



California State University
Northridge

the **New**
Journal
of **Student**
Research
Abstracts

vol. 19 **2014**

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of **Student**
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vol. 19 **2014**

Editor
Steven B. Oppenheimer
California State University, Northridge

Sponsor
California State University, Northridge

The New Journal of Student Research Abstracts 2014 Volume XIX

An Annual Journal for Young Investigators and Their Teachers

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Dianne F. Harrison, Ph.D.
President
California State University, Northridge

We are pleased to welcome you to the 2014 edition of the *Journal of Student Research Abstracts*. The innovative brainchild of Dr. Steven Oppenheimer, Professor of Biology at California State University, Northridge, the *Journal* for more than 25 years has showcased the work of young scientists at the pre-collegiate K-12 level, who have conducted their research under the tutelage of their teachers trained in CSUN's research labs. As Thomas Jefferson wrote long ago, democracy cannot survive without the unending "diffusion of knowledge."

The excitement of conducting true, hands-on research and seeing the results of their work published in the *Journal* provides students with the kind of experience, confidence, and pride that are essential to encouraging youngsters to pursue a career in science and research. The continued strong preparation of future scientists will be essential to the nation's place as a leader in innovation, as well as to its continued security, health, and welfare. Indeed, the priority placed by the Federal government on putting more youth on a science and research track has made this program a nationwide model and was a key reason Dr. Oppenheimer was honored by President Barack Obama with a U.S. Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring in 2009.

The university is pleased to make the journal available online free of charge to students and teachers who wish to be inspired and see the innovative research conducted by their peers.

We are proud to support the work of Dr. Oppenheimer and the teachers and students whose outstanding work is included in the journal. They truly help make CSUN shine!

Dianne F. Harrison, Ph.D.
President

Harry Hellenbrand, Ph.D.
Provost and Vice President
for Academic Affairs

Jerry Stinner, Ph.D.
Dean, College of Science
and Mathematics

Honoring a Great Mentor and Donor: Julie Gorchynski, M.D., Professor

Thank you to Dr. Gorchynski for also sponsoring five new awards, including a K-12 teacher research award!

In Her Words:

As Professor and Research Director in emergency medicine, my interest in research and education began during my graduate studies at California State University, Northridge (CSUN), in biology as a master's student under the supervision of Steven B. Oppenheimer, Ph.D.

I received two bachelor's degrees at CSUN, in public health and biology. During the master's program I taught CSUN biology laboratory courses to undergraduate students. My mentoring of students began during this time and continued through my medical training. After obtaining a master's degree in 1987, I went to medical school at Creighton University School of Medicine in Omaha, Nebraska. I returned to California in 1991, where I completed my specialty residency training in emergency medicine at Loma Linda University Medical Center in 1994.

As an academic faculty for the past 20 years, I have mentored hundreds of high school, undergraduate premedical and preprofessional health students, medical students and residents. Since 2011, selected graduate students in the master's program in the Center for Cancer and Developmental Biology at CSUN receive a "Julie Gorchynski, M.D., MSc Research Scholarship Award" for research supplies to advance graduate student research. Most recipients are now in postgraduate Ph.D., M.D., dental and law programs.

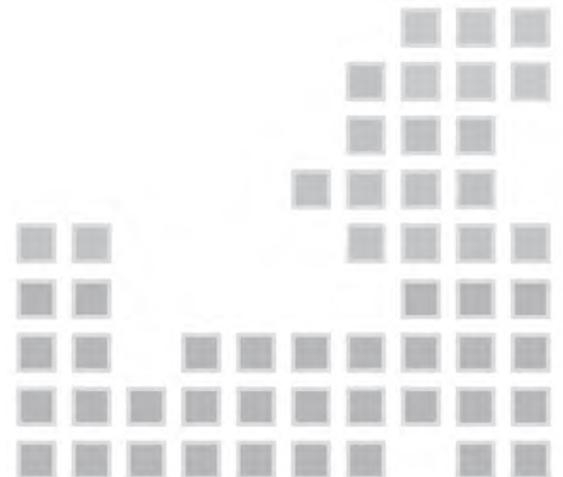
I also have been involved in clinical emergency medicine, research and education since 1991 in California at Loma Linda University Medical Center and at the University of California, Irvine, Medical Center, as well as in Texas at Texas A&M and the San Antonio UT Health Science Centers. I have been an invited speaker for local, state, national and international emergency medicine conferences, where I had also been selected to present my research. I have numerous publications in medical journals for my clinical research in emergency medicine. One of my numerous awards in research includes a Certificate of Recognition from the National Science Foundation and Research Director Program awarded to me by Dr. Oppenheimer, NSF/U.S Presidential Award recipient, Director for Cancer and Developmental Biology. This certificate was signed by Dr. Oppenheimer and by the late Francis H.C. Crick, Nobel Laureate, Honorary Project Chair.

