then I developed my hypothesis. Then I wrote my methodology.
Gather materials: an acid rain solution (90 % water, 10% sulfuric acid, with a pH of 2), 4 radishes, 4 onions, 4 small paper plates, a pair of safety goggles, 2 pairs of safety gloves, protective chemical gown, a clock a pencil, tongs, 6 beakers a data collection form.
Put on your safety goggles, a chemical gown, and 1 pair of gloves. After this, you pour 15 cc of acid rain solution in 2 separate beakers (marked radish and onion). You then repeated this procedure with 30 cc and 45 cc of acid rain solution. Next, you replace your gloves with a new pair. Then you place a radish and an onion used as a control vegetable on a paper plate labeled "control." Next label a paper plate Trial 1, 15 cc of acid rain solution, a paper plate labeled Trial 2, 30 cc, and another paper plate labeled Trial 3, 45 cc of acid rain solution. Next, take 3 radishes and 3 onions (about the same size) and place 1 radish in a beaker marked 15 cc, 1 radish in a beaker marked 30 cc, and 1 radish in a beaker marked 45 cc. Do the same with the 3 onions. After placing all the onions and the radishes in their assigned beakers, let the vegetables sit in the beakers for 20 minutes, to absorb the acid rain. Then remove the vegetables with a pair of tongs and place the vegetables on their assigned plates, and let them sit there for 24 hours. After 24 hours, examine the vegetables for deterioration, changes in skin texture, size, and color. Record your results in a data collection form.

III. ANALYSIS OF DATA

In all three trials, the onion showed no deterioration. The color of the onion that had 15 cc of solution poured on it had no color change, unlike the onions with 30 cc and 45 cc. The onions with these amounts (30 cc and 45 cc) had light brown spots. For all three trials no holes were seen and the size of the onions didn't change.
The radish, on the other hand, had much different results from the onion. In trial 1 (15 cc) and trial 2 (30 cc), the radish had some deterioration. In trial 3 (45 cc), the radish was completely deteriorated. In trial 1 and 2, the radish lost it's red color. Eventually, the radish was blackened (trial 3). No holes were seen in trial 1, but in trial 2, there was small, 1/4-inch holes

noted. In trial 3, big, 1/2-inch holes could be seen all around the radish. In trial 1 and 2 the radish had decreased it's size by 25%). By trial 3, the size had decreased to 50%.

IV. SUMMARY AND CONCLUSION

In this experiment, I found that the amount of acid rain has an effect on these two bulb vegetables, a radish and an onion. I thought that the onion with 45 cc of acid rain solution would least effected and the radish the most, and my data indicated that I was correct. Therefore, I accept my hypothesis which stated that 45 cc of acid rain solution will effect the radish the greatest and the onion the least. In all three trials, the radish had the most deterioration, loss of color, holes, and size change compared to all the onions. As the amount of acid rain increased, so did the deterioration on the radish. The acid rain solution did not effect the onion, probably because of its protective shell.

V. APPLICATION

This information could be used to help educate farmers and vegetable growers who live in an area predisposed to acid precipitation. It gives them vital information about which type of vegetables to grow if they live in these kinds of areas (for example growing vegetables with a protective shell or covering like an onion).

Title: Will Different Air Temperatures Affect the Size of a Balloon?

STUDENT RESEARCHER: Alex Dessens
SCHOOL: Mandeville Middle School
Mandeville, LA 70448
GRADE: 5th
TEACHER: Cherie Erkel, MED.

I. STATEMENT OF PURPOSE AND HYPOTHESIS:
I want to find out if the temperature of air inside of a balloon affects the size of the balloon. My hypothesis states that hot air will make the balloon bigger.
II. METHODOLOGY:
First, I gathered the materials. Second, I filled the pot halfway with water and heated it over a medium heat on the stove. Third, I filled the bowl halfway with a mixture of ice and water. Then I blew up the balloon and tied a knot in it, and using the marker, placed an X on the widest part. Next, I measured the circumference of the balloon by placing the tape measure on the X. l recorded the original circumference. I then placed the balloon in the ice water for 3 minutes. I took it out and again measured and recorded the circumference. Then, using tongs, I held the balloon in the warm water for 3 minutes. Lastly, I took the balloon out and measured and recorded the circumference. I repeated this procedure three times.
III. ANALYSIS OF DATA:
Results of the trials were as follows:
Original Circumference
Trial 1: 17 7/8 in
Trial 2: 17 3/8 in
Trial 3: 19 in
Cold Water
Trial 1: 17 5/8 in
Trial 2: 17 in
Trial 3: 18 3/4 in

Warm Water
Trial I: 18 in
Trial 2: 17 1/2 in
Trial 3: 19 1/4 in
The average decrease in the circumference of the three balloons in the cold water was 1/4 inch, while the average increase in circumference of the three balloons in the warm water was 1/8 inch.
IV. SUMMARY AND CONCLUSION:
I found out that if the temperature of air inside a balloon is cooled, the balloon will become smaller, and if the temperature of air inside a balloon is warmed, the balloon will become bigger. Therefore, I accept my hypothesis, which stated that hot air inside of a balloon will make the balloon bigger.
V. APPLICATION:
Don't put a balloon outside on a hot day or it will get bigger and pop.

The National Student Research Center
E-Journal of Student Research: Science

Volume 9, Number 2, August, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: How Color Affects the Temperature of Styrofoam

STUDENT RESEARCHER: Susan Travis
SCHOOL: Leroy E. Mayo Elementary
Holden, MA
GRADE: 5
TEACHER: Mr. Boisselle

I. STATEMENT OF PURPOSE AND HYPOTHESIS:
The purpose of this experiment is to find the effect of color on the temperature of Styrofoam. My hypothesis states that, out of all the colored plates, the black colored Styrofoam will absorb the most heat and that the white will absorb the least amount of heat.

II. METHODOLOGY:

First, I chose my topic and I wrote my statement of purpose. Then I wrote my review of literature. Then I came up with a hypothesis based on the review of literature and wrote my methodology. Then I made a list of materials. Next, I made a data collection form. Afterwards, I started conducted the experiment by taking eight different Styrofoam plates and covering them with a different color piece of paper (white, yellow, red, orange, green, blue, purple, and black). I also left one without color on it, out of curiosity. Then I placed another plate under each one. I took a thermometer and put it between the plates and made sure that the thermometer did not touch the sides (for even exposure). Then I placed the plates 120 cm. underneath the lamp and let it sit for 5 minutes. I then recorded the temperature of the thermometer on a data collection sheet. I let the plate sit at room temperature for one minute. I did this twice for each plate. Next, I wrote my analysis of data. I then wrote my summary and conclusion and applied my findings to the world outside the classroom.
III. ANALYSIS OF DATA:
The average temperature of the white plate was 70.25 F. The average temperature of the blank plate was 73 F (room temperature). The average temperature of the yellow plate was 73.5 F. The average temperature of the red plate was 73.75 F. The average temperature of the green plate was also 73.75 F. The average temperature of the orange plate was 74.75 F. The average temperature of the blue plate was 74.75 also. The average temperature of the purple plate was 75.25 F. The average temperature for the black plate was 76.25 F.
IV. SUMMARY AND CONCLUSION:
I found that the color black absorbed the most heat, then purple, then blue, then orange, then green, then red, then yellow, then the blank plate, and then the white. Therefore, I accept my hypothesis which stated that, out of all the colored plates, the black colored Styrofoam will absorb the most heat and that the white will absorb the least amount of heat.
V. APPLICATION:
I can apply my observations to the world outside the classroom by telling people not to buy black or other colors during the summer, but to buy those certain colored garments in the winter time, as they absorb more heat. Depending on where people live, they should have different colored cars or other ways of transportation. If someone lives in a warm place, their car should be white or a light color. If someone lives a cold place, his/her way of transportation should be black, or a dark color like navy blue, as it will absorb heat. Tents used for camping and sleeping bags should be black or a dark color unless camping in a very warm climate.

Title: Parachute Construction and Float Time

STUDENT RESEARCHER: Yuantee Zhu
SCHOOL: Mayo Elementary School
Holden, Massachusetts
GRADE: 5
TEACHER: Wayne Boisselle
I. STATEMENT OF PURPOSE AND HYPOTHESIS:
I wanted to find out which type of paper or any other material would stay in mid-air the longest. My hypothesis states that the parachute made out of loose leaf paper (20cm by 19cm) would stay in mid-air longer than a parachute made out of Kleenex, newspaper, tin foil, Syrian wrap, paper towel, or an overhead sheet of the same dimensions.
II. METHODOLOGY:
First, I wrote a statement of purpose, reviewed the literature and developed an hypothesis. Secondly, I cut out a 20cm by 19cm piece of an overhead sheet, loose leaf paper, Kleenex, newspaper, tin foil, Syrian wrap, and paper towel. Third, I attached a 12 centimeter piece of

string to the ends of each parachute where I poked holes. After that I taped a penny to the other end of the strings. Finally, I dropped each parachute from a 3 meter height. I recorded the amount of time the parachute took to hit the ground using a stopwatch.

III. ANALYSIS OF DATA:

Material	Time-Trial 1	Time-Trial 2	Average
Overhead Sheets	1.5	1.6	1.55
Paper Towel	1.7	1.7	1.7
Kleenex	1.8	1.7	1.75
Saran Wrap	1.8	1.8	1.8
Loose Leaf Paper	2	1.9	1.95
Tin Foil	2.1	2.2	2.15
Newspaper	2.3	2.7	2.5

The parachute made out of loose leaf paper was in the air for 2.0 seconds for trial 1 and 1.9 seconds for trial 2 with an average of 1.95 seconds. The parachute made of Kleenex was in air for 1.8 sec. for trial 1 and 1.7 sec. for trial 2 with an average of 1.75 sec. The parachute made of paper towels was in air for 1.7 sec. for trial 1 and 2 with an average of 1.7 seconds. The parachute made of newspaper was in air for 2.3 sec. for trial 1 and 2.7 sec. for trial 2 with an average of 2.5 seconds. The parachute made of overhead sheets was in air for 1.5 sec. for trial 1 and 1.6 sec. for trial 2 with an average of 1.55 seconds. The parachute made of Saran wrap was in air for 1.8 sec. for trial 1 and 2 with an average of 1.8 seconds. The parachute made of tin foil was in air for 2.1 sec. for trial 1 and 2.2 sec. for trial 2 with an average of 2.15 seconds.

V. SUMMARY AND CONCLUSION:

According to my research, I found out that newspaper would float in mid-air the longest. Therefore, I reject my hypothesis which stated that the parachute made out of loose leaf paper would stay in mid-air longer than a 20cm by 19cm parachute made out of Kleenex, newspaper, tin foil, Saran wrap, paper towel, or an overhead sheet.

V. APPLICATION:

I learned from this experiment that, to make a successful parachute, it would have these characteristics: the material of the parachute's area should be larger than it's density and mass. The material should be strong and durable so the wind doesn't tear through it.

Title: Toby's Toys

STUDENT RESEARCHER: Nicole Knight
SCHOOL ADDRESS: Pleasants Co. Middle School
Belmont, WV
GRADE: 6th
TEACHER: Mrs. Strickler

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I wanted to know what toy my dog, Toby, likes best. I thought he would pick his celery stick or the football because those are the main toys he plays with. He never plays with his red bone, so I thought he wouldn't pick that as much. My hypothesis stated that if I give Toby several toys, he would choose a favorite.

II. METHODOLOGY:

I conducted this project by laying the four toys in a row. The toys were the football, a celery stick, a brown bone, and a red bone.

The celery stick is green and has a black and white smiley face. It's soft rubber, squeezy and makes noise. The football is blue, hot pink, yellow, black and white. It is soft, squeezy and makes noise. The floppy bone is soft and red. It isn't squeezy and does not make noise. The brown bone is hard plastic and smooth. It is not squeezy and does not make noise.

After setting the toys out, I held Toby back and then let him go. He sniffed them, then went for one, and ran away with it or came back with it. I charted his behavior for 22 days.
III. ANALYSIS OF DATA:
Toby sniffed the red bone 3 times and he chose it 0 times.
Toby sniffed the celery stick 3 times and chose it 8 times.
Toby sniffed his football 5 times and chose it 11 times.
Toby sniffed the brown bone 6 times and chose it 3 times.
I laid the toys out on the floor in front of Toby 22 times. My charts compare how many times he sniffed each toy and how many times he picked each toy.

III. SUMMARY AND CONCLUSION:
Toby sniffed the brown bone more than the other toys. The toy that Toby likes best is his football. He chose the football the most. His second favorite is the green celery stick. Toby's third pick is the brown bone. The last and least favorite choice is the red bone. Toby doesn't like it very much at all.
My data showed that my hypothesis was correct. Toby chose the football the most times and the red bone the least. Also, he didn't always choose what he sniffed. Sometimes he didn't sniff the toys first, he went straight for the toy he wanted to pick.
IV. APPLICATION:
This experiment is about what choices a dog makes in a given time period. Dog toy companies could test to see if dogs prefer large or small, smooth or rough, hard or soft, squeezy or not squeezy, bright or dull, fragrant or odorless, and taste or tasteless toys.

Title: **What Makes You Sneeze?**

STUDENT RESEARCHER: Jeremy Barsema
SCHOOL ADDRESS: Morrison Junior High School
Morrison, IL
GRADE: 8
TEACHER: Mrs. Rena Rickles
I. STATEMENT OF PURPOSE AND HYPOTHESIS:
One day I went to see a movie. When I came out I noticed people were sneezing. This got me to thinking. Do people sneeze when they leave a movie and enter the bright sunlight?
I wanted to answer the question, "Do you sneeze when you come out of a dark theater into the bright sunlight?" I predicted that more people will say no than yes.
I also wanted to answer the question, "Do you get a headache when you sit too close to the screen?" I predicted that more people will say no than yes.
II. METHODOLOGY:
1. I made my observation.
2. I made my hypothesis.
3. I developed a questionnaire with questions.
4. I surveyed twenty people.
5. I recorded the ages and answers from my respondents.
6. I charted my results.
7. I made my conclusion.
8. I published my report.
III. ANALYSIS OF DATA:

Age	Do you sneeze when you come out of a dark theater into the sunlight?	What makes you sneeze other than a cold?	Do you get a headache if you sit to close to the screen?	Where do you like to sit in the theater?
57	No	Pepper	No	Middle
60	No	Sun	No	Back
34	No	Dust	No	Middle
34	No	Pepper	No	Middle
30	No	Pluck eyes	Yes	Middle
31	No	Pepper	No	Middle
31	No	Pepper	No	Back
13	Yes		No	Front
6	Yes		Yes	Back
36	Yes		Yes	Back
15	No	Pepper	No	Front
12	No	Pepper	No	Middle
30	Yes		No	Back
6	Yes		No	Front
19	No	Dust	No	Middle
58	No	Pepper	Yes	Middle
29	No	Dust	No	Middle
31	Yes		Yes	Back
13	No	Dust	No	Middle
14	Yes		No	Front
	No	Dust	No	Back

Only seven of the twenty people in my survey sneeze when they come out of a dark theater into the sun. Seven people said that pepper makes them sneeze and five said that dust makes them sneeze. Only five said that they get headaches if they sit too close to the screen. Ten people like to sit in the middle of the theater and seven like to sit in the back.

IV. SUMMARY AND CONCLUSION:

I conclude that most people do not sneeze when they leave a dark theater. I also conclude that most people do not get headaches from sitting too close to the screen. So my hypotheses were right.

V. APPLICATION:

I think the theaters should provide lighting that would help people adjust before walking outdoors. They could turn the lights on in the theater and provide an after movie presentation for 3 to 5 minutes to give the lights time to work. Another option is to have theaters post signs on the door advising people to wear sunglasses as they leave to help their eyes adjust to the light again.

Title: **The Effect of Temperature on the Flight of Golf Balls**

STUDENT RESEARCHER: Mitchell Parsons
SCHOOL: Bellbrook Jr. High
Bellbrook, Ohio
GRADE: 7th grade
TEACHER: Mrs. St. Pierr

I. STATEMENT OF PURPOSE AND HYPOTHESIS:

I wanted to find out if the temperature of a golf ball would affect the distance it traveled when struck. I thought that the temperature would affect the distance it would travel. The warmer the golf ball, the father it would travel and the colder the ball, the less distance it would travel.

II. METHODOLOGY:

I built a hitting machine that would hit the golf balls with an equal amount of force each time.

Materials

-20in by 24in piece of plywood
-Clay pigeon thrower
-Sawhorse
-18 Maxfli golf balls
-5 iron golf club
-"c" clamp
-pencil
-paper
-yardstick/tape measurer
-6 bolts
-6 nuts
-golf tee
-artificial hitting surface
-2 cinder blocks & 2 chains

Procedure

1. Buy 18 Maxfli golf balls
2. Buy a clay pigeon thrower
3. Put the clay pigeon thrower together
4. Mount the clay pigeon thrower on a 20in by 24in piece of plywood
5. Mount the clay pigeon thrower and the piece of plywood to a sawhorse
6. Clamp a 5 iron onto the arm of the clay pigeon thrower with 3 "c" clamps. Hook two cinder blocks to sawhorse to stabilize it.
8. Put 6 golf balls in a pan of 66 degree Celsius water for 10 minutes
9. Take 6 golf balls and put them in a freezer overnight (-12 degrees Celsius)
10. Take 6 golf balls and leave them at room temperature overnight (23 degrees Celsius)
11. Take all of the golf balls outside and hit them with the hitting machine you constructed
12. Record data
13. Graph results
13. Write conclusion

III. ANALYSIS OF DATA:

Attempt	1	2	3	4	5	6	Average
Hot	31.50	32.10	32.18	32.63	32.70	32.00	32.350
Cold	32.70	32.78	33.53	33.98	34.64	34.50	33.685
Normal	33.98	34.65	34.98	35.30	36.53	38.20	35.604

IV. SUMMARY AND CONCLUSION:
I found that my hypothesis was partially correct. The temperature did affect the distance. The colder the ball, the less distance it traveled. I was incorrect when I said that the warmer the ball, the farther is would travel. I did not take into account the cover might melt. Actually, the warmer the ball, the less it traveled. Golf balls are made to perform best in normal playing conditions. This is why the room temperature ball went the farthest.
V. APPLICATION:
In the real world, my results would be very helpful. You now know that when going to play golf never freeze or boil you golf balls. Try to keep them at room temperature. If I were to do this research again, I would test different golf balls, strengthen the hitting machine so it would fully compress the ball, and try less extreme temperatures.

Title: Does Music Affect Your Pulse?

STUDENT RESEARCHER: Elizabeth
SCHOOL ADDRESS: Kucera Middle School
Rialto, California
GRADE: 7
TEACHER: Ms. R. Pearce

I. STATEMENT OF PURPOSE AND HYPOTHESIS:
I was interested in pulse and how to take someone's pulse. I also wanted to see if music affected the pulse so I did an experiment. My hypothesis was that music does affect your pulse. I believed that loud, rowdier music will speed up your pulse or increase it and soft, mellow music like classical music will slow down or decrease a your pulse.
II. METHODOLOGY:
I tested my hypothesis by actually doing an experiment on pulse. I had each person rest for five minutes before testing them. Then I took their pulse for fifteen seconds and recorded the results. After that I had them listen to contemporary music for two minutes. I took their pulse for fifteen seconds then recorded those results. Following that I had that person listen to classical music for two minutes. After that I took their pulse for fifteen seconds. I then recorded my final results. The materials I used were a watch with a second hand, classical music, contemporary music, pencil, and some paper.
III. ANALYSIS OF DATA:
I found that, in most cases, a person's pulse decreases after hearing classical music. Sometimes, depending on the person, a pulse usually will go up after the contemporary music, but that doesn't always happen. My data show that my hypothesis is half way right because only four out of the eight people's pulses did exactly what I thought would happen and that was for the pulse to increase on the contemporary music and to decrease on the classical music.
IV. SUMMARY AND CONCLUSION:
I partially accepted my hypothesis because only half of the people's pulses did exactly what I thought would happen and the other people's pulses didn't do what I thought would happen. I think I could improve this experiment by testing more people and testing more of an age variety of people. What I did wrong was I didn't test enough people and it would have been better if I tested more people.
V. APPLICATION:
This experiment can apply to real life because people listen to music that might make their pulse go up. If I could do more research, I would want to find out why people's pulses don't

all react the same with the same music. This would be important because this could also be the answer to some other people's science questions. Plus, this would be a good question for a research project and also it could be good research.

Title: Scented or Regular?

STUDENT RESEARCHER: Elba
SCHOOL ADDRESS: Kucera Middle School
Rialto, Ca 92376
GRADE: Seventh
TEACHER: R. Pearce

I. STATEMENT OF PURPOSE AND HYPOTHESIS:
I wanted to find out if a regular candle or a scented candle lasted longer. I thought that a scented candle would last longer. I already knew both scented and regular candles were practically made the same, but there had to have been something extra in the scented candle in order to make them scented.
II. METHODOLOGY:
I tested my hypothesis by experimenting. I lit a regular and scented candle and then I recorded which candle lasted longer. The materials that I used were a regular candle, a scented candle, and a match or lighter. This is how I tested my idea. I got a regular candle and then I got a scented candle. Then I got a match. I lit both of the candles and put them where they wouldn't burn any thing. I then checked the candles every thirty minutes. Then after each candle burned out I recorded the outcome.
III. ANALYSIS OF DATA:
I found out a scented candle lasts longer than a regular candle in most of the cases. My data showed that my hypothesis was correct. My hypothesis was correct because I predicted a scented candle would last longer than a regular candle.
IV. SUMMARY AND CONCLUSION:
I accept my hypothesis. A scented candle does last longer than a regular' candle. I think I can improve my experiment by adding in other types of candles. I don't think that I did anything wrong in my project. I followed everything according to my plan.
V. APPLICATION:
This experiment can apply to real life because, if you ever needed a long lasting candle, you would pick a scented candle instead of a regular candle. If I could do more research, I would want to find out if the type of scent a candle has would affect it's chances of lasting longer than a regular candle. This would be important because then I would know to buy the longest lasting candle.

Title: Photosynthesis - A Plant's Greatest Ability

STUDENT RESEARCHER: Robert
SCHOOL ADDRESS: Kucera Middle School
Rialto, California
GRADE: Seventh
TEACHER: Mrs. R. Pearce

I. STATEMENT OF PURPOSE AND HYPOTHESIS:
I was interested in photosynthesis. My hypothesis was that a plant with 24 hours of indirect artificial light would grow faster than a plant in the sun.

II. METHODOLOGY:
I tested my hypothesis by growing three plants. The materials I used were 3-Polka-Dot Plants, water, a measuring cup, sun light, 2 fluorescent lights, a watch, journal, pencil, 3 flower plants, and 3 name-tag-stickers. The manipulated variable was light because I used sunlight, 24 hour artificial light, and off and on artificial light.
To test my hypothesis, I first gathered the correct supplies I needed. Second, I labeled the three name-tag-stickers with "A", "B", and "C". Third, I stuck one marked name-tag-sticker on each one of the Polka Dot Plant's pots. Fourth, I put plant "A" outside. Fifth, I put plant "B" under the first fluorescent light. Sixth, I put plant "C" under the second fluorescent light. Seventh, I kept the fluorescent light above plant "B" lit for twenty-four hours a day. Eighth, I kept fluorescent light above plant "C" lit for 8 hours at a time a day. Ninth, I watered each plant with I/2 a cup of water every twenty-four hours. Tenth, I wrote down all of my observations in my journal using a pencil. Last, I repeated steps 7-I0 of the way I did my project for 8 days.
III. ANALYSIS OF DATA:
I found out that the plant with 24 hour artificial light grew faster than the plant with off and on artificial light and the plant with sunlight. My data show that my hypothesis was correct.
IV. SUMMARY AND CONCLUSION:
I accepted my hypothesis because the plant with 24-hour artificial light grew faster than the plant with off and on artificial light and the plant with sunlight. What I did wrong was water the plants at different times. For instance, I watered plant "A" 45 seconds before plant "B". I don't really think that it affected my project all that much considering that my project has to do with light.
V. APPLICATION:
This experiment can apply to real life because photosynthesis is essential to all living plants. Perhaps in the future photosynthesis will supply oxygen for space travel or underground living. I think that my project could be used in real life by farmers. With my information, they might be able to speed up the process for crop growing and double our food resources.

Title: The Nose Knows

STUDENT RESEARCHER: Jamie
SCHOOL ADDRESS: Kucera Middle School
Rialto, California
GRADE: 7th GRADE
TEACHER: Mrs. R. Pearce
I. STATEMENT OF STATEMENT OF PURPOSE AND HYPOTHESIS:
I was interested in taste buds and smelling. I also wanted to find out if you can taste better with your nose plugged or unplugged. My hypothesis was that you can taste better with your nose unplugged. I already knew that we taste with what we call taste buds.
II. METHODOLOGY:
I tested my hypothesis by putting 3 different flavor Jellybeans in my subjects' mouths (at different times) and plugged their nose and asked what flavor they thought it was. Then I wrote their response down next to the real flavor printed on my data collection sheet. Then I unplugged their nose and asked them what they thought the flavor was. Then I wrote that down, too. The materials I used were a glove, a blindfold, 10 human test subjects, and three different flavored jelly beans for each test subject.
III. ANALYSIS OF DATA:

Out of 10 subjects and 30 guesses with nose plugged, only 5 of the guesses were right. Then with nose unplugged, 14 of the guesses were right. I also found out that 4 subjects were unable to identify the flavor of the jelly beans with their nose plugged and one subject was unable to identify the flavor of the jelly beans with their nose unplugged.
IV. SUMMARY AND CONCLUSION:
I accepted my hypothesis because all of the subjects, except one, could tell the flavor of one or more of the jellybeans with their nose unplugged. I think I could improve this experiment by testing them with more flavors or asking if they can taste it on there tongue.
V. APPLICATION:
This experiment can apply to real life because if someone tries some food and learns that its flavor is gross, than they can plug their nose so they can't taste it.

Title: Smelly Candles Melting

STUDENT RESEARCHER: Cassaundra
SCHOOL ADDRESS: Kucera Middle School
Rialto, CA
GRADE: 7th
TEACHER: Ms. R. Pearce
I. STATEMENT OF PURPOSE AND HYPOTHESIS:
I was interested in finding out if the smell of a candle effects the melting process. My hypothesis was that the scented candle would melt faster because of the perfume used to create the scent. I thought that the scented candle was going to melt faster because the wax seemed thinner.
II. METHODOLOGY:
I tested my hypothesis by letting an unscented and a scented candle burn for the same amount of time. The materials I used were 4 unscented candles, 4 scented candles, and a lighter. I tested my idea by letting an unscented and a scented candle burn for one hour. Then I blew them out at the same time. I then measured the height of each candle.
Ill. ANALYSIS OF DATA:
I found out that the smell of a candle would effect its melting process by making it melt faster. My data show that my hypothesis was correct.
IV. SUMMARY AND CONCLUSION:
I accept my hypothesis because the scented candle melted faster 3 out of 4 tries. I think I can improve this research by increasing the number of trials that I did.
V. APPLICATION:
My experiment can apply to real life because, if electricity goes out, you might want a candle that lasts longer. If I could do more research, I would want to find out what the two candles were made out of because maybe the scented candle had a different type of wax which made it melt faster. This is important because, if you don't want the candle to give off a smell and you want a long lasting candle, you can use an unscented candle.

The National Student Research Center
E-Journal of Student Research: Science

Volume 9, Number 3, September, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: Feet and the Growth of Bacteria

Student Researcher: Scott Cole
School Address: Longfellow Middle School
Falls Church, VA 22043
Grade: 7
Teacher: Mrs. Hankins

I. Statement of Purpose and Hypothesis:

The point of the experiment I conducted was to see which bacteria, bacteria that came from the feet of a human, a rabbit, and a chicken, would grow the fastest. I hypothesized that if the size of the animal that the sample was taken from was increased, then the speed of the growth of the bacteria would increase.

II. Methodology:

I tested my hypothesis by taking samples of bacteria from the feet of a chicken, a human, and a rabbit, placing them in augers, and recording their growth over three days. I used a culture mix, water, a stove, a pot, nine petri dishes, graph paper, and samples of bacteria in my project. The full procedure went like this. I first mixed the water and the culture mix, then boiled it, and added some to each of the petri dishes. Then I pressed the feet of each of the animals on three of the cultures. Next, I recorded the size of the bacteria. I waited for twenty-four hours, then recorded the size again. I repeated this procedure once more. The controls of the experiment were the environment where the cultures were kept, how they were prepared, the time allowed for the bacteria to grow, the type of culture the bacteria was placed on, and the units used to measure the growth of the bacteria. Some possible intervening variables are the amount of each kind of bacteria introduced to each culture and the possibility of contamination of the cultures.
III. Analysis of Data:
The average growth for the chicken cultures was 12 44/125 cm. on the first day, 19 2/3 cm on the second day, and 30 cm on the third day. The average growth for the rabbit cultures was 13 cm the first day, 15 cm the second day, and 19 1/3 cm the last day. Finally, the average growth for the human cultures was 1/30 cm the first day, 3 1/6 cm the second day, and 31 2/3 cm the third day.
IV. Summary and Conclusion:
In the end of the experiment, my hypothesis was correct. During the first and second days though, my hypothesis was incorrect.
These data prove that the growth of bacteria can be erratic or consistent, depending on the kind of bacteria. As for my hypothesis, I'm not sure what to conclude based on the fact that the status of my hypothesis changed day to day. There are possibilities that the cultures were contaminated with bacteria other than the kind I was testing. Also, the rabbit foot had fur on It, while the chicken and human feet didn't. This could've had an influence on the results.
V. Application:
I can't apply my experiment to the real world because the animals' feet which I sampled came from different areas of sterilization. If someone was to repeat this experiment, I would advise he/she to keep the augers as sterile of bacteria (except for the bacteria you are testing) as he/she can.

Title: The Physics of Baseball

Student Researcher: Andrew Lardy
School Address: 2000 Westmoreland St.
Falls Church, VA 22043
Grade: 7
Teacher: Mrs. Hankins
I. Statement of Purpose and Hypothesis:
The topic that I chose was based on the physics that apply to baseball. I wanted to see the effect that different filling materials would have on the distance that a ball would travel when hit by a baseball bat with these materials inside. My hypothesis was that if the bat filling was rolled cork, then the distance traveled by the baseball would increase.
II. Methodology:
I tested my hypothesis by setting up a batting apparatus. This apparatus would hold the baseball bat and be spring loaded so that when it was pulled back to a marked distance, it would swing the bat around and hit the baseball off of a baseball tee with the exact same amount of force every time.

I made this apparatus out of a piece of wood, nuts and bolts, clamps, and hinges attached to a wooden post. My independent variable (the variable in the experiment that is altered purposefully by the experimenter) was the material that the bat was filled with. The different materials I used to fill the bats were solid wood, sawdust, rolled cork, and rubber balls. My dependent variable (the variable that is altered because of the independent variable) was the distance traveled by the baseball when hit by the bat. The first step of the experiment was to obtain a wooden bat and build the bat apparatus. The next step is to mount the solid wooden bat on the apparatus and place the ball on the tee. You then pull back the apparatus to the marked point and release. Have a helper mark the exact point that the ball landed. Mark this spot with some form of a marker. Repeat this 10 times or more. Then drill a hole down the barrel of the bat that you just used. Fill the bat with one of the filling materials and use something to keep the contents in the chamber such as wood putty or packing tape. Mount the newly filled bat and repeat the testing process. Repeat this with every bat filling and then record your results.

III. Analysis of Data:

After I reviewed my data, I found that my hypothesis was incorrect. The rolled cork actually ranked second to last of the four bat fillings in average distance traveled, barely placing ahead of the sawdust filling. Surprisingly, the bat that hit the ball the furthest on average was the solid wooden bat. It surpassed all fillings with a healthy margin. The closest to the solid wooden bat was the rubber ball filling.

IV. Summary and Conclusion:

From my data, I found that the heavier and more solid the bat filling, the further the ball will travel. The wood, obviously the most solid and the heaviest, came out on top of the other fillings. The sawdust was neither solid nor heavy, and it ranked last. The rubber balls placed ahead of the rolled cork because they were tightly packed and weighed more than the cork which was not packed very tightly. The only error in my experiment that I could find was the way I packed the fillings in the bat. I could not pack the cork as tightly as it was supposed to be because I had to be able to remove it so that I could put the other fillings in the bat. The rubber balls however, I had to pack tightly because they would not have fit in the chamber if they were not packed. This is a considerable window for error that may have thrown my findings off from what they should have been.

V. Application:

My experiment could be very useful in the real world. In Major League Baseball, it is illegal to "cork" a baseball bat or do anything to the bat that would make it hollow or filled with something. Unfortunately, this rule has, over time, been broken over and over again. The data that I have found will tell major league players that it is not worth it to fill your bat.

For further research of my experiment, I recommend several things. I think that a more accurate system of measurement to determine the distance traveled by the ball would strengthen the experiment. Also, a method of removing the filling materials from the bat chamber when tightly packed is vital to the relevance of this experiment. The materials when not packed tightly, are of little to no use at all. Another option would be to fill synthetic bats so that every material has a separate bat but there are no flaws or imperfections in the bat itself that would affect the results.