Many of the students I have mentored in the past 20 years have entered into professional postgraduate training in medical, dental, veterinary, pharmacy, nursing, physical therapy, law and Ph.D. programs.

It has been said that, "as a teacher, it isn't someone who teaches something, but someone who inspires the student to give of their best in order to discover what they already know."



Julie Gorchynski, M.D., Professor



A decorative background consisting of a grid of small, light gray squares. The grid is 20 columns wide and 30 rows high. A black rectangular box is overlaid on the right side of the grid, containing the title 'Table of Contents' in white text. The title 'Table of' is in a cursive font, and 'Contents' is in a bold, sans-serif font.

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About the Editor

Dr. Steven B. Oppenheimer

Steven B. Oppenheimer received the Ph.D. degree from Johns Hopkins University and is currently Professor of Biology and Director of the Center for Cancer and Developmental Biology at California State University, Northridge. He is author or coauthor, mostly with his Cal State students, of more than 300 publications and national presentations, including 14 books and book editions; was awarded over \$7 million in research and science education grants serving as Principal Investigator; and served on National Institutes of Health and National Science Foundation grant review panels. In addition, he serves on the editorial board and is editor for the United States, Canada and South America of the 60-year-old international journal *ACTA Histochemica*, published by Elsevier. He is recipient of 26 distinguished teaching awards, distinguished research awards, outstanding professor awards and other honors from local, statewide and national organizations. In 1984, he was named statewide Trustees Outstanding Professor of the California State University system (the system's highest honor), and in 1992 he was elected Fellow of the American Association for the Advancement of Science (AAAS). The AAAS defines a Fellow as "a member whose efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished." He is a recipient of a U.S. Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring.

Dr. Oppenheimer thanks the following organizations for funding his student-involved research programs: National Institutes of Health, National Institute of General Medical Sciences SCORE, RISE and MARC programs, the Joseph Drown Foundation, the Sidney Stern Memorial Trust, the National Science Foundation and California Science Project.

The editor also wishes to thank Van Nuys Airport for all of its past support of the journal, helping give wings to students' educational dreams!

Editor's e-mail address: steven.oppenheimer@csun.edu

Editor's program websites:

www.csun.edu/biology/faculty/oppenheimer.htm

www.youtube.com/watch?v=JQCd5NIFVoQ

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About the Associate Editor

Dr. Helen H. Chun

Helen H. Chun received her Ph.D. and was a postdoctoral researcher at the University of California, Los Angeles. She currently is an Associate Professor in the Biology Department at California State University, Dominguez Hills. She researches the cellular response to radiation exposure, particularly in the stimulation of DNA repair and cell death.

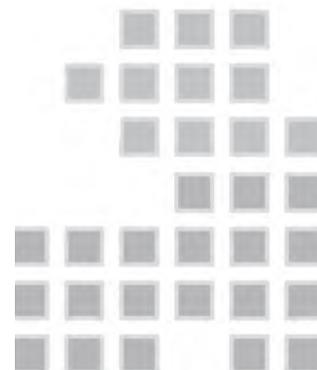
About the Sponsor

California State University, Northridge, has been ranked by the National Science Foundation in the Top 12 (sometimes No. 1) of over 500 similar universities in numbers of its science and social science graduates who go on to achieve doctoral degrees.