Title: The Amount of Voltage Left in Different Batteries After Four Hours of Use

Student Researcher: Rahul Guha
School Address: Longfellow Middle School
Falls Church, VA 22043

Grade: 7
Teacher: Mrs. Hankins

I. Statement of Purpose and Hypothesis:

I wanted to find out what effect the brand of battery had on the amount of voltage left in the battery after 4 hours of use. I hypothesized that if the brand of battery was Energizer then the voltage would be the most after 4 hours of use.

II. Methodology:

I used 4 brands of AA batteries (Rayovac, a generic brand, Duracell, and Energizer), 1 Ampere Volt Ohms Meter, 1 piece of cardboard, 4 small light bulbs, 4 small light bulb holders, 4 battery holders, 8 strips of rubber insulated wire, 1 watch (with seconds, minutes, and hours), and an apparatus to hold the batteries. The apparatus consisted of the battery in the battery holder connected to the light bulb using rubber-insulated wire. The foundation of the connection was the 1 piece of cardboard.

The first step is to record the voltage of the 4 batteries using the Ampere Voltage Wire Meter and then put the batteries in the holders. Wait for 15 minutes, and after the 15 minutes take the batteries out and test the voltage. Continue this process for 4 hours. I used 3 trials, but the next experimenter may try more.

III. Analysis of Data:

My graphs and charts showed that there was not a significant difference between the amount of voltage in the different brands of batteries after 4 hours of use. The battery that had the largest average amount of voltage after 4 hours of use and three trials was the generic brand with 1.413 volts. In second place was the Duracell battery with 1.411 average volts, the Energizer battery came next 1.405 average volts, and the Rayovac battery did the worst with only 1.395 average volts left after 4 hours of use. In the last 3 hours of the experiment, the Rayovac battery performed poorly compared to the other batteries. After the first hour the batteries had about the same amount of voltage. In the second hour, Duracell was doing the best, followed by the generic brand, then Energizer, and finally Rayovac. After the third hour, the Rayovac and Energizer batteries were becoming slowly exhausted while the Duracell and generic batteries maintained a small and steady drop in voltage.

IV. Summary and Conclusion:

I had predicted that the name brand (and more expensive) Energizer battery would have the most average voltage after 4 hours of use, but I was surprised that the generic (and more affordable) battery performed the best. One possible source of error was the time that I checked the voltage of the battery. The meter I was using did not allow me to check the voltage of each battery at the same time, so I had to take each one out separately. This took more time than it should have and could have tainted some of the information.

V. Application:

Hopefully, my research has solved the problem many American consumers face sooner or later in their lives. That problem is what kind of battery brand lasts the longest. There are so many different brands available that claim to be the best, so it can all get very confusing. I tested the more recognizable name brands and one generic name brand because I was curious to see if cost made a difference in performance. I suggest that, if this experiment is continued, that the next experimenter does more trials, try more battery brands, and wait until the batteries die out. The reason I only tested the batteries for 4 hours was because I had previously done a pilot test for the experiment and found that waiting for the battery to die was very time consuming.

Title: The Effect of Type of Stain Remover on the Ability to Remove Stain

Student Researcher: Jeff Dixon

School Address: Longfellow Middle School
Falls Church, VA 22043
Grade: 7th
Teacher: Mrs. Hankins

I. Statement of Purpose and Hypothesis:
The purpose of this experiment was to determine which type of stain remover could best remove a variety of stains from a handkerchief. The experimenter hypothesized that if Clorox stain remover was applied to the handkerchief, then the amount of stain remaining on the handkerchief would decrease by the greatest amount.
II. Methodology:
The experimenter proceeded to apply stains (grass, chocolate pudding, grape juice, and ketchup) to four separate handkerchiefs. Each of the handkerchiefs was labeled by the name of a stain remover (Clorox, Shout, Spray'n'Wash, Zout) used on it. The experimenter then followed the directions listed on the bottle. After having done this, the experimenter compared the amount of stain on each handkerchief. The experimenter gave each stain remover a ranking (first place, second place, third place, and fourth place) on how well it removed each specific kind of stain. The experimenter then computed the average of the rankings and the results were then used to determine which stain remover worked best.
III. Analysis of Data:
The results placed Clorox in first place with an average ranking of 1.5, Shout in a tie for second place with Spray'n'Wash with an average ranking of 2.25, and Zout in fourth place with an average ranking of 4. The original hypothesis was supported by the data, as Clorox finished first in all of the trials except one, and its average ranking was the best among all of the stain removers. It should be noted, however, that all of the stain removers did an excellent job of getting rid of the stains, and only traces of the stain could be spotted.
IV. Summary and Conclusion:
From experimenting with stain removers, the experimenter has been able to conclude that most stain removers do an excellent job of removing stains, but that Clorox specifically does the best job. In fact, the only stain remover tested that should be avoided is Zout, which failed to perform well on all of the tests.
V. Application:
The experimenter has discovered much about the purchase of stain removers. The experimenter recommends that the consumer purchase Clorox.

Title: The Effect of Light on Change in Lettuce Plant Height

Student Researcher: Colleen Fang
School Address: Longfellow Middle School
Falls Church, VA 22043
Grade: 7th
Teacher: Mrs. Hankins

I. Statement of Purpose and Hypothesis:
The experimenter wanted to know the effect of light on plant growth. The experimenter's hypothesis stated that, if the lettuce plants were placed under artificial (incandescent) light, then the height of the plant would decrease and the plant would die.
II. Methodology:
The materials used in the experiment were ten Styrofoam cups, 20 lettuce seeds, water, ten labels, one black permanent marker, two cardboard boxes, soil, one pencil, and one ruler. Variables in the experiment were natural and artificial light for the groups of independent variables and the change in height of the lettuce plant in cm as the dependent variable. The

control of the experiment was natural light. The procedure for this experiment is to label each of the two groups of five labels A B C D E and one group N (natural) and the other A (artificial) also. Adhere the labels to ten Styrofoam cups. Measure seven cm from the bottom of each cup, make a mark, and fill each cup with soil up to the line. Drop two seeds into each 2.5cm hole in each cup and cover the hole. Leave the plant for eight hours and record its height each day.
III. Analysis of Data:
Both chart and graph created showed that both groups of plants' heights either increased or stayed the same in the first four days, but after a week and three days all plants in the artificial light group died. The plants in the natural light group still were alive.
IV. Summary and Conclusion:
Data such as plant heights in the both light groups either stayed the same or increased and all plants in the artificial light group died, proves that the experimenter's hypothesis was partly true because all the plants in the artificial light group did die, but did not decrease in height. Also, data from research showed that incandescent light does not have all colors from the light spectrum needed for a plant to survive well. Shortcomings in the experiment were the weather and the distance away from the light source. This is because if the weather outside was cloudy then the natural light group would get less light than that of the artificial light group. Also, there was not an accurate way to measure the distance from the light source.
V. Application:
One way the experimenter could apply their research to the real world is by informing people that even though incandescent light is a constant dependable light source; it lacks properties that natural light has, causing natural light to be a better choice to grow plants. The experimenter's findings can help people solve a problem by making them understand why plants grown in artificial incandescent light tend to die or not grow healthily. Suggestions I have for further research are to introduce another group of independent variables such as fluorescent light, so that the experimenter can compare a wider variety of lights. Also, to use more trials.

Title: The Effects of Common Drinks on the Strength of Egg Shells

Student Researcher: Ginger Slack
School Address: Longfellow Middle School
Falls Church, Virginia 22043
Grade: 7
Teacher: Mrs. Libby Hankins
I. Statement of Purpose and Hypothesis:
The purpose of this experiment was to study the effect of popular beverages on eggshell strength. I chose eggs to represent teeth as both are made from calcium. I hypothesized that if the beverage was apple juice, then the number of taps until fracture would be lowest. I was inspired to do this project to help my brother Jonathan who has weak tooth enamel. Dr. Ternisky, my brother's dentist, suggested that fruit juices were the cause of his tooth decay. I wondered what drinks were the most corrosive. For this project, I submerged eggs in drinks for a week, observed and recorded their strengths.
II. Methodology:
I tested my hypothesis by following an easy procedure. First, I gathered all my materials: 20 8-oz. plastic cups, 20 eggs, 5 cups each of orange juice, apple juice, Coke, and tap water, and an Egg Tapper. I poured 1 cup of beverage into 1 plastic cup and repeated this step five times so that each beverage would have 5 trials. Water was used as the control. Next, I submerged an egg into each of the cups and refrigerated them for one week. During the waiting time, I

created the Egg Tapper. After one week, I removed the eggs, observed them, and recorded my observations. Finally, I tested each egg by placing it onto the loading block of the Egg Tapper. I pulled back the handle until it reached the restraint bar and released it. I continued to tap the egg until a fracture was visible. On a data chart, I recorded the number of times it took to fracture the egg.
III. Analysis of Data:
Overall, apple juice weakened the eggshells the most, followed by Coke, orange juice, and then water. The average number of times the eggshell was tapped before it fractured was 2 for apple juice, 2.6 for Coke, 3 for orange juice, and 16.4 for water.
IV. Summary and Conclusion:
Overall, my hypothesis was supported by the data. I guessed if the drink is apple juice, then the number of times the eggshell is tapped until it fractures will be lowest. My mother agreed that apple juice might be the problem because Jonathan chose it as his drink for every meal. During this experiment, I thought demineralization was taking place. Demineralization is the breaking down of minerals by acids. Apple juice, Coke, and orange juice are all acidic. Water is neutral so it wouldn't chemically weaken the eggshell. To improve this experiment, I noted one source of error that might have effected the experiment: detecting the fracture. For example, people with better eyesight would detect smaller fractures. To improve this experiment, I would record the number of taps until the eggshell is completely broken.
V. Application:
This information could help people take care of their teeth: brush, floss, avoid sugars and acidic beverages! One classmate has already thanked me for this information as his brother is also suffering with weakened tooth enamel. With my results, I am helping my brother save his teeth.

Title: The Speed of Dye Ascending to the Carnation's Petals

Student Researcher: Alexander Weber
School Address: Fox Lane Middle School
Bedford, New York
Grade: 7
Teacher : Dr. Carolyn R. Sears
1. Statement of Purpose and Hypothesis:
I wanted to find out how fast it would take for three different colored dyes to travel up a carnation. My hypothesis states that the different colored dyes will travel up the carnation at the same rate because the dyes are simply water with color.
2. Methodology:
I planned to test my experiment by using nine different carnations and three dyes. I put three in red dye, three in blue dye and three in green dye. I used three carnations in each dye so that I had a bigger sample size. In the same type of glass, I placed a cup of water and twenty drops of dye. I placed three carnations in each glass. I recut the stems so it was a fresh cut and the stem length was 6 1/4 inches. I placed the glasses in the same place so they then had the same sunlight. These were all my control variables. My only independent variable was the different color of the dyes. The dependent variable was the time it took for the dye to ascend through the stem and enter the carnation's petals.
3. Analysis of Data:
The red dye traveled up the carnation in an average time of 1 hour 58 minutes. The blue dye went up the carnation in an average of 1 hour and 19 minutes. The green dye went up the carnation in an average of 2 hours 11 minutes.
4. Summary and Conclusion:

I found out that the blue dye went up the carnations the fastest, followed by the red dye and then the green dye. However, it was also interesting that not all the blue dyes were faster than the reds and not all the red dyes were faster than the greens. My hypothesis was incorrect. This is extremely surprising to me because I did not think the color would make a difference. A factor in my experiment that could have affected my hypothesis and the results of the experiment was the freshness of the flowers, for fresh flowers will take the color of the dye faster.
5. Application:
Like colored dyes in my experiment, some chemicals that pollute our waters can get into the soil and ground water and contaminate our vegetables and plants growing in the soil. Some chemicals and pollutants, just like the color dyes, may travel up into the plant and affect its health or growth.

Title: Do Celery Leaves, Daisy Petals, or Carnation Petals Obtain the Dye Fastest?

Student Researcher: Alexander Weber
School Address: Fox Lane Middle School
Bedford, New York
Grade: 7
Teacher : Dr. Carolyn R. Sears
1. Statement of Purpose and Hypothesis:
It is a known fact that celery leaves, daisy petals, and carnation petals can be dyed. However, I have always wondered which becomes dyed the fastest. My hypothesis is that either the carnations or daisies will be dyed the fastest because their stem's are the thinnest. Since their stems are the most narrow, the color will not wander inside the stem, it will simply be forced up to the petals.
2. Methodology:
I planned to test my experiment by using three celery stalks, three carnations, and three daffodils. This was done in order to have a bigger sample size. I conducted my experiment, by recutting each stem/stalk to the same length. I then put the three celery stalks in one glass of blue dye, the three carnations in one glass of blue dye, and the three daisies in one glass of blue dye. All nine glasses were the same kind, filled with the same amount of water, the same amount of dye, the same temperature water, and placed in the same area where they would receive the same sunlight. These were all my controlled variables. My independent variable was the type of plant. My dependent variable was the time it took for the dye to ascend to the plant's leaves or petals.
3. Analysis of Data:
The carnation petals took the blue dye the fastest, with an average time of 1 hour, 12 minutes. The celery leaves took up the dye with an average time of 1 hour, 20 minutes. The daisies took up the dye slowest with an average time of 1 hour, 25 minutes.
4. Summary and Conclusion:
I discovered that the carnations took the dye the fastest, followed by the celery and then the daisies. However, it was very interesting that not all the carnations were faster than the celery and not all the celery were faster than the daisies. My hypothesis was partly correct. I am partly correct because the carnations took the dye on the average the fastest, but the daisies did not take the dye faster than the celery. A factor in my experiment that was out of my control was the freshness of the flowers and plants. This was a factor in the results of my experiments and affected my hypothesis because fresh flowers and plants will take the color of the dye faster.

5. Application:
My experiment demonstrates how quickly liquids travel in plants. I have learned how quickly flowers can be dyed. I surmise that you would have to water carnations more frequently than celery and celery more frequently than daisies. Also, with the regard to the environment, we must be careful not to pollute our ground water and our soil because that will enter the plant and harm the food that we eat. This is most important because what we eat will ultimately affect our health.

Title: The Effect of Acid Rain on the Growth of Radish, Tomato, and Squash Plants.

Student Researcher: Amanda Russo
School Address: Fox Lane Middle School
Bedford, NY 10506
Grade: 7
Teacher: Dr. Carolyn R. Sears
I. Statement of Purpose and Hypothesis:

I wanted to find out more about acid rain, and I am very interested in plants. So I decided to do an experiment using water mixed with different amounts of lemon juice. The four solutions had the following pH's: 7, 6, 5, and 4. I watered Radish, Tomato, and Squash plants with 25 ml of these solutions and made observations. My hypothesis states that plants watered with neutral water will grow taller and healthier than plants watered with acidic water.
II. Methodology:
Materials:
Radish Seeds
Tomato Seeds
Squash Seeds
1 planting flat with 24 sections
Redi-Earth Potting Soil
Lemon Juice
pH test paper
labels
Popsicle sticks
Procedure:
I started my experiment on Sunday, April 4, 1999. I used a flat with 24 sections for plants. I wrapped each section around the bottom with aluminum foil, so that the different water solutions would not mix. I then placed 4 tablespoons of Redi-Earth Potting Soil in each section. Then I moistened the soil in each section with 50 ml of water. I placed 4 Radish seeds in each of 8 sections, 4 Tomato seeds in each of 8 sections, and 4 Squash seeds in each of 8 sections. I placed the seeds in an indented part of the soil about 1 cm apart from each other. I then covered each with 2 tablespoons of soil and added 50 ml more water to each section. I covered the flat with a clear plastic cover and placed it at a sunny south window.
On May 2, 1999, the majority of seedlings had grown to about 3 cm in height, I removed the plastic cover, and I began to water two of each type with 25 ml of the different solutions prepared as follows:
- tap water pH 7
- 500ml tap water mixed with 20 drops of lemon juice pH 6
- 500ml tap water mixed with 40 drops of lemon juice pH 5
- 500ml tap water mixed with 60 drops of lemon juice pH 4

I observed the plants, watered with the appropriate solution, and measured the height in centimeters about twice a week.
III. Analysis of Data:
The data that I collected indicate that the plants grew to a different average height based on the pH of the water that it was watered with. The radish plants watered with solutions having pH's of 4 and 5 were 0.5cm tall when I was finished collecting my data. The radish plants watered with a solution having a pH of 6 finished at a height of 12.5cm. The radish plants watered with a solution having a pH of 7 grew to a height of 9cm.
The tomato plants watered with a solution having a pH of 4 grew to an average height of 12cm. The tomato plants watered with a solution having pH of 5 grew to an average height of 14cm. The average height of the tomato plants watered with a solution having a pH of 6 was 17cm. The average height of the tomato plants watered with neutral water was 15cm.
The squash plants watered with a solution having a pH of 4 were 0.5cm tall when I finished collecting my data. The squash plants watered with a solution having a pH of 5 were 10cm tall when I finished collecting my data. The average height of the squash plants watered with a solution having a pH of 6 was 9cm. The average height of the squash plants watered with neutral water was 16cm.
These data indicate that plants watered with neutral water grew taller and stronger than plants watered with acidic water. The radish and tomato plants grew better when watered with a solution having a pH of 6.
IV. Summary and Conclusion:

By doing this experiment I learned that acid rain has a negative effect on radish, tomato, and squash plants. The final heights of all my plants indicate that as pH decreased, the growth rate and general health of the plants also decreased. Therefore, I accept my hypothesis that plants watered with neutral water will grow taller and healthier than plants watered with acidic water. One exception to my hypothesis is the data I collected at pH 6 for radish and tomato plants. This data shows that in some cases, slightly acidic water can be beneficial.

One limitation of my experiment is the sample size. For better replication, I could have used more samples of each plant. Another limitation is the length of time that I was given to collect data. If data were collected over a longer period of time, the results could be more reliable.
V. Application:

Acid rain is not only a classroom problem. It is a serious threat to our environment. The data from my experiment is a small piece of evidence that helps to prove this point. According to Kathryn Gay in her book titled "Acid Rain," it is harming wildlife and many types of plants and trees. Scientists in Canada, Germany, Scandinavia, and the U.S. have reported decreasing growth rates of specific types of trees. Acid rain is considered a type of air pollution and comes in the form of snow, sleet, hail, dew, fog and frost. It is common in urban areas, which are surrounded by cities.

Unfortunately, the amount of acid rain has increased greatly. Many people are working hard to prevent acid rain from getting even more widespread. Researchers such as the U.S. National Clean Air Coalition are educating the public about the effects of acid rain. They also monitor the acid rain, and analyze and map the data, looking for patterns. Efforts to make better use of our energy resources can also help protect our environment from the dangerous impacts of acid rain.

Title: Backpack Weight, Posture, and Back Pain in Fox Lane Students

Student Researchers: Matt Bronstein and Brett Joseph
School Address: Fox Lane Middle School
Bedford, New York 10506
Grade: 7
Teacher: Dr. Carolyn R. Sears

I. Statement of Purpose and Hypothesis:

Due to insufficient time to pass from class to class, many Fox Lane Middle School students carry heavy backpacks all day because they are unable to utilize their lockers. Many of these backpacks weigh over fifteen pounds, and some up to twenty-five pounds. These heavy bags are carried between houses several times a day. We decided to study this problem and how it is affecting students when our parents started complaining about our posture. I (M. Bronstein) realized that I was getting used to walking in a hunched over position because I had to walk this way during the school day. By leaning forward, I was compensating for the weight of the backpack which would pull me over if I was standing straight. We wanted to see if other students were having similar problems with their posture, and also to see if they were experiencing back, neck or shoulder pain as we sometimes do. Our hypothesis is that students who carry heavy backpacks experience poor posture and/or back problems.

II. Methodology:

We decided to write a survey asking students about problems with their posture and with back pain. We also decided to weigh each student's backpack to see if there was a relationship between the weight of the backpack and the way a student stood. We photographed each person who completed the survey, and measured the angle at which they are leaning forward when they are standing in a relaxed pose. We compared these angles to a picture of an average healthy spine that we found on the internet. A total of 25 students were interviewed. We asked 19 middle school students to participate in the study. Before we explained the topic, we photographed each person standing naturally. We didn't want to have the topic influence the way that people were standing. Then we explained the study, asked the students the questions on the survey, and weighed their backpack or bag. We also decided to have a few Fox Lane High School students complete the survey. Since the high school has a longer time for passing, and students might have time to use their lockers, we wondered whether they had similar problems to the middle school students we spoke to. Six high school students completed the survey.

III. Analysis of Data :

The survey showed that 44% of the students' parents complained about their posture. 66% of the students surveyed found it difficult to stand with their back straight. 64% of the students that we interviewed complained of some sort of back, neck or shoulder pain. Most of the people who experienced back pain also complained of neck and/or shoulder pain. 76% of the students surveyed felt that they did not have enough time in between classes to use their lockers. 12% have been told by a doctor that they have back problems. 76% of the students we interviewed carried their books in a backpack. When we examined the photographs of the students and measured the angle at which they were leaning forward, we found many students with poor posture. The angle of a healthy spine measures approximately 15 degrees, but most of the students we studied were leaning forward more than 25 degrees. The graph demonstrates that as the weight of the backpack increases, the posture of the students gets worse. The data tend to support our hypothesis.

IV. Summary and Conclusion:

The survey indicates that middle school and high school students have some problems with posture and/or back pain. Students who tend to carry heavy backpacks seem to have more problems with posture than students who carried smaller, lighter bags. The survey also indicates that students at Fox Lane Middle School feel that they need more time in between classes to use their lockers. There seems to be very little difference between the posture of the high school and middle school students, however, it is possible that the poor posture of the

high school students may have originated when they had the same problem of inadequate passing time when they were in the middle school. Our study does have certain limitations. The number of students we interviewed was not that large. It would certainly be a more accurate survey if the entire house(s) could fill out the questionnaire. It would also be interesting to have a control group by interviewing students from another school where they have time to use their lockers. We could then compare the posture of both groups. Another limitation of the study is that some people we interviewed might have poor posture or back pain because of other medical problems, or because of their anatomy. Despite these limitations, we accept our original hypothesis that students are experiencing problems with posture and pain because of the heavy backpacks that they carry.
V. Application:
Students need to express their concern about the lack of passing time to parents and faculty so that the problem can be addressed in the Fox Lane Middle School. This study, however, also can be applied to students who carry heavy bags in other communities, and to adults as well who carry heavy bags or backpacks during their daily activities. If carrying heavy backpacks can effect posture and cause pain, there may be possible health risks which could be prevented if people were made aware of the problem. It would also be interesting to invent a bag which could carry a large load of books without causing back pain or affecting posture.

Title: How Does Location and Weather Effect a Cell Phone's Signal?

Student Researcher: Chris Kulawik
School Address: Fox Lane Middle School
Bedford, New York
Grade: 7
Teacher : Dr. Carolyn R. Sears
I. Hypothesis

I chose to do research on the cellular phone. I chose it because it is now becoming very popular. More and more people in this decade are turning to technology and computers. So learning about the phone of the future will help me.

I want to find out about where the signals are strong and weak. I think that this data would be very helpful for several reasons. Lets say our car broke down, and the nearest town is 50 miles away, and the signal by the car is so weak a call cannot be placed. I'd rather know where I can find a strong signal, to call for help, instead of walking 50 miles, to the nearest town.

My hypothesis is that the signal would be stronger in open areas, and in cloudy weather. I thought cloudy weather would make the signal stronger, because I thought the waves would bounce off the clouds until it reaches a cell tower.

II. Methodology

The most important thing in this experiment is the testing itself. One mistake can ruin everything. Therefore my methodology is very precise and I followed it very carefully to minimize any room for mistakes.

In this project, I used several materials. My dad's cell phone, a clipboard to record the results on the spot, data sheet, my computer, the school computer, and Claris Works Spreadsheet.

My first step was to draw a map with my route on it. For this experiment, I drew a map of my housing complex. Then I would get a data sheet ready, with a place to put the date, weather, location, and signal strength.
Once that was completed, I started to test the cellular phone and record the results. I used the same route every time; I started on the road and ended with the tennis court ever time. Keeping things the same was a very important part of my research. After five days I had all my information needed and could start putting data on the spreadsheet, in the school computer lab. Once the spreadsheet was filled out, I made 2 graphs for each location. A line graph and a bar graph, showing the date, location, and signal strength were created for each location. 1 was the lowest signal and 5 was the highest signal. Then I placed all of the information and data on a poster.

III. Data Analysis

The data collected shows a certain trend. Locations in open area, such as the parking lot and the road had a high signal. I believe this occurred because there was no interference. Places with large objects block the waves and lower the signal. This part of my hypothesis was correct, that open area increase the signal strength. I was surprised when I found out that the signal was not as strong in cloudy weather, but was better in sunny weather. My theory about the waves bouncing off the clouds was wrong.

IV. Summary

I found out that the top two locations were the road and the parking lot{open area}. Behind the house and the side of the house have the lowest signals because they are obstructed by an object. In short, any place in a open areas will have a better signal then one obstructed by a big object. Sunny weather has a better signal then fog or cloudy weather. This proves that half of my hypothesis is correct. The one thing I am upset about is that the second part of my hypothesis was wrong.

V. Application

I feel my research on the subject of cellular phones will have many applications in the world outside the classroom. As I mentioned before, if my dad's car breaks down I can place a call from the cellular phone. If the signal is weak I can move my location to an open area. I know where I should go to make a call instead of leaving the car and walking to the nearest city. This information could be used by many people, such as a business man or the President of the United States.

Title: The Treats Which a Horse Likes Best

Student Researcher: Hanna McKean
School Address: Fox Lane Middle School
Bedford, NY 10506
Grade: 6
Teacher: Dr. Carolyn Sears

1. Statement of Purpose and Hypothesis:

Horse treats have different tastes and shapes to make them different. Some horses have different tastes than others. I wanted to find what type of treats my horse likes best. My hypothesis is that Mrs. Pastures will be most liked by the horse.

2. Methodology:

I tested my hypothesis by first gathering all my different materials. I gathered four different types of treats with sixteen samples for each. The four different types were Mrs. Pastures, Sweet Lumps, Horse Nibbles, and NHT. I took my horse out of its stall. I also had my data table to record the results and observations. To start the experiment, give the horse each type of treat to have it get a sense for the treat's taste. Then give the horse all four of the treats laid out and watch it decide which treat it wants. Then remove all the rest of the treats. And record your results and observations. Repeat these steps 16 times on different days. Remember to do one treat for each type and switch around the places of the treats. Then your results will depend on your horse's taste! There are many different variables involved. The controlled variables were the same horse testing the treat and the same amount of treats for each type. My independent variable is the different types of treats are switched different places. And my dependent variable was what treats the horse liked.

3. Analysis of Data:

The data I collected show that Mrs. Pastures was favored over the other brands of horse treats. Out of the 16 times the experiment was run, Mrs. Pastures treat was chosen 6 times. Sweet Lumps were chosen 5 times. Horse Nibbles treat was chosen three times. The NHT treat was liked the least, which was only chosen two times. My hypothesis was correct; Mrs. Pastures was the most liked treat.

4. Summary and Conclusion:

I found out that Mrs. Pasture's brand of horse treats was the most chosen by the horse out of 16 runs. I accepted my hypothesis.

5. Application:

I learned that Mrs. Pastures was the most liked treat by my horse. My research findings can help people in the outside world who buy treats for their horses. They can save money by buying Mrs. Pastures treat first rather than all different types. If their horse enjoys Mrs. Pastures then they will have avoided wasting money.

The National Student Research Center
E-Journal of Student Research: Science

Volume 9, Number 4, November, 2000

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: Fermentation

Student Researcher: Sara Miran
School Address: Edgemont Jr./Sr. High School
Scarsdale, NY 10583
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:
I wanted to know more about fermentation. Fermentation is a chemical reaction that splits complex organic compounds into relatively simple substances. I wanted to know which common household food items, when mixed with yeast and water, would produce the most

ethyl alcohol. My hypothesis stated that grapes and sugar would be the best two substances to ferment.
II. Methodology:
A. I started with 14 jars. I mixed one packet of yeast into three cups of warm tap water in each jar and stirred for one minute. I added two teaspoons of each of the following substances:
Control
Salt
Sugar
Vinegar
Raw grape pulp
Raw potato pulp
Raw apple pulp
B. Since the results of my first trial were not as successful as I had hoped, I repeated the experiment with a change in procedure. I again started with 14 glass jars, but used a revised procedure, which I developed after the first experiment failed to produce significant amounts of ethyl alcohol. I mixed one packet of yeast into three cups of warm tap water in each jar, and stirred for one minute. I added four tablespoons (as compared with two teaspoons of each in my first experiment) of each of the same substances that I used in my first experiment, as follows:
I then stirred the contents of each jar and covered each jar with a deflated balloon and a metal ring to keep the balloon in place.
I observed the expanding balloons and then I measured the amount of ethyl alcohol in each jar using a hydrometer over a period of four days.
III. Analysis of Data:
A. I tested each jar with a hydrometer 3 times, after one week, two weeks and three weeks. All jars read zero at week one. At week two, jar number 3 was at 2 and jar number 10 was at 1, while all other jars were at zero. At week three, jar numbers 1, 8, 9 and 13 stayed at zero, jar numbers 2, 6, 7 and 14 measured less than zero, jar numbers 3, 4, 5, 10 and 12 measured 1 (jar 3 having gone down from 2 a week earlier), and jar number 11 had gone to 2.

Because of these not very encouraging results, I decided to repeat the experiment using an increased amount of fermentation substances.
B. Within fifteen minutes, there was foam up to the top of jar numbers 3, 5, 10 and 12. By 20 minutes, the gas pressure generated in each of these jars was enough to push off the balloon and metal ring holding down the balloon on the top of each jar. I also smelled a bad odor from each jar.

By thirty minutes, jars 7 and 14 had significant foaming, and had also pushed off their balloons and metal rings. At this point I decided to relieve the gas pressure building up by punching a small hole in the balloon covering the top of each jar.

I also noted that the grape pulp in jars 5 and 12 was floating at the top of the jars. In my prior experiment the grape pulp had stayed at the bottom of the jars. I tested the substances four times with my hydrometer once a day for four consecutive days. On day one, I tested jar numbers 1-7 and got 0, 0, 0, 0, 2, 2, and 2. On day one, my results for jar numbers 8-14 were 0, 0, 0, 0, 1, 2, and 1. On day two, I tested jars 1-7 and got 1, 0, 0, 0, 2, 3, and 3. On day two, my results for jar numbers 8-14 were 1, 0, 1, 0, 2, 2, and 3.
On day three, I tested jar numbers 1-7 and got 1, 0, 2, 0, 3, 4, and 3. On day three my results for jar numbers 8-14 were 1, 0, 2, 0, 3, 4, and 3. On day four, I tested jar numbers 1-7 and got 2, 0, 4, 0, 4, 5, and 4. On day four, my results for jar numbers 8-14 were 2, 0, 4, 0, 4, 5 and 4.
IV. Summary and Conclusion

Based on my second experiment, I have concluded that the fermented potato mash produced the highest amount of ethyl alcohol, closely followed by apple mash, grape mash and sugar water. Surprisingly, the control jars containing only yeast produced a measurable amount of ethyl alcohol. The salt solution and vinegar solution produced none. I was also surprised to see that it took longer to produce ethyl alcohol in the sugar water jars (2-3 days) as compared with the potato, grape and apple mash mixtures, which produced measurable amounts of ethyl alcohol in just one day.
My data show that my hypothesis was partially correct. I had thought that sugar water and grape mash would produce the most ethyl alcohol. My results show that while both did produce ethyl alcohol, grape mash and apple mash produced more ethyl alcohol than sugar water over a four-day period, while potato mash produced the most ethyl alcohol over this period.
V. Application

My experiment showed that ethyl alcohol can be produced by the fermentation of common household food items, such as mashed apples, grapes, potatoes, and sugar water. Ethyl alcohol can be used as an environmentally friendly alternative or supplement to gasoline and other petroleum based fuels. My experiment shows that it is possible to produce ethyl alcohol from food items, which would otherwise just end up as garbage. It should be possible to generate ethyl alcohol from apple cores, potato peels, rotting and spoiled food, which would otherwise be thrown away.

Title: The Effect of Video Game Playing on Color Stimulus Processing

Student Researcher: Jason Brodsky
School Address: Edgemont Jr./Sr. High School
Scarsdale, NY 10583
Grade: 7
Teacher: Maria Russo

I. Statement of Purpose and Hypothesis
I wished to know if playing video games could effect how well people are able to process color stimulus. Video games often involve staring at colorful displays for long periods of time, and usually require the whole attention of the user. It follows that if video games had any effect, it would be stronger and more noticeable than the effect of watching TV, or other activities that involve high color stimulus, as these activities are not interactive, and so do not require as much attention as video games.
I decided to test color stimulus processing with a simple test. The words "Red", "Green", "Blue", "Purple", "Black", and "Gray" were each typed 24 times. Then the font of four words of each type was changed to each color. The net result was that there were 144 words, each meaning a color, and printed in the same or different color ink. The words were then scrambled randomly.
My hypothesis was that the time it took people to read all the words would go up after playing a video game, whereas the time it took for people to recognize what color each word was printed in would go down after playing the game.
II. Methodology:
First, I told my idea for this experiment to several people, who gave me some idea of what they thought would happen. Next, I contacted an ophthalmologist who gave his opinion on the project. I also looked at a few books to see if they would reveal anything useful, though they did not. I was then able to formulate my hypothesis based on my own knowledge and the

ideas of others. I made four tests with the procedure described in part I. This was necessary because I was going to administer each type of test (words and colors) twice and wanted to have a different pattern of words for each so people would not remember the previous test and then be able to do better because of that. While it is possible that one test might be more or less difficult than the others, this is unlikely, and the test were given in a random order, so that if a trend was universal among all the test subjects, which test given would be proven to not effect the results. Next, I randomly selected six test subjects out of a pool consisting of children in my grade, who I was both relatively familiar with and who were known to be relatively cooperative and not likely to make things difficult. Three boys and three girls were chosen, though one of the boys was found to be slightly colorblind and so was replaced.