Sponsor's website: www.csun.edu



Dr. Steven Oppenheimer (seated front row, second from left) visits the Blue Room in the White House, where he received a 2009 U.S. Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. Arden Bement, then-Director of the National Science Foundation, is standing at the far left.



From the Editor:**A Golden Opportunity for Underrepresented Science Students Interested in Careers in Biomedical Research**

To those underrepresented science students who select California State University, Northridge, for your college experience: We have a golden opportunity for you. If you are a U.S. citizen or permanent resident and if you are possibly interested in a Ph.D. degree in biomedical science, you can apply for distinguished programs funded by the National Institutes of Health (Maria Elena Zavala, Director). These programs will open many doors and will pay you thousands of dollars to do research while a student at California State University, Northridge. We thank the National Institutes of Health, National Institute of General Medical Sciences MORE program for distinguished support for these student opportunities.

For more information, contact Steven Oppenheimer at steven.oppenheimer@csun.edu.

**About the Journal and Abstracts**

The New Journal of Student Research Abstracts is published yearly in the fall. Continued publication is always dependent on funding.

The journal is intended to serve as

- (1) a vehicle to honor young investigators and their teachers by showcasing their work, motivating them to continue their involvement in research science;
- (2) a sourcebook for both students and teachers who are looking for ideas for research projects; and
- (3) a volume to disseminate student research discoveries.

Many abstracts included in the journal demonstrate good science, i.e., clear introductions describing a hypothesis to be tested, appropriate methods and data analysis, results and conclusion statements, and – most important – sufficient numbers of appropriate control and experimental samples and repetitions of experiments. Some are idea abstracts, and some are abstracts of library or Internet research projects.

Abstracts are reviewed by the teachers and the journal editors. Although the journal editors delete very poor abstracts from the publication, some abstracts herein are quite flawed, and some lack at least one component of a good science experiment. Including some of these abstracts helps make this journal very useful for classes to learn what makes for a good experiment and a good abstract versus a not-so-good experiment and a not-so-good abstract.

Some of the abstracts are experimental plans instead of completed projects. This is especially true in the case of long-term, sophisticated research programs that require extensive setup and planning. The journal encourages abstracts on the planning and progress of such projects.

The journal editor continues to reserve the right not to publish those abstracts that are seriously flawed. The journal does not notify authors if their abstracts have been deleted. **Please note that any abstract that involves harming vertebrate animals (including humans) will not be published in this journal.**

Any opinions, findings and conclusions or recommendations are those of the individual authors of the abstracts presented in the journal, and do not necessarily reflect the views of California State University, Northridge, other contributing organizations and individuals, or the journal staff.

Submission of Abstracts

Any science teacher may submit student abstracts following the format used with the abstracts in this volume. After the title, followed by student author name(s) and teacher name (teacher), school and school street address, city, state and ZIP Code, abstracts should begin with the purpose of the study, followed by how it was done, and then the results and conclusions.

All abstracts should be typed in **11-point Arial font**, error-free. Messy abstracts and those not following proper format may be discarded. The journal is not responsible for any abstracts received or for publication errors. The journal does not acknowledge receipt of abstracts and there is no guarantee that they will be published or that the journal will be published in any given year.

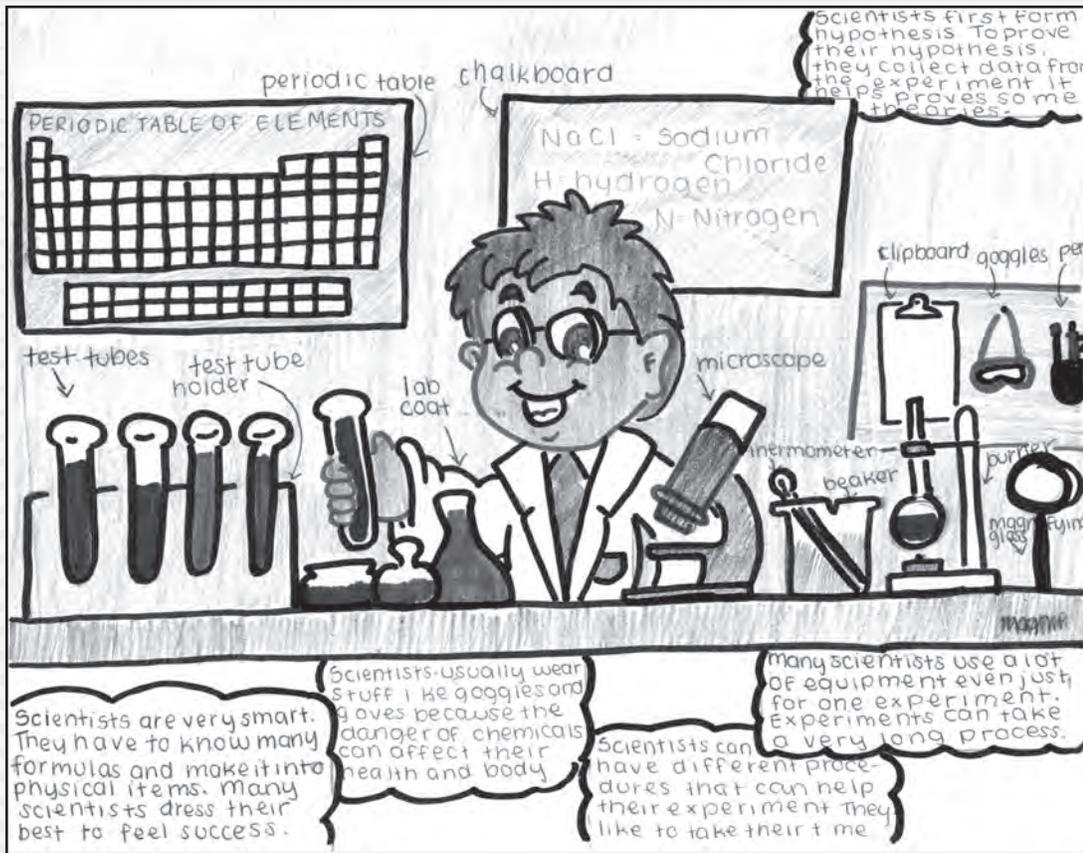
Only teachers may submit their students' abstracts to the journal. Teachers must submit each abstract as an **electronic Word document to steven.oppenheimer@csun.edu**. Abstracts not submitted electronically or not following the other guidelines provided herein may be discarded without notice.

The deadline for receipt of abstracts for each annual volume is June 1, but an issue may be closed at an earlier date. Publication is scheduled for each fall. Submitted abstracts are not returned to authors, so students and teachers are advised to keep a copy of all submitted materials. The only confirmation that abstracts will be published is if they appear in print.