Each subject was invited to my house, where they took the word test, in which they read all the words on a sheet, and the color test, in which they identified the color of each word on the sheet. Most people were given the color test first, and then the word test, though two people were given the tests in the opposite order to make sure that the order did not make a difference. After taking the tests, the person played a Nintendo 64 game, Diddy Kong Racing, for a half-hour. A sequence of four levels of the game known to be particularly colorful was played as many times as necessary to fill the half-hour. After the thirty minutes were up each subject took the tests again, in the same order they had been given them. There were also two control subjects, who were given the tests a half-hour apart but did not play a video game.

For this project, the testing procedure, game procedure, and subject procedure were controlled variables. The testing procedure included the type of test, the makeup of the words on the tests, the randomness of the order of those words, the way the test was timed and the time separating the pre- and post-tests. The video game procedure involved the game and levels played, as well as the time spent playing, and the approximate distance from the screen. The subject procedure included the process used to pick subjects randomly, the chance of any particular subject becoming picked, and the information each subject was given before the test, which was limited to what the subjects need to know when deciding whether they wished to participate. The manipulated variable was whether or not a subject played the video game or not. The variable that responded was the time on the tests. I created a chart and graph of the results, and analyzed the data. Finally, I accepted or rejected my hypothesis, summarized the data, and applied my findings to real life.

III. Analysis of Data:

I timed how long it took for subjects to read and identify the colors of all the words on two separate tests before and after playing a video game. Six subjects participated in this. The average percent gain between the first and second scores for the color test was 11%, and the average percent loss between the first and second scores for the word test was 2%. For the control subjects, the average gain between the first and second scores for the color test was 18%, and the average loss for the word test was 10%. A t-test, a statistical formula that is used to see how certain we can be in saying that the difference is significant, showed that there is a 0.01 chance that the general population would do worse on the color test after playing video games, and that there is a greater than 0.1 chance that the general population would do worse on the word score after playing video games. Another t-test showed that there is a 0.91 chance that playing video games does not improve scores on the color test more than not playing does for the general population, and that there is a 0.86 chance that video games do not generally lower scores for the word test.

IV. Summary and Conclusion:

While the times for the normal test subjects on the color test did get better after playing video games, the times also got better for the control subjects, suggesting that some testing effect is involved. This means that taking the test twice increases the scores, probably because the subjects understand the tests more and are used to taking them. Since the improvement of the

normal test subjects was generally lower that that of the control subjects, it is possible that video game playing lowers scores, but is offset by the testing effect. The word scores are unusual, since they suggest a negative testing effect, which is highly unlikely for this kind of test. If there was a negative testing effect, it is possible that word scores are improved by video games, but are offset by the testing effect. My hypothesis is therefore completely incorrect, since it appears that there is almost no chance that video game playing improves color scores and worsens word scores, and just the opposite may be true.
V. Application
I, and many other people, greatly enjoy video and computer games, and so spend a great deal of time playing them. If doing so could cause us to have greater difficulty or ease in processing various types of stimuli immediately afterwards, it would be prudent for us to not play for a significant amount of time when we expect to do something that requires processing color or text quickly immediately afterward. If playing video games does no harm, or some good, it might be a good idea to save work that requires that kind of processing for after game playing, or at least not worry to much about the timing, assuming that game playing will leave enough time to do quality work. Many people also claim that Video game playing can cause people to become confused and absent-minded. Since there is no evidence that video games affect color stimulus processing, there appears to be no reason to change habits to reflect any effect of video games.

Title: What is Edgemont Putting into the Bronx River?

Student Researcher: Rebecca Fabbro
School Address: Edgemont Jr./Sr. High School
Scarsdale, New York
Grade: 7
Teacher: Maria Russo

I. Statement of Purpose and Hypothesis:
This experiment was designed to test what pollutants were found in the Bronx River and to compare those to the pollutants found in the run-off behind my house. I wanted to see which of the pollutants in the Bronx River came from the Edgemont area, specifically from a stream of run-off that flows parallel to Edgemont Road in between the High School and the pond. I also thought this experiment would be a good follow up to a study done by Mrs. Russo's Science Research Group which tested the Bronx River chemically, physically, and biologically. For my purposes I conducted only chemical testing, and I only tested five indicators of pollution, which were pH, phosphates, nitrates, dissolved oxygen, and chloride. My original hypothesis stated that the pollutants would be fairly similar in both the run-off and the river but that the levels of these pollutants would be higher in the river. In fact, I thought that the only test with more negative results in the run-off would be a lower dissolved oxygen level since the water only really moved after a rain. In addition, I thought that both would have high levels of nitrates and phosphates since those are good indicators of fertilizer run-off, which has proved to be a problem in the Bronx River before. Finally I assumed that the pollutants in the run-off and the river were probably mainly from fertilizer run-off or drainage from washing machines. I concluded these by previous testing on the river and the fact that I used to have a washing machine that emptied into the run-off and thought this might still be a problem.
II. Methodology:
I began by writing my statement of purpose and my hypothesis. I looked at the results from the Science Research Group, asked my parents, and used my previous knowledge of the

watershed to support these. Next, I sampled water from two different sites, one on the Bronx River (Site 1 in Research Group) and one taken from the run-off in my backyard.
While taking these water samples, I observed the physical differences between the stream of run-off and the actual river. The water in the run-off was slower moving, shallower, and more turbid then the water in the Bronx River. It was also warmer which was quite obvious since smaller bodies of water warm up more quickly.
I preformed tests for Phosphates, pH, Dissolved Oxygen, Nitrates, and Chloride four times during the month of May on the dates of May 9, May 13, May 16, and May 21. I tried to do the tests under different circumstances, which were during a heat wave, after a heat wave, after a heavy rain, or during a cold front. To eliminate error I made sure that I controlled certain variables such as sampling technique, testing procedures, and the time of day. The only variable that I changed was taking samples from two different sites. Even though I did test four times I didn't do every test every time so the tests for chloride, and nitrates were only done twice while the test for phosphates was preformed 3 times and the tests for pH and dissolved oxygen were conducted 4 times each.
After I had collected all my data I made graphs and averaged out the numbers. I used these results to compare the data and to draw conclusions. From my findings I rejected parts of my hypothesis and accepted others. I then did final copies of the data charts and graphs, wrote up my summary and conclusion and applied my findings to the outside world.
III. Analysis of Data:
The average pH level of the Bronx River was 7.9; the average pH of the run-off was 7.6. This means that the pH level of the Bronx River is slightly more basic than the pH level in the run-off (the average pH level is 7).
The average phosphate level of the Bronx River was 7.7; the Phosphate level of the run-off was 5.6. This means that the run-off had a lesser level of phosphates. Phosphates are an indicator of fertilizer run-off and sewage.
The Dissolved Oxygen level was 7.7 on average in the Bronx River in comparison to the to average of 6.7 for the run-off. This means that the dissolved oxygen was low in both but was lower in the run-off. When dissolved oxygen levels are too low they can cause aquatic life to die.

The average nitrates level was 4.4 in the Bronx River while it was 6.6 in the run-off. That means that the nitrates levels were higher in the run-off. Nitrates at high levels are an indicator of fertilizer.
In the Bronx River and the run-off the average chlorides level was 150, so both probably have the same amount of road run-off. Chlorides are usually found in rivers and streams because of run-off carrying salt from the roads in winter.
IV. Summary and Conclusion:

Several conclusions may be drawn from my results. First, I would like to accept most of my hypothesis. The pollutants in both were fairly the same, the river did have a higher level of phosphates, and the run-of did have a lower dissolved oxygen level. The higher phosphate levels do show evidence of fertilizer run-off.

However my hypothesis was proven wrong in two ways. Neither the Bronx River nor its run-off had high levels of nitrates and the nitrate level was higher in the run-off than it was in the Bronx River.

Over all my results were pretty much expected and they mirrored the results found by the Science Research Group. My data could use more replication to confirm its accuracy. If the experiment was further improved other sites of Bronx River run-off could be tested, such as the run-off that flows from the High School.

V. Application

These data only prove a much larger point- if we keep polluting our water sources we will have large problems in the future. As the population grows and construction increases, more habitats, especially vital ones like the wetlands, are being destroyed. Cleaner water is a first step to improving the environment. Simple steps can be taken here in Edgemont to reduce water pollution. People can refrain from using excessive fertilizer, they can decrease road salt use and they can get their pipes checked often.

Hopefully this experiment can be improved upon and perhaps continued. Science Research Group will be testing the Bronx River and I think that it would be interesting to note if the condition of the river changes over the years.

This experiment should make you think, as it has made me think, about how to protect our watershed for ourselves and for generations to come.

Title: The Effects of Different Environments on the Iwan Apple Blossom Orchid

Student Researcher: Sam Leeds
School Address: Edgemont High School
Scarsdale, New York 10583
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose/Hypothesis:

I wanted to know more about an environment's effect on a growing orchid. An environment is a synonym for habitat. A habitat is a place where flora and fauna live and thrive. I wanted to know what habitat an orchid would thrive best in. My hypothesis stated that orchids in a rain forest environment would thrive better than those in the dessert, swamp, and control environments.
II. Methodology:

First, I wrote my statement of purpose. Then I read my books about growing orchids and which ones were the best choices for house plants. I then went to the "Orchid Show" at the Winter Garden in New York City. There I bought eight Iwan Apple Blossom orchid plants. I then placed two orchids each in 3 environments and one control group. The manipulated variable was the habitat . The responding variable was the height and width of the orchids in different environments. The variables held constant were the "precipitation" amounts, the kind of orchid used, and the hours of light per day.

The control plants were set up in a window facing northeast with natural light. The control was in a closed clear plastic container measuring 730 cubic inches.

The rain forest environment was created in a 10 gallon fish tank. The light source was a 60 watt "dayglow" bulb. The environment had a simulated canopy of fake plants. The tank was closed with two inches of water at the bottom of the tank. There was an island of small pebbles to one side of the tank that the orchids were planted in. There were also two tetra fish in the water.

The desert environment was a 730 cubic inch clear plastic aerated pet carrier. The container was filled about 1/3 of the way with fine, sand-like gravel. The light source was a 75-watt fluorescent bulb.

The swamp environment was a closed ten-gallon fish tank filled with 4 inches of water, one aquatic plant, one crayfish, and one tetra fish. The orchid was planted in small gravel mixed with some sandy gravel. The orchid was planted at the water level. The light source was a 75-watt incandescent bulb with a yellow cast.

The three environments were set up in a big box-like area. During a six week period I recorded my observations. I measured both the height and the leaf span of each plant. Additionally I noted if the plants produced stems or buds.

Finally, I accepted or rejected my hypothesis and wrote my conclusion and summary.
III. Analysis of Data:

The orchids in the rain forest grew higher at a faster rate than all of the other plants. On the sixth week, the control had caught up though. When it comes to the span of the plants' leaves, the control grew best. The swamp went at the fastest rate, but then started to shrink! On the sixth week, the rain forest plants were at the same span as the control plants. After six weeks, the rain forest plants grew the best. I figured this out by adding up the final measurements for each plant in every graph, and the divided each plant number by two.
IV. Summary and Conclusion:

The orchids in the rain forest grew the best because the average of height and the leaf span was greater than any of the other plants. Also there was a stem sprouting.

I concluded that the orchids need to be in a humid environment. They were protected from direct light by the canopy. Therefore I concluded that they needed filtered bright light. I also thought that the fish might have contributed fertilizer with their excretions. Fish also give off carbon dioxide, which plants need for photosynthesis. Therefore I also concluded that the plants need fertilizer (plant food) and a source of carbon dioxide.

I accepted my hypothesis that the rain forest would be the best habitat.
V. Application:

I can apply this information to my life because I am extremely interested in orchids. Now when I am cultivating orchids, I know which environment is most likely to support orchids the best. In fact, I have been able to revive some of the orchids in our house that were dying by changing their light source and the amount of water they were getting based on what I learned from this research project. Cultivators who grow orchids for a living could definitely use this information to grow large amounts of orchids at once. This growing method also seems to produce larger and healthier leaves.

Title: Length of Burning of Different Tree Barks

Student Researcher: Charlie Birns
School Address: Edgemont Jr./Sr. High School
Scarsdale, New York

Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:
My topic, the length of burning of different tree barks, is a study to find out how long different tree barks burn. I wanted to know what trees would burn for a longer time and which trees were very flammable. I did this project for forest fires. My hypothesis stated that the bigger, bulkier trees would be hardest to burn and shorter, skinny trees would burn more quickly.
II. Methodology:
I tested my hypothesis by collecting samples of five different trees and proceeded to burn them on a grill. The materials I used were a knife, for skinning bark from the trees, a grill to burn the bark, an electric lighter to start the fire, a stopwatch to record the time of burning, a tree identification book to find out what trees I used, and a digital camera to take pictures of the trees and myself conducting the experiment. The only manipulated variable between the samples was the type of tree. The method of burning and size were approximately the same. First, I cut the bark pieces into the same shape and size (3 x 3), and then I placed them on a grill and timed the burning until the bark was in ashes. Last, I recorded the time it took to totally turn to ash, in seconds.
III. Analysis of Data:
The data I recorded indicated that my hypothesis was correct. The thicker trees such as the White Poplar burned for the longest period of time, 7:02 sec., and thin trees like the American Elm were very flammable and burned in only 1:19 sec.
IV. Summary and Conclusion:

I found out that bigger tree bark was harder to burn. I accept my hypothesis because it turned out to work for the trees I tested and it makes more sense then having thin trees burn longer than thick ones. There were only two limitations I found in my studies. One was that it was hard to identify the trees I chose and secondly some barks weren't easy to peel so I had to find trees that were easier to peel and weren't on other people's property.
V. Application:
The reason I did this experiment was that I can apply this information to the real world by figuring out what forests and individual trees are easier to burn in case of forest fires. This can help people because signs and warnings can be given in areas highly populated with trees that are more flammable and where people should be especially careful. This also helps home and furniture builders because it tells them what wood is least flammable and would probably be safest in the home.

Title: The Effect of Thyroxin on Rats

Student Researcher: Kendrick Lo
School Address: Edgemont Jr./Sr. High School
Scarsdale, New York 10583
Grade: 7
Teacher: Mrs. Russo

I. Statement of Purpose and Hypothesis:
I wanted to find out the effects of thyroxin on a mammal after the school science project on the effects of thyroxin on an amphibian. Thyroxin is a hormone released by the thyroid gland, which increases the growth rate in ones body. I wanted to know if the rats treated with

thyroxin would die quicker just like the tadpoles treated with thyroxin did. My hypothesis stated that the thyroxin treated rats would grow bigger and would die quicker than the regular rats.
II. Methodology:
I first wrote my hypothesis and statement of purpose, then went online and looked for studies with thyroxin and rats to find out how much thyroxin should be administered. I then went to a pet shop and bought six rats, a pack of bedding, rat food, a water bottle, a food canister, and a rat cage. My dad bought a small pack of thyroxin pills and a few needles. All the rats weighed 100 grams. The manipulated variable was the amount of thyroxin given to the rats. The controlled variables were the location of cages, age and health of rats at start date, diet, temperature and environment. The control group of rats had no thyroxin given. The responding variable was their behavior, weight, and food intake.
We gave the thyroxin treated rats 4cc's of the chemical. One of the control rats died of sickness, and then soon after, one of the thyroxin treated rats died for no apparent reason, so only four were left. My dad injected the experimental rats for about one week. We then bought another cage, food bowl, and water bottle. We put the experimental rats into the new cage and dissolved 4cc's of thyroxin in their water. I recorded observations and the weight of each rat every week. I then said if my hypothesis was right or wrong and wrote my summary and conclusion. I then applied the data to places beyond the classroom.
III. Analysis of Data:
The thyroxin treated rats became very active in the first week. They ate about three times as many grams of food than the regular rats did. They also seemed bigger in size. Also, their fur color had turned a very bright shade of yellow. Two rats died, but they were not both thyroxin treated rats. They both died so quickly into the experiment so I can't draw any conclusions from it. The second normal rat weighed 175 grams, the third normal rat weighed 190 grams, which averaged to 182.5 grams. The first thyroxin treated rat weighed 200 grams, and the second rat weighed 220 grams, averaging to 210 grams.
IV. Summary and Conclusion:
The rats treated with thyroxin were much more active than the control rats. They could run across the cage in less than a second and weighed a little more than the controls. They seemed very agitated compared to the controls and moved a lot more in the day. So, some parts of my hypothesis have been proven correct. The thyroxin treated rats were bigger in size, but since only one of the thyroxin treated rats died so soon in the beginning, I cannot prove that thyroxin treated rats die before normal rats do.
V. Application:
This information can be useful because it proves that thyroxin increases growth rate in rats. I also found out there are many ways to take thyroxin, one being to dissolve it in water, the second being to just swallow the pill, and the third to inject it. The only thing about dissolving the thyroxin in water with the rats is that you can't control how much they drink. Thyroxin is important because it regulates the rate of metabolism in people. The side effects of taking thyroxin in humans is loose stool, excessive sweating, and a faster metabolism rate.