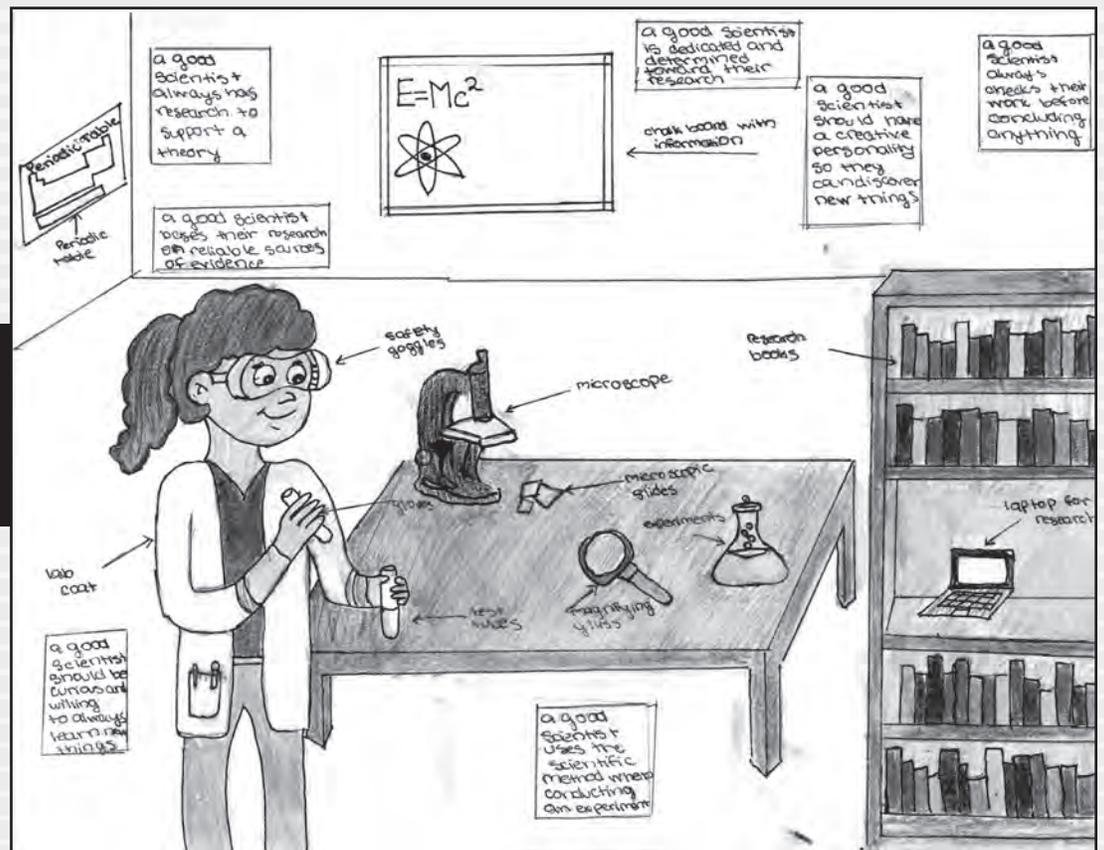
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What Is a Scientist?