Title: Salt vs. CG-90

Student Researcher: Chris Paskov
School Address: Edgemont Jr./Sr. High School
Scarsdale, NY 10583
Grade: 7
Teacher: Mr. Rubenstein

I. Statement of Purpose and Hypothesis:
The objective of this study is to investigate the corrosiveness of salt and CG-90, a chloride deicer. Salt (sodium chloride) and deicers have been used to melt snow on roadways, bridges, parking structures, etc. Laboratory tests indicate that CG-90 is very similar to salt in its ability to melt ice. It consists of salt and corrosion inhibitors (phosphates). The inhibitors are added to salt to reduce its corrosiveness on steel by developing a protective film on steel to prevent the chloride ion from uniting with steel. However, the effect of CG-90 on concrete as well as copper, aluminum, and other similar metals has not been researched yet. I therefore chose to test CG-90 and compare the results with those of salt. My hypothesis was that CG-90 would be less detrimental than salt because of the inhibitors.
II. Methodology:
First, I set my objective and read some relevant literature on CG-90 and deicers in general. Second, I formed a hypothesis. Next, I obtained two test samples of concrete, copper, aluminum, and steel. I massed each sample to find the original mass. One specimen of each of the metals and concrete was placed in a solution containing 3% CG-90 and the other specimens were placed in a solution containing 3% salt. The manipulated variables were all the test samples in CG-90 solution. The responding variable was how fast the test samples corroded. The variables held constant were the amount of CG-90 and salt, the amount of water, how much time the specimens were kept in the solutions, and the type of container. I made observations every day, and took the mass of each specimen every week (see tables). Since the concrete specimens were saturated with water, I let them dry for 24 hours before massing. After the data was collected, I evaluated it in order to reject or accept my hypothesis. The data was then applied to real life.
III. Analysis of Data:
After examining the data, I found that CG-90 was less corrosive than salt. This was true for every test sample used. However, copper produced more powder in CG-90 than in salt. Some white powder was formed in both the CG-90 and the salt solutions used for the concrete specimens. This, however, did not result in change of the concrete specimen mass.

Mass reduction is most rapid during the initial week and slows down thereafter. Since the initial solutions were used throughout the test period, they "became weaker" gradually.

CG-90 is much less corrosive to steel than salt is. While salt produced 10% reduction of mass, CG-90 caused only 0.9%. Similar results have been published in the literature. For copper and aluminum, salt and CG-90 caused very comparable reduction of mass. For copper, the mass reduction was 5%, and 6% in CG-90 and salt, respectively. For aluminum, the mass reduction was 3% and 4% for CG-90 and salt respectively.
IV. Summary and Conclusion:
All metal specimens placed in CG-90 solution corroded less than those placed in salt solution. Therefore, I accepted my hypothesis, stating that CG-90 would be less corrosive.
The mass reductions for copper were comparable for both, salt and CG-90 solutions. Therefore, the inhibitor used in CG-90 does not reduce the corrosion rate for copper. The same conclusion applies for aluminum as well.
As for concrete in CG-90 solution, the powder produced by the concrete never hardened, unlike the powder in the salt solution. Some previous studies have shown that the presence of salt or CG-90 accelerate concrete spalling and scaling caused by freeze-thaw cycles. Apparently, the addition of inhibitors does not make CG-90 less dangerous for concrete than salt. Since my concrete specimens were not subjected to freeze-thaw cycles, their exposure to salt and CG-90 did not result in spalling and scaling.
V. Application:
I can apply the information obtained in a few ways. When choosing whether to use CG-90 or salt for my driveway, I would choose CG-90. In addition, when bridges or roads need to have

the snow or ice melted off them, CG-90 should be used instead of salt.

The manufacturers of chloride-deicers need to modify the inhibitors by making them less corrosive to copper, aluminum, and other similar metals. This way, the equipment used for bridge and road maintenance, as well as sculptures, railing, etc. made of copper and aluminum would be preserved.
Similar to salt, CG-90 is harmful to the environment. There are some new deicers on the market that do not cause much corrosion in metals, they are safe for concrete, and are excellent for the environment. However, these deicers are still very expensive ($600/ ton versus $36/ ton for salt and $100/ ton for CG-90.)

Title: Do Purebred Dogs Have More Health Problems Than Mixed Dogs?

Student Researcher: Lea Kaminstein
School Address: Edgemont Jr., Sr. High School
2 White Oak Lane
Scarsdale, N.Y. 10583
Grade: 7
Teacher: Ms. Russo

I. Statement of Purpose and Hypothesis:
I wanted to know more about the health problems of dogs because my family couldn't decide between a purebred dog and a mixed-bred dog. My hypothesis is that purebred dogs have more health problems than mixed-bred dogs. This has happened over the years because dogs have been force bred in some cases because breeding has become a business. There are other very complicated reasons but that's a whole other experiment.
II. Methodology:

To get the information needed for my experiment, I went to an animal hospital. I got records of twenty dogs; ten pure and ten mixed. I recorded the sick visits and their dates from 1995 to 2000. I have two variables, time and type of dog (mixed or pure). Time is a variable because I only recorded the visits from 1995-2000. Mixed or purebred dog is a variable because I am comparing which one has more health problems.
III. Analysis of Data:

The data that I collected proved my hypothesis right. The purebred dogs have many more health problems than mixed bred dogs. My charts show that most of the health problems were in two or three years and not spread out so much. The totals are: purebred 53 visits and mixed bred- 38 visits. That's a 15-visit interval!
IV. Summary and Conclusion:

As I said before, I accept my hypothesis because it said that purebred dogs would have more health problems than mixed dogs. Another reason is the totals (pure-53, mixed-38). They are 15 visits apart; one of the purebred dogs had 13 visits alone, which probably raised the average a lot. Some of the problems that occurred while I was recording my data were, deciding if something was a health problem or not. For example, getting hit by a car or getting in a fight with another dog. Another problem was that one of the purebred dogs was really fat and not in good health compared to the other dogs, which were in pretty good health except for these visits.

V. Application:

I will use this information in life when I go to buy a dog. So I can decide whether or not I want the responsibility and can pay the expenses of all the health problems of a purebred dog, or if I would rather have less health problems and more time with the dog. Personally, I'm leaning towards the mixed dog. Another way to apply this experiment to life is so that scientists can research a way to prevent all these health problems in purebred dogs.

Title: The Corrosion Of Nails

Student Researcher: Howard F. Berman
School Address: Edgemont Jr./Sr. High School
Scarsdale, NY 10583
Grade: 7
Teacher: Mr. Rubenstien

I. Statement of Purpose and Hypothesis:

My topic is how fast nails rust in two different liquids; water and vinegar. I wanted to find out which liquid is better for the nails and if the nails rust differently in different liquids. I also wanted to find out if coating the nails with different substances helps prevent rust. My hypothesis stated that the nails would rust the same in both liquids and that both liquids would keep the nails preserved. It also states that coating the nails is better for them.

II. Methodology:

To test my hypothesis I used:
2 plastic cups
8 nails
String
100ml of H2O
100ml of vinegar
Nail polish
Glue
Hot glue

There is only one manipulated variable, which is the liquid. To do this experiment: fill one cup with the H2O and the other with vinegar. Tie about five inches of string to each nail. Coat 2 nails with nail polish, 2 with glue, 2 with hot glue, and leave the last two as controls. Place one of each type of nail in the different liquids, namely water and vinegar. Record results.

III. Analysis of Data:

By analyzing my data, I concluded that vinegar helps prevent rust and H2O causes it. The data however does show that after a certain point the rust level goes down because of the water washing it away. An observation that I made showed a black substance on the vinegar nails, which appears to be a type of fungus. I also noticed that hot glue and nail polish seem to prevent rust (at least somewhat)

IV. Summary and Conclusion:

I found out that vinegar protects the nails better than the H2O, which made the nails rust quicker. My hypothesis was wrong, because I did not take into account that I was working with two different liquids. My hypothesis was wrong because the nails in the water rusted and in vinegar they grew something else, but it certainly wasn't rust. Part of my hypothesis that was right however, coating the nails did in fact help protect them, especially the hot glue.

V. Application:

My findings can help solve a problem because if you want to use nails or build something which may get wet, you might want to coat them in hot glue because that prevented rust the most. It will also help the building industry to develop nails that will not rust. This will improve the quality of the nails and therefore the structures being built with them.

Title: The Effect of a Multi-Vitamin Supplement and Vitamins D, B, and C on the Growth of Lima Beans

Student Researcher: Philip Lugovina
School Address: Edgemont Jr./ Sr. High School
White Oak Lane
Scarsdale, NY 10583
Grade: 7
Teacher: Maria L. Russo

I. Statement of Purpose and Hypothesis:
I was curious about how certain vitamins would affect the growth of plants. Plants receive certain vitamins and minerals from the soil, sunlight, and water which helps them grow strong and healthy, just like human beings. My hypothesis stated that the vitamin C could be too acidic and kill the plants but the others would aid in growth and may even act as a fertilizer.
II. Methodology:
To begin, I wrote my purpose and hypothesis. I used lima beans from the same bag and the same soil for each pot. Then I bought 4 different vitamins (B, C, D, vitamin supplement) of the same brand. I then ground up the vitamins, one by one, with a mortar and pestle and made two concentrations of each. The concentrations were: 1:5 and 1:20. I used 200 ml of water for each solution. With 1 teaspoon = 5 ml I made the correct concentrations. I recorded the height in centimeters every other day and fed each plant one teaspoon of the appropriate solution every other day. I used a spray bottle to make sure all the solution came off the measuring spoon for each plant. The sample size was as follows: 4 control pots with two seeds each, 2 pots with vitamin D in two concentrations, 2 pots with vitamin C in two concentrations, 2 pots with the B vitamins in two concentrations, and 2 pots with a multi-vitamin supplement in two concentrations. The manipulated variable was the vitamin that was being fed. The responding variable was the growth of the plants. The controlled variables were the pots, the soil, the seeds, the location, the amount of water, the way of watering, and the amount of solution. Finally, I analyzed my data, accepted or rejected my hypothesis, wrote a summary and conclusion, and applied my experiment to the world outside the classroom.
III. Analysis of Data:
Plant numbers 1, 3, 4, 6, 7, 8, and 9 did not grow. These were three of the control, the lower concentration of vitamin D, both concentrations of the multi-vitamin, and the higher concentrations of vitamins C and B. The plants that grew were one control, the higher concentration of vitamin D, the lower concentration of vitamin C, and both concentrations of the B vitamins. The higher concentration of vitamin D and the lower concentration of the B vitamins did the best out of all plants, by far, growing to the final heights of 73 cm and 72 cm. The control and lower concentration of vitamin C did well also with heights of 16 cm and 27 cm. The higher concentration of the B vitamins had a very late germination and stunted growth.
IV. Summary and Conclusion:

The plants that were fed vitamin D in higher concentration and the B vitamins in a lower concentration did the best. It is important to note this is a preliminary study but some conclusions can be made from the data. Vitamin D can be absorbed from the sun therefore supplementing the plant with vitamin D could be like giving the plant more sunlight and in turn might explain the huge growth difference between it and the control. It is possible that the B vitamins have some benefit to plants but too much can stunt growth. Vitamin C is an acid which may explain why the higher concentration did not grow. The multi-vitamin may have caused the seeds to die simply because they don't need all the vitamins, there may be additives in the vitamin supplement, or there might have been a problem with the seeds.
V. Application:
This study can be applied to my life. My dad has a vegetable garden and has many plants that he keeps in his house and maybe if he was feeling he wanted to try something new, he could fertilize his garden with vitamin D or B. Also there maybe could be a study done that could see if some component or form of vitamin D is a real benefit to plants and there could be an agricultural revolution. This could increase the growth and quality of food growth benefiting people's health. Farmers could substitute this new discovery for fertilizer therefore making a more environmentally friendly way of farming. Developing countries could also benefit in the way that there is a possibility that this could improve their farming and economy.

Title: The Amount of Fat In Some Chosen Foods

Student Researcher: Daniel DePasquale
School Address: Edgemont Jr./Sr. High School
Scarsdale, New York 10583
Grade: 7
Teacher: Ms. Maria Russo

I. Statement of Purpose and Hypothesis:
I am very athletic for my size and age, yet I am considered to be overweight by doctors' standards. The purpose of this project was to see if some of my favorite foods are healthy or not. My hypothesis was that many foods I eat have high fat content.
II. Materials and Methodology:
1 50 ml burette and stand
17 - 10 ml pipettes
1 - triple beam balance
1 - small calorie balance
2 - 80 ml beakers
1 - glass funnel
1 - 1,000 ml beaker
1 - 500 ml graduated
85 - ml Hexane (an organic solvent)
To test my hypothesis I took four single serving samples of some of my favorite foods and mixed them in a blender with increments of 250 ml of ice water. When I mixed those things together I was able to see the separate layers of different components present in each food type, namely the protein, the carbohydrate, the water and the layer of fat floating on top. It was necessary to leave the mixture sitting undisturbed overnight in order to obtain better separation. The next day, I scooped the fat out and poured it into a pan. Next, I put the pan in the oven so that the water can evaporate from the mixture. Next, I added Hexane to the reduced mixture for further fat separation. From there the liquid is transferred to a 1,000 ml beaker in which Hexane is added again to extract more fat. The next step is to transfer that to

a 50-ml burette. While in the burette I used even more Hexane to extract more fat. I used a pipette to suck out the extra fat. Next, I took a pan and boiled the fat to take out any extra water and Hexane. Then, I transferred the final mixture into a beaker to mass it and I recorded my data.

III. Analysis of Data:

My data showed that my favorite foods have a high fat content. Strawberry Shortcake has 6.15 grams of fat, Chicken Parmesan has 11.2 grams of fat, chicken wings has 5.5 grams of fat and the Diet Garlic Sauce (Chinese) has 3.7 grams of fat.

IV. Summary and Conclusion:

During this project I learned that foods I enjoy have different fat contents. Of the foods tested, the Chicken wings had the highest fat content of 8.70%, followed by the Strawberry Shortcake with 8.10%. The homemade Chicken Parmesan with a 6.10% fat content occupied the third ranking. And of all the samples tested the Diet Garlic sauce ranked the lowest in fat with 4.10% fat content. Nevertheless, the Chicken Parmesan has the highest total fat per serving of all the foods tested.

V. Application:

This project has made me aware of the amount of fat contained in some of my favorite foods. I was able to visualize the separated fat from the foods. At times I became overwhelmed with the grease on my hands and stuck to the glassware (that I had to wash afterwards). In view of that I have already changed my eating habits by avoiding some of the foods I tested.

Another thing I learned was that it takes a long time to complete this experiment. Separating the fat from the food was the longest part of the project. I also learned how to use chemicals, equipment, and do the measurements the correct way. You also have to have a lot of patience, and sometimes the results are not correct and you have to do it over. An important point I learned was that you could not assume in science. Everything has to be measured, sometimes re-measured to assure accuracy in the results.

Since the medical community has established that fats are detrimental to ones health, we should all pay closer attention to the foods we choose to eat. Fats, in your body cause heart disease, high blood pressure and high cholesterol. I think that reading the labels in foods that are considered to be low in fat, and also paying attention to the ingredients we are using while we cook, are important steps to reducing fat in our diets.

The National Student Research Center
E-Journal of Student Research: Science

Volume 9, Number 5, January, 2001

The National Student Research Center is dedicated to promoting student research and the use of the scientific method in all subject areas across the curriculum, especially science and math.

For more information contact:
John I. Swang, Ph.D.
Founder/Director
National Student Research Center
2024 Livingston Street
Mandeville, Louisiana 70448
U.S.A.
E-Mail: nsrcmms@communique.net
http://youth.net/nsrc/nsrc.html

TABLE OF CONTENTS

Title: Checkin' Out the Weber Library

Student Researchers: David Gugiliano, Grace Van Voorhis, Tyler Meade,
Josh Lipman and Shelley Liu.
School: Weber Elementary
Iowa City, Iowa
Grade: Grades 5 & 6
Teacher: Chris Rohret

I. Statement of purpose and hypothesis:

We wanted to learn more about students' opinions of the Weber library and its usefulness to Weber students. Our hypotheses were that students were going to want more updated sports

books and students would not check out magazines very often.