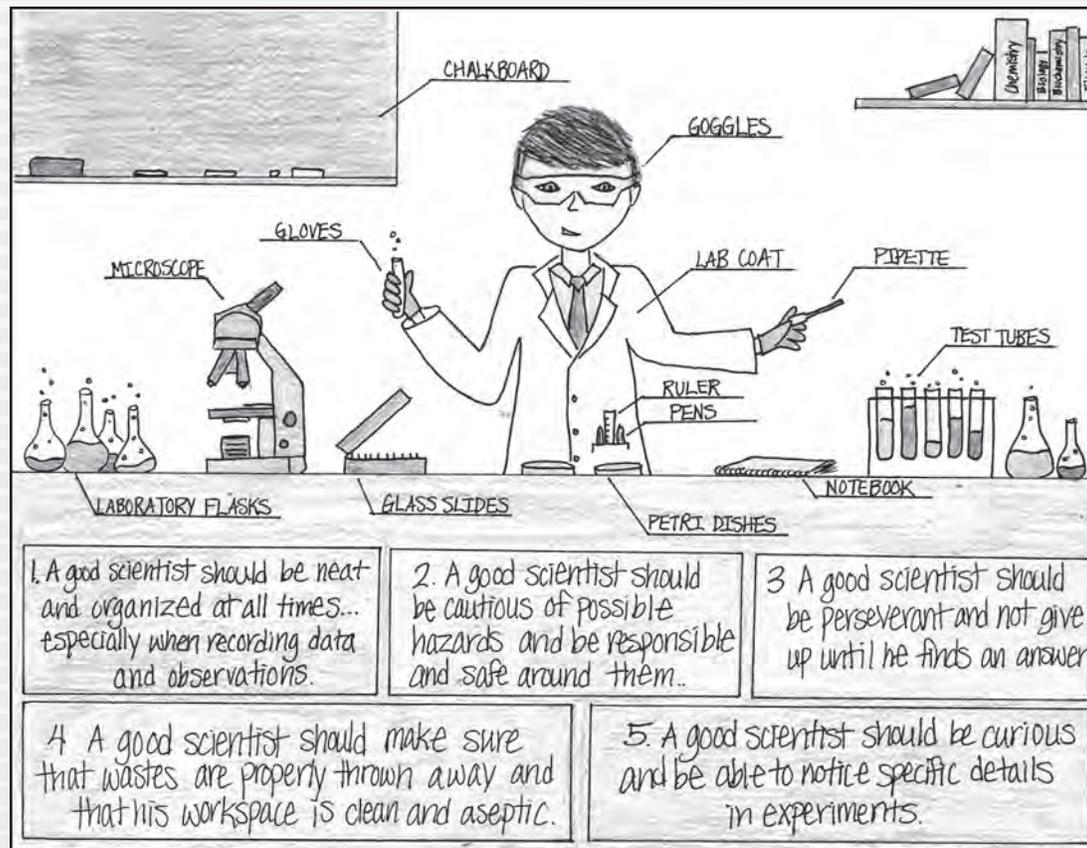
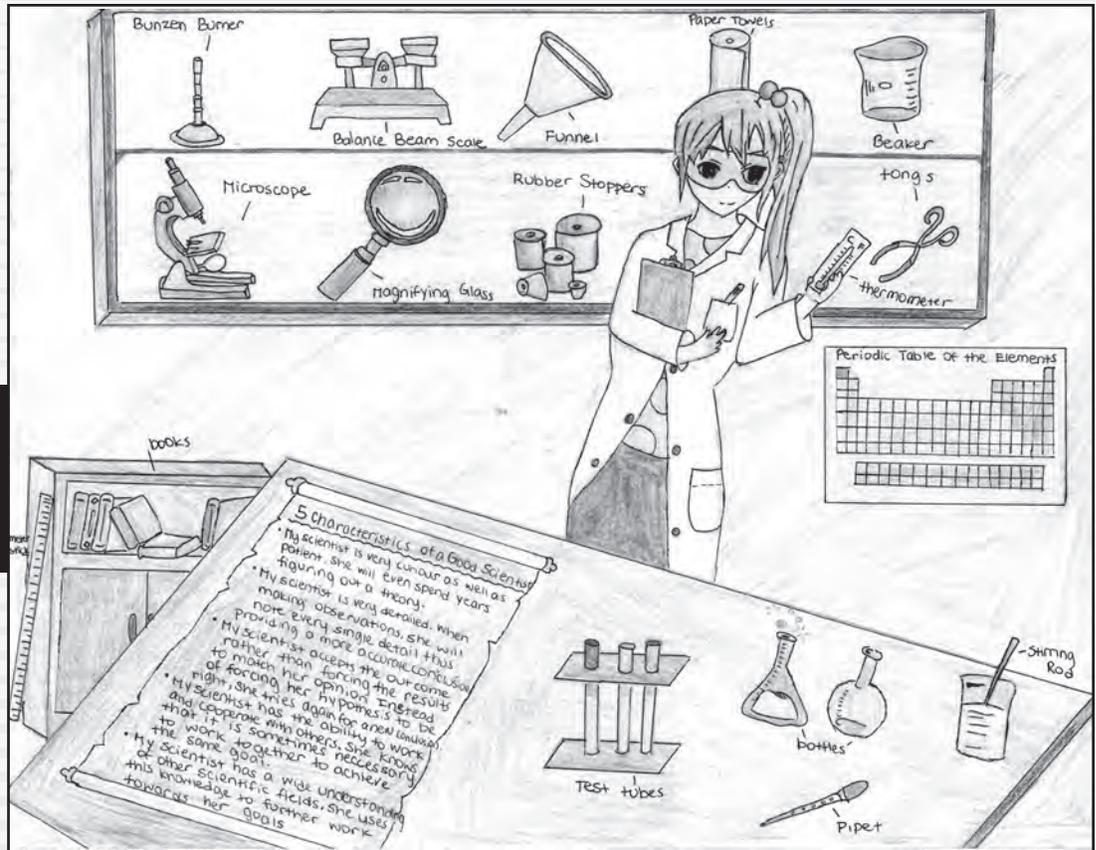


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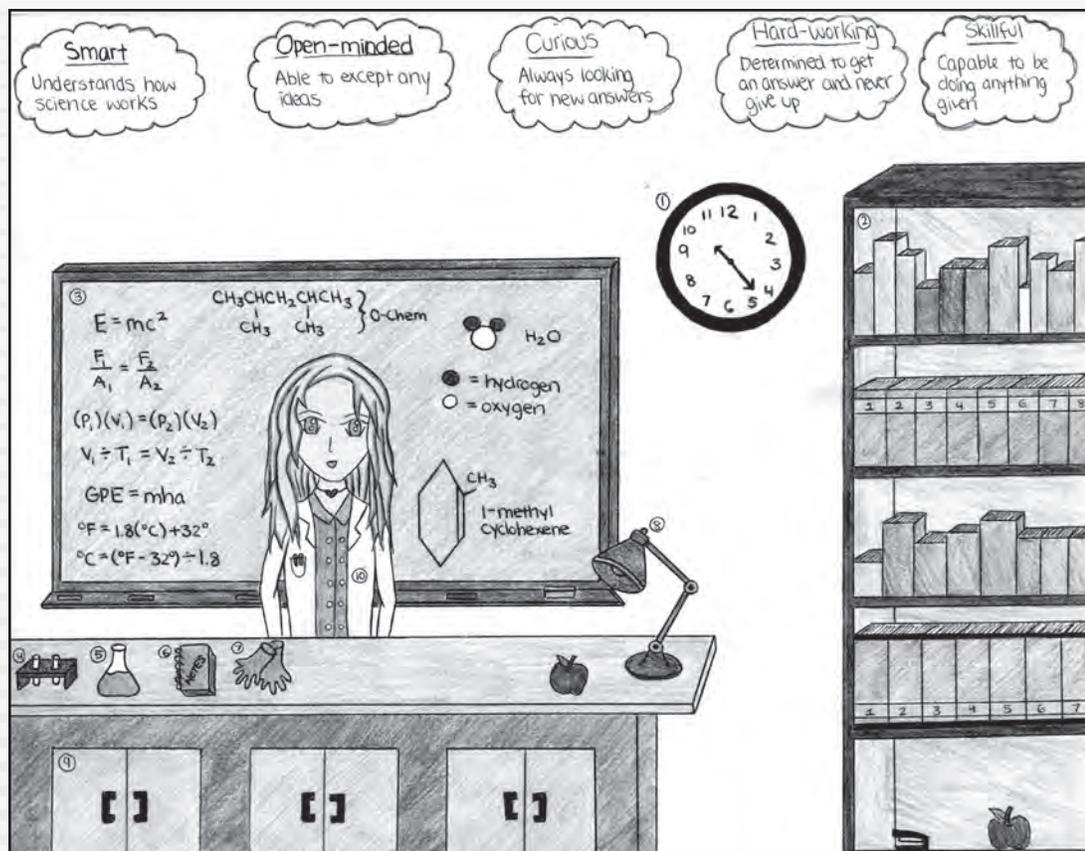