II. Methodology:

We first decided to conduct a study that would tell us the quality of our service and resources. We randomly chose 25 boys and 25 girls from Teams 3 and Team 4 (Grades 3, 4, 5, & 6) to complete our survey. Finally, we compiled data and wrote our abstract. We also interviewed our media specialist, Mrs. Stein, to find out about our library.

III. Analysis of data:

We found out that it is easy for most students to find books in the library. It was interesting to find out that most students can use the computerized card catalog, dictionary, atlas, and encyclopedia very efficiently. We learned that lots of students want more mystery and adventure books. From our surveys, we found out that 85% of the students find most of the research materials that they need. The majority of students also find enough books that fit their reading level.

IV. Summary and conclusion:

Eighty five percent of the students rated the services and selection of materials in the Weber library very highly. We accept part of our hypothesis because not very many students wanted the magazines and only 37% of the students wanted the sports books.

V. Application:

We will share this information with Mrs. Stein because it would help her decide what books she should order. Also other schools might get the idea of doing a survey like ours to find out more about what their kids want in the library.

Title: Don't Drink and Drive

Student Researchers: Amy Whitmore, Carolyn Russell, Donna Marino, Greg Redlawsk,
Stephanie Cool & Vasu Balakrishnan
School: Weber Elementary
Iowa City, Iowa
Grade: 5th and 6th
Teacher: Mrs. Rohret

I. Statement of Purpose and Hypothesis:

We wanted to know 5th and 6th grade Weber student's knowledge of drinking and driving. Our hypothesis stated that we all agreed that the students would not know much about drinking and driving. We decided on this topic because we thought it was important to our generation and saving lives in our community.

II. Methodology:

We read information and interviewed an Iowa City police officer to learn about drinking and driving. We then wrote a survey and picked a stratified random sample group. It consisted of

50 5th and 6th graders from Weber School but only 30 responded. To make it even, we had twenty-five boys and twenty-five girls, 10 total from each of the five classrooms. Next, we looked at all of the data and tallied all the responses. Then we made circle graphs to show the results of our research and we wrote our abstract.

III. Analysis of Data:

We learned that not many of the students knew the legal consequences of drinking and driving. However, the majority knew the correct age group picked up most often for drinking and driving, which is 19-23 year olds. About half of the students we surveyed had learned about drinking and driving in school and the other half hadn't.

III. Summary and Conclusion:

The majority of 5th and 6th grade students at Weber Elementary do not know much about drinking and driving. Although, a big 93% thought that you should learn about drinking and driving in school. Therefore, we accepted our hypothesis.

IV. Application:

We will be sending our information to the Iowa City Police Department and the Iowa City Science and Health coordinators, Joan Vandenburg and Jeanne Bancroft. We hope they will share this with teachers so they can emphasize the dangers of drinking and driving.

Title: Strength of Plastic Wrap

Student Researcher: Erin Hoops
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jean Jensby

I. Statement of Purpose and Hypothesis
The purpose of my investigation is to determine the strength of different brands of plastic wrap. My hypothesis states that Saran Wrap will be the strongest.
II. Methodology
Independent variable (manipulated variable): different brands of plastic wrap
Dependent variable (responding variable): the strength of the different plastic wraps
Controls: same size of test sheet, same weights, same way of laying the weights on the plastic wrap, same amount of time
Materials:
data sheet
pencil
eight different brands of plastic wrap: Saran Wrap, IGA, Handy
Wrap Clear Johnson, Red Handy Wrap Johnson, Reynolds Wrap Holiday print, Always Save, and Glad Wrap
weights: nine of them exactly one pound each
two chairs that are exactly the same height
cellophane tape (two inches for each side of the plastic wrap)
centimeter ruler

Procedure:
1. Cut plastic wrap test sheets so they are exactly 5 inches wide and 5 inches long.
2. Gather two chairs with seats that are the same height and place them so that the seats are facing and are exactly 4 inches apart.
3. Tape the plastic wrap to the two chairs with exactly 2 inches of tape for each side of the plastic wrap so that you can put your weights on to measure the strength.
4. Measure where the exact middle of the plastic wrap is.
5. Gather one pound weights and place them one at a time in the middle of the plastic wrap.
6. Lay them exactly the same direction.
7. Keep adding more one pound weights on the different plastic wrap until it breaks, and record your data.
8. Continue this procedure until you have tested all eight brands.
9. Repeat steps #1-#8 four more times for more accurate results.

III. Analysis of Data

My data shows that the Reynolds Holiday wrap held 10.5 pounds average after four trials. After four trials the average for the Saran Wrap was 6.25 pounds. For IGA the average after four trials was 6.75 pounds. For the Glad Cling wrap the average was 6.5 pounds after four trials. After four trials for the Johnson Red Handy wrap, average held was 6 pounds. For the average of the Ziploc Clear Handy wrap after four trials, it held 7.5 pounds. After four trials for Johnson Clear Handy wrap, its average was 9 pounds. Lastly, Always Save held an average of 4.75 pounds after four trials.

IV. Summary and Conclusion

I found out that the Reynolds Holiday wrap was the strongest and held the most weight. Therefore my hypothesis was rejected. The second strongest was the Johnson Clear Handy wrap. Then it was the Ziploc Clear Handy wrap. Next strongest was the IGA brand. Then came the Glad Cling wrap. Next was the Saran wrap, and after that the Johnson Red Handy wrap. The least strongest brand was the Always Save. To make the results more accurate I could have done more trials and could have used more kinds of Plastic Wrap.

V. Application

I now see how important plastic strength is when it comes to packaging. It can be a major factor when it comes to keeping food fresh and packaging items to ship to stores. Industries can use this synthetic material in many different ways. Some of those ways are for packaging when shipping things to another place, and also they can be used in making many different materials that we use today.

Title: Tooth Decay

Student Researcher: Lauren Tipton
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jean Jensby

I. Statement of Purpose and Hypothesis

The purpose of my investigation is to determine the effect of different liquid substances on the decaying of teeth. My hypothesis states that a tooth in the liquid substance orange juice will decay the fastest.

II. Methodology

Independent variable (manipulated variable): different liquid substances- water, milk, orange juice, pop (Dr. Pepper)
Dependent variable (responding variable): tooth decay
Controls: same amount of liquid in each container, same size container, kept in same refrigerator, liquid dumped out every week and replaced with the same amount (30 mL) as the last week
Materials:
pencil
data sheet
pan
latex gloves
stove
old toothbrush
bleach
small bucket
30 mL measuring cup
4 small containers with lids
paper marked with numbers 1-4
refrigerator
water
milk
orange juice
Dr. Pepper
teeth: 4 of the same size and no decayed spots;
(I used dog teeth from a veterinarian)
strainer
Procedure:
1. Gather all materials needed for this experiment.
2. Find the 4 teeth that you are going to be using for this experiment. I found mine at the Animal Clinic.
3. Clean the teeth by soaking them in bleach water for 2 minutes.
4. Scrub the teeth with an old toothbrush. Use latex gloves on your hands. Make sure that you wash your hands thoroughly after touching the teeth.
5. Boil the containers and their lids to remove all germs. Afterwards, dry the containers with a dry, clean towel.
6. Take a piece of paper that has the numbers 1-4 written on the paper and put #1 tooth in its spot and #2 tooth in its spot and so on. #1 tooth is the tooth that will be soaked in water, #2 tooth is in milk, #3 is in orange juice, and #4 is in Dr. Pepper.

7. Fill each container with 30 mL of each kind of liquid: #1 container with 30 mL of water, #2 container with 30 mL of milk, #3 container with 30 mL of orange juice, and #4 container with 30 mL of Dr. Pepper.
8. Now put #1-#4 teeth in each of their containers and close the lids so that no air can escape. NEVER MIX UP THE TEETH!
9. Store the containers in a refrigerator. I used the a bottom storage drawer so that nothing would ruin the containers or spill the contents.
10. After each week, record any changes and/or take a picture.
11. Repeat steps #6-#10 each week, replacing the liquids each week.
12. Once 3 out of the 4 teeth have decayed to a point where the tooth is starting to show decay with cavities, you can stop the experiment and record the findings.
13. Once step #12 is finished, organize the data and record the findings.

III. Analysis of Data

My data shows that a tooth soaked in Dr. Pepper had the most cavities after 20 weeks compared to the liquids water, milk, and orange juice. It took one week to show any cavities in the pop tooth. The others showed cavities in week 20 and the water tooth never showed any cavities.

The tooth soaked in the liquid water showed that no cavities resulted overall. The tooth stayed the same color after being taken out of the water. The tooth soaked in the liquid milk resulted in 1 cavity overall. The tooth had many white spots on it. The tooth soaked in the liquid orange juice resulted in 1 cavity overall. The tooth shrunk and became very thin and after being taken out of the juice, the tooth turned a brownish-orange color. The tooth that was soaked in pop (Dr. Pepper) resulted in 4 cavities overall. This tooth turned the same color as Dr. Pepper which is a dark brown almost black color on one side and the other side turned a light brown.
IV. Summary and Conclusion
I found out that a tooth soaked in pop resulted in the most cavities, therefore my hypothesis is rejected. Of all the teeth soaked in a liquid, the water tooth had the least cavities and the pop tooth had the most cavities. The number of cavities in each tooth from most to least was #4 pop, #3 orange juice and #2 milk both had the same, and #1 water. To make my results more valid I could have done more trials and used more kinds of liquids.
V. Application
I now understand why it is important for people to drink less products that have sugar in them. Water is one of the best drinks because it has no sugar content in it. Dentists should show the effects of drinking products with high sugar levels and not brushing their teeth to their patients.

Title: Bubbles and Scent

Student Researcher: Shayna VanNortwick
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jean Jensby
I. Statement of Purpose and Hypothesis
The purpose of my investigation is to determine the effect of the different water temperatures on the height of different scented soap bubbles. My hypothesis states that the scent doesn't matter on how high the bubbles get in different temperatures of water.
II. Methodology
Independent variable (manipulated variable): the temperatures of the water
Dependent variable (responding variable): the height of different scented soap bubbles
Controls: same amount of water, same amount of each scent of soap, same container, same day, same method of getting soap and water into the pan, same way of stirring the solution
Materials:
data sheet
pencil
water
liquid soap (I used Sarah Michael's Natural Shower Gel, A Div. of Laloren, INC.; the scents were peach, freesia, rose and seashore.)
pan

clear centimeter ruler
stirring utensil (I took a beater off of our mixer and used it to stirred the solution by hand.)
thermometer
measuring cup
Procedure:
1. Gather all materials needed for this experiment.
2. Make sure you have the water the right temperature. Adjust the faucet so that the cold water measures 80 degrees F., and the warm water measures 120 degrees F.
3. Measure out 6 cups of water into a large soup kettle with a flat bottom.
4. Measure how high the water level is by putting a clear centimeter ruler in the center of the pan.
5. Record the data.
6. Then pour in 1 teaspoon of the first scent of soap to be tested into the water.
7. Stir the water and soap mixture for one minute with the stirring utensil. Using a timer.
8. Put the clear ruler in the center of the pan, and measure the top of the bubbles.
9. Record your data.
10. Subtract the height of the water from the height of the bubbles. Record your data.
11. Empty the water out and rinse the pan so there are no more bubbles in it.
12. Repeat steps #2 through #11 for each scent of soap.
13. For each scent run the trials three times with cold water and three times with warm water.
III. Analysis of Data
My data shows the height of the bubbles for Peach scent: at 80 degrees Fahrenheit the height of the bubble average was 3.5 centimeters out of 3 trials, and at 120 degrees Fahrenheit the height of the bubble average was 4.17 centimeters out of 3 trials.

The height of the bubbles for Freesia scent: at 80 degrees Fahrenheit the height of the bubble average was 4.67 centimeters out of 3 trials, and at 120 degrees Fahrenheit the height of the bubble average was 3.83 centimeters out of 3 trials.

The height of the bubbles for Seashore scent: at 80 degrees Fahrenheit the height of the bubbles average was 5.6 centimeters out of 3 trials, and at 120 degrees Fahrenheit the height of the bubble average was 4.83 centimeters out of 3 trials.

The height of the bubbles for Rose scent: at 80 degrees Fahrenheit the height of the bubble average was 4.17 centimeters out of 3 trials, and at 120 degrees Fahrenheit the height of the bubble average was 4.17 centimeters out of 3 trials.
IV. Summary and Conclusion
I have to partially reject my hypothesis because with my tests the scent does not matter how high the bubbles get. It is the temperature that matters. I found out that the colder water had a higher bubble level, but the warmer water made the scent of the soap smell better. To make my results more valid I should have run more trials, used more scents of soap, and I should have had a variety of brands of the soap.
V. Application
I now understand that it is important to people how high the bubbles get. The reason is that, if an adult has a small child that wants to take a bubble bath, they might want to know how high the bubbles get so they know how high to fill the tub with water. That is because if the water goes up to a child's chest, the bubbles won't go near the child's face.

They could use this data for advertising the product. For example, a company that is advertising a higher bubble level would have more people buy it rather than a company that has a lower bubble level.

Title: Water Pressure Effects On The Human Body

Student Researcher: Jake Dozier
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jean Jensby

I. Statement of Purpose and Hypothesis
The purpose of my investigation is to determine the effects of water pressure on a jar full of air (jar represents human lung). My hypothesis states that the deeper an air bubble goes in the water, the smaller the bubble of air will get.
II. Methodology
Independent Variable (manipulated variable): the different depths
Dependent Variable (responding variable): water pressure on the human body
Controls: Use the same jar to measure the pressure, same area tested, same day, and around the same time.
Materials:
one gallon sized glass jar
rubber bands (big enough to fit around the 1 gallon jar)
data sheet
scuba diving equipment (buoyancy compensator, scuba tank, mask, fins, etc.)
clear lake or ocean with deep water (at least 102 feet)
ruler (one foot, even though I measured in centimeters)
4-pound weight (this keeps the jar straight up and down in the water)
brass clip (attaches to the string which attaches to the mouth of the jar)
string centimeter ruler (optional, it can be glued to the jar to help you measure)
liquid super glue (glue the string centimeter to the glass jar)
camera (optional)
string (attaches to the jar)
nylon ties (to attach the string to the jar)
black permanent marker
Procedure:
1. To set up your jar, get all the materials together. Put the jar right side up and put 12 cups of water into it.
2. With a black marker, trace around the air/water line very carefully making sure not to wiggle the jar and the water.
3. With the string, place it on the outside mouth of the jar. Take the nylon ties and place around the mouth of the jar. Now tighten them until the string won't move.
4. This step is optional. Find a scuba diving depth gauge and place it on the string by sliding the string through the hole.
5. Attach the weight by connecting the brass clip to the string and attach a nylon tie to the weight by tightening the tie about halfway. This allows the brass clip to connect to the nylon tie which holds the weight. This will keep the jar from tipping sideways underwater.
6. With super-glue, place the tip of the measuring tape at the spot where 12 cups of water was marked. Glue the measuring tape to the jar making sure it is straight up and down. Allow to dry and now you are ready to start.
7. Go to diving site. My dad and I did this at the dam at Table Rock Lake in Missouri. Put on diving gear correctly using all safety precautions.

8. Around 3 feet, fill the gallon sized jar about 75% full of air by turning it upside down and putting it in the water. Let the air come out by tilting the jar at the angle to where it lets out enough air to fill it 75% with air.
9. Then on the gallon jar, mark where the air/water line is located with a rubber band. We used a 4 pound weight to hold the jar straight up and down in the water.
10. Descend to 34 feet deep with the one gallon jar and mark where the air/water line is, again.
11. Keep descending to 68 feet deep with the gallon sized jar and again mark where the air/water line is at with another rubber band.
12. Keep descending down to 102 feet and mark where the air/water line is located at with a rubber band.
13. Ascend back to the surface of the water and record your data on a data sheet. Do not move the rubber bands on the glass jar.
14. Measure how many centimeters the line moved between the surface, 33 feet, and 66 feet in centimeters with a ruler. Record your observations on a data table.
15. Repeat procedure to verify first data.

III. Analysis of Data

My data showed the deeper I went in the water the more condensed the air bubble got. On dive number one, from the surface to 34 feet, the air/water line moved 8.3 centimeters from the time we were on the surface to the depth we were at. From 34 feet to 68 feet, the air/water line moved another 3.2 centimeters. At 102 feet, the air/water line moved 1.5 more centimeters.

On dive number two, the air/water line moved 8.5 centimeters from the surface to 34 feet. At 34 feet to 68 feet, the air/water line moved 3 centimeters. As I descended down to 102 feet, the line moved another 1.2 centimeters.