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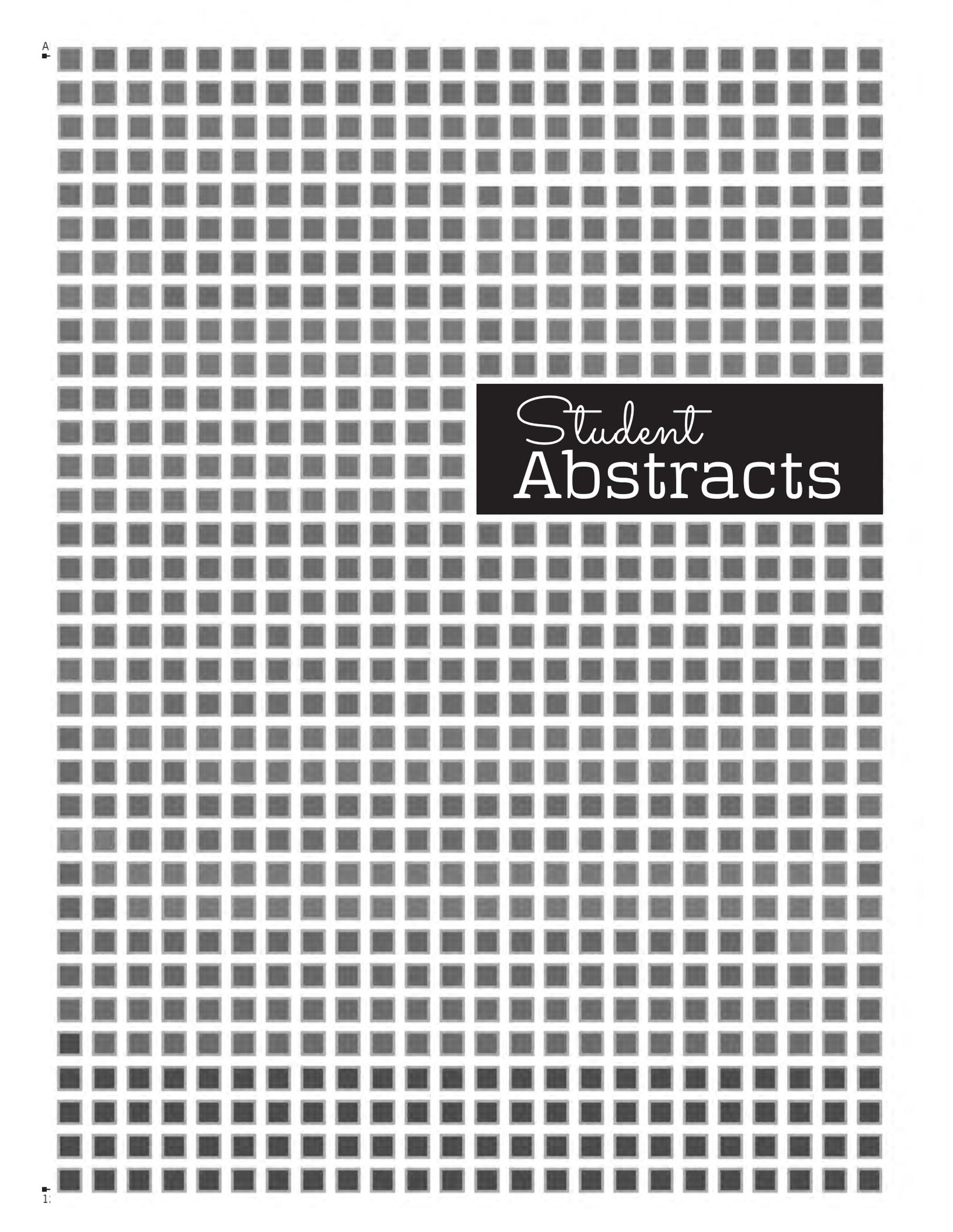
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Student
Abstracts

5433

Which Fruit or Vegetable Will Have the Highest Average Water Content?

Adam Omary and T. Miller (teacher)

Oliver Wendell Holmes Middle School
9351 Paso Robles Ave.
Northridge, CA 91325

The purpose of this experiment is to see which fruit or vegetable will have the highest average water content. As a hypothesis, it was determined that the pepper would have the highest average water content. All of the fruits and vegetables were weighed, and then they were put in an oven at 200 degrees Fahrenheit for 8 hours. After 8 hours, they were weighed again and the water content was determined. Each vegetable and fruit was tested four times. The potatoes' average water content was 31%, the tomatoes' was 38%, the oranges' was 52% and the peppers' was 55%. The hypothesis was correct; the peppers had the highest average water content at 55%.

5434

How Does Windmill Blade Design Affect Energy Production?

Liam Shay and D. Shah (teacher)

Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This study examines the energy produced when traditional windmill blades are replaced with original designs based on watermill buckets and cloth sailboat sails. A 3-blade balsa wood turbine with a 20° pitch was used as the control. The following original designs were tested: a 9-cupped (3-blade) and an 18-cupped (6-blade) watermill design, and a 3-sail and 6-sail triangular cloth design. A