The total that the line moved at 34 feet was averaged out at 8.4 centimeters. At 68 feet, it moved a total of 11.5 centimeters. The average that the line moved was 12.85 centimeters at 102 feet.

IV. Summary and Conclusion

My observations show that the deeper in the water air goes, the smaller the air bubble gets. Therefore my hypothesis is accepted. The water pressure in the jar condensed the air making more air pressure in the top of the jar. The reason I descended to 34, 68, and 102 feet was because those depths are located where the atmospheres are at.

V. Application

I understand the importance of water pressure on the body. It can cause injury and even death by forming bubbles in the blood which go into the heart through the veins and eventually cause heart failure. There is 14.7 pounds of air pressure per square inch where we live right now. This is known as one atmosphere. At 34 feet is two atmospheres, 68 feet is three atmospheres, and 102 feet is four atmospheres. I descended four atmospheres to collect data for my project. I could have tested my experiment in different water temperatures and it could have affected the experiment. Pressure is everywhere in our lives no matter what we do. We cannot stop it or control it at all.

Title: Different Brands of Detergents and Surface Tension

Student Researcher: Nealy Sandell
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Jean Jensby

I. Statement of Purpose and Hypothesis

The purpose of my investigation is to determine the effect of different brands of detergents on surface tension. My hypothesis states that Tide (one of the four brands of detergents) will create the lowest surface tension.

II. Methodology

Independent variable (manipulated variable): four different detergents-Tide, Era, Woolite, and Surf.

Dependent variable (responding variable): the surface tension

Controls: the same amount of water, the same amount of detergent, same temperature, same room conditions, same button, and a new thread each test

Materials:

data sheet
pencil
liquid Tide
liquid Surf
liquid Era
liquid Woolite
4 glass or plastic containers
1 stirring rod
several plastic buttons
1 four inch piece of thread
an eyedropper
several quarts of tap water at room temperature

Procedure:

1. Fill the four, 10 ounce, plastic containers with 8 ounces of water to be the in the tests.
2. Loop the thread through the holes of the button. Holding the thread gently, lower the button onto the surface of the water. If the button sinks, try another button until you find one that sits on the surface of the water.
3. Remove the button and dry it thoroughly.
4. Using the eyedropper, place one drop of the first detergent to be tested in the container of water. Stir the solution thoroughly with the stirring rod.
5. Carefully lower the button and rest it on the water's surface. Remove the button and change the thread after ever test.
6. Repeat steps #4 and #5, adding a drop of detergent each time until the button sinks when lowered onto the water. Keep track of the number of drops you added to the water up until the button sank.
7. After the button sinks, record the number of drops of detergent you have added.
8. Next, remove the button, rinse and dry it. Pour the water into the sink, rinse and dry the container thoroughly.
9. Repeat steps #2-#8 for each different brand of detergent. Be sure to use the same button with a clean thread for each new soap brand.
10. All tests should be done several times. Then average the results.

III. Analysis of Data

My data shows that one drop of Tide broke the surface tension in every trial except in trial 4; the average drops of Tide was 1.25. Then I changed the soap to Era and on all the trials it was 3 drops and the average was 3 drops. I then changed my soap a third time to Woolite and on all of the trials were 2 drops except trial 3 where it was 1 drop and the average came out to be

1.75. Next, I changed my soap to Surf and it was different every time. The first trial was 1 drop, the second trial was 4 drops, the third trial was 5 drops, and the fourth trial was 2 drops. The average of Surf was 3 drops.
lV. Summary and Conclusion
I found out that Tide used the least amount of detergent to break the surface tension, which was only 1.25 drops. The data that I collected from my experiment showed that, out of four detergents, Tide was the one that had the least drops of detergents, the second least was Woolite with 1.75 drops, Era and Surf both needed 3 drops to break the surface tension. Therefore, I accept my hypothesis. For additional suggestions, you might need to have a more accurate eyedropper and a better measure of water in a cup and have more trials to see if the tests are accurate.
V. Application
When I apply my research to the real world it would help because if you wash your clothes in only plain water you won't get them clean. So to get them the cleanest you need a detergent. I found out that there is a difference in soap's effect on water. Soap manufacturers should have on-going research to produce a better product. You would probably want to use Tide.

Title: Increasing Jumping Height

Student Researcher: Clark McDonald
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jensby

I. Statement of Purpose and Hypothesis
The purpose of my investigation is to determine the effect of drop jumping {every other day for two months} on jumping height. My hypothesis states that after two months of drop jumping my jumping height will have increased.
II. Methodology
Independent variable (manipulated variable): drop jumping 400 times
Dependent variable (responding variable): height of jump
Controls: same time of day, hard surface, calendar to record every other day, same method of measuring height of jump
Materials:
Pencil
Calendar
Ruler
Tape
Data Table
Procedure:
Gather all needed materials.
Record current vertical jump. I took the average of 4 jumps. Explanation of vertical jump: stand flat-footed against the wall and mark height of fingertips; then jump and record height of fingertips. The difference is my vertical jump.
Drop jump every other day for the months of February and March for 400 times total on three stairs late in the day before I eat the evening meal. To drop jump 1st time stand on the first step, jump down to the ground and back up to the 1st step, stay on the 1st step. To drop jump the 2nd time stay on the 1st step jump down to the ground and back up to the 2nd step, stay on the 2nd step. To drop jump the 3rd time, stay on the 2nd step and jump down to the ground

and up to the 3rd step. The drop jump down gives the pre-stretch to the leg muscles, and the vigorous drive upwards, the secondary contraction. The exercise will be more effective the less time my feet are in contact with the ground.
Record how much my vertical jump improved over the month of February. [See step # 2.]

Record how much my vertical jump improved over the month of March. [See step # 2.]

Add the totals from February and March together to see how much I have improved over all.
III. Analysis of Data
My data shows that drop jumping every other day for the months of February and March increased my vertical jump. My first measured vertical jump was measured on February 12, I had gained a 1/4 of an inch. The second measurement was on February 24, I had gained an additional 1/2 inch. On March 1, I had gained an additional 1/3 inch. On March 31, my last measurement I had gained 1/4 inch.
IV. Summary and Conclusion
I found out that by using the drop jumping exercise my vertical jumping height has improved. To make my data more valid, I should have had other people drop jump with me to get more accurate data. I found out that my hypothesis was accepted because my vertical jumping height was improved. On February 12, I improved 1/4 inch, at the end of the month of February, when I measured to find out my increase, I had gained an additional 1/2 inch. On March 1 I had gained another 1/3 inch. On March 31, I measured my last measurement and it was, 1/4 inch making a total over all gain of 1 1/3 inch.
Note: To begin this project, in October through January I was trying to improve my vertical jump by jumping rope. I had gained 1 inch by jumping rope and was not satisfied, so I looked for more research on how to improve my jumping height. While I was looking for a better way to improve my jumping height I came across a web-site that said drop jumping was the most efficient way of improving a vertical jump. (see bibliography) This is why I didn't have more time to drop jump. If I continue this exercise I believe that I will have better data on drop jumping alone.
V. Application
I now understand that having a high vertical jump can help people with any kind of sport they are involved in. For instance, in basketball it will help with quickness and improve leg power rebounding. I suggest that people who try this should do it for a longer period of time and not drop jump every other day to avoid injury. Jumping every other day got hard to do and got in the way of school activities. I think it was better to drop jump when I got home from school because my legs weren't stiff, like they are in the morning before they were warmed up. Hopefully, these suggestions will help other people who try this exercise.

Title: Herbs - Nature's Memory Boosters?

Student Researcher: Jenna Roe
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jean Jensby

I. Statement of Purpose and Hypothesis
The purpose of my investigation is to determine the effect of certain herbs on the ability to memorize. My hypothesis states that the herbs will improve the quality of the test subjects' memory.

II. Methodology
Independent Variable: different herbs
Dependent Variable: ability to memorize a series of numbers
Controls: same rooms for test, same amount of herbs, same quantity of time to memorize, same stop-watch (time response), same numbers for same test, same brand of herbs, same bottle of herbs used for all participants
Materials:

Data Sheet
Pencil
Subjects
Rosemary
Basil
Thyme
Ginger
Note Cards
Stop Watch
Black Marker
Room with plain walls, ect.
Procedure:
Use note cards and black marker and write number sequences with 4 - 10 numbers each. When writing these use the same numbers but in different orders. The number sequences should consist of the numbers 0-9.

Find a room that is relatively blank and has no decorations or anything that might call one's attention to it. I am using the basement of my house. Make sure that your participants aren't wearing anything that has a pungent smell, such as perfume, cologne, or deodorant.
Get your stopwatch.
Begin testing your subject using just one set; that set should contain sequences with 4 -10 numbers each. The series with 4 and 5 numbers, give the participant 3 seconds to memorize; 6 and 7, give them 4 seconds; 8 and 9, give them 5 seconds; and 10 give them 6 seconds to memorize the numbers they see before they say the numbers back.
Record data of how many numbers they got right out of the sequence.
Now have the subject smell one of the herbs - rosemary, basil, ginger, or thyme.
Repeat the procedure you used in steps #5 - #6 using a different set of number sequences .
Give the subject a small container holding fresh-ground coffee beans, and instruct them to smell it till he/she doesn't smell the previous herb any more.
When the subject has cleared his/ her sinuses, begin the testing using a different set of number sequences than the ones you used in the previous test and have them smell a different herb.
Record data.
Repeat step #9.
Continue this process of testing the subject with herbs and then giving coffee to clear sinuses you have used all the herbs in the testing.
Once you are done with that 1 subject do this same procedure with the other subject repeating steps #5 - #12 testing memory and all the herbs.
III. Analysis of Data

My data shows that the herbs increased the quality of the subject's memory. The subject's memory increased by having the capacity to memorize 1 whole, additional number on an average of all of the subjects' scores. Since all of the subjects got a 100% on memorizing the sequences with 4-6 numbers, with and without the herbs, I did not make a graph to represent those results, being, as they were, irrelevant to my research of finding if the herbs enhanced

the subject's skill to memorize a sequence of numbers. In the rest of the sequences, those containing from 7-10 numbers, the subjects missed anywhere from 0-6 numbers. The average percent of numbers the subjects could recall adequately in a sequence were: using no herbs - 75.68%, using rosemary - 92.25%, using ginger - 85.25%, using thyme - 82.68%, and using basil - 85.18%.
IV. Summary and Conclusion
After the testing of 10 subjects of various ages, I found that my hypothesis was accepted. This is so because the use of the herbs while the subject memorized a number sequence improved the quality of the test subject's memory, according to the average of all the subjects' scores. Even though all of the herbs mostly helped the subjects' memories, I found that rosemary was the most distinguished of the herbs in helping the subjects' memories. My theory about the rosemary is that because rosemary had a more pleasing scent the subjects' brains accepted the aid more readily. My theory was confirmed when several of the subjects commented on the smell of the rosemary and thought its fragrance was the best. The exact words of one subject was, "I liked the rosemary the best because it smelled good."

Some defects might have been that: the subjects weren't all the same age, there were only 10 tests accomplished, and the tests weren't administered all on the same day.
V. Application

I believe that my findings will benefit the real world by helping students and/or adults who need to memorize a certain item and have the memory's quality be superior. This can come in handy when students are studying for an exam, or when an adult is studying for an interview and needs facts. I think this new use for herbs will be promising.

Title: Brick Strength

Student Researcher: Kelly Heitmann
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jean Jensby

I. Statement of Purpose and Hypothesis
The purpose of my investigation is to determine the effect of the size of the sand particles on the strength of the brick. My hypothesis states that the smaller the sand particles the stronger the brick.
II. Methodology
Manipulated variable: Size of the sand particles.

Responding variable: Strength of the brick.
Controls: Use the same recipe, same amount and kind of glue, same volume of sand, same size of container to mold it in, same weather conditions.
Materials:
1 gallon of glue
Rectangular molding container
A 1 Quart Measuring container to compute volume
Paper to record data on (data table)
2 gallons of sand from river, to make three sizes of sifted sand.
Pencil to record data with

Set of standard pound weights
Two tables to balance both ends of the brick on
Procedure:
Gather the materials.
Sift the sand samples into three different sizes small, medium, and large grains.
Measure the volume of each of the sifted sand samples in the 1 quart measuring container and record it on a piece of paper.
Mix sand and glue together in the rectangular molding container.
Let mixture of the sand and the glue dry for 4 days.
Test bricks strength by setting the brick between the two tables and adding weights until it collapses.
Record the data on a piece of paper.
Repeat steps 2-7 on each brick.
Calculate which brick was the strongest.
Average the weight that it took to collapse the brick.
III. Analysis of Data
My data shows that the bricks made with the finely sifted sand held an average weight of 21.1 pounds after 3 trials. After 3 trials, the brick made with the medium-size sand held an average weight of 20.3 pounds. The large sifted sand held an average weight of 16.6 pounds after 3 trials.
IV. Summary and conclusion

I found out that the smaller the sand particles the more strength the brick had. Therefore, my hypothesis is accepted. Of all trials, the average brick strengths the brick made with the finely sifted sand was the strongest. The order of strength was fine, medium, then coarse. One short coming was that I had an outliar, or number that didn't fit, in the strength of a medium sand brick: it held 30 pounds which was higher than the strongest fine brick. I should have done more tests, but it was a long process to make all of the bricks and mold them with only a few molding containers.
V. Application
There is a brick manufacturer close by in the town of Fairbury, Nebraska. They would most certainly need to study this type of research, to get the strength and recipe that they want. Consumers would also want to know the strength and weight of the brick that they are buying, so they get a good buy. After I made these bricks by hand, I have a new appreciation for the millions of people throughout history who have had to build structures by making their own handmade bricks. And I know in Third World countries today people still have to make their own bricks.

Title: Crystal Growth

Student Researcher: Joelle Blecha
School Address: Belleville Middle School
Belleville, Kansas
Grade: 8
Teacher: Mrs. Jean Jensby

I. Statement of Purpose and Hypothesis
The purpose of my investigation is to determine the effect of solution strength on crystal growth rates. My hypothesis states that the stronger the solution the more the crystals will grow.

II. Methodology
Independent variable (manipulated variable): solution strength
Dependent variable (responding variable): crystal growth
Controls: same recipe, same room temperature, same day to control humidity, same container
Materials:

Data sheet
pencil
alum powder
5 jars of same brand and height
5 saucers
5 pieces of string (each 5 inches long)
5 unsharpened pencils
saucepan
cloth
paper towels
stove
centimeter ruler
scale
Procedure:
1. Measure out 3 tablespoons of the alum powder for the first experiment.
2. Pour into the pan.
3. Measure out 1 pint of water and pour into the pan.
4. Heat the mixture to 350 degrees.
5. Add two more teaspoons of alum to the mixture and bring mixture to a boil.
6. Let the mixture cool to room temperature.
7. Pour 1/4 of a cup of the mixture into the saucer.
8. Put the saucer in a cool place like a room.
9. Pour rest of solution into the jar.
10. Stir another tablespoon of alum into the jar.
11. Cover the jar with a cloth.
12. Set jar in a room.
13. Wait until solution in saucer evaporates. This will take about 3 weeks.
14. Choose the biggest crystal as the seed.
15. Tie one piece of thread to the seed crystal.
16. Hang the crystal into the solution.
17. Put the jar somewhere warm like a window sill.
18. Wait until the liquid in jar evaporates and leaves crystals.
19. Record information about amount of days it took to grow crystals on data sheet.
20. Carefully take crystals out of the jar.
21. Lay the crystals on a paper towel sheet.
22. Wait until the crystals dry.
23. Record size, weight, and shape of crystals.
24. Repeat steps #1-#22 four more times, each time increasing the amount of alum by 1/4 teaspoon.
25. Repeat steps #1-#23 five times, thus insuring accurate results.
26. Record all findings.
III. Analysis of Data
After repeated trials of the crystal growth, I found out that Jar 1 (which was the control) had crystals that grew an average of 1 1/2 inches. Jar 2 (weaker than the control), had crystals with an average of 1/2 an inch, and Jar 3 (the weakest solution), grew crystals with an average

of 1/4 inch. Jar 4 (stronger than the control) had crystals about 2 inches and Jar 5 (the strongest solution) had crystals of 4 1/2 inches.

IV. Summary and Conclusion

I found out that the strongest solution I used had the biggest crystal growth. My hypothesis, therefore, was accepted. Some of the things that could have been improved upon include more trials, and even stronger or weaker solutions. This could also be repeated with another recipe, to test the accuracy of the results.

V. Application

A way that this could be applied to the real world is if people wanted bigger crystals for their x-rays, but couldn't find them in nature or buy them, chemists could grow them. Also, if someone wanted to sell the crystals to people, they could make more money on larger crystals, so this experiment would definitely help. Crystals are used for x-rays, carved and sold, and are used for other various reasons, so chemists would be looking for better ways to make crystals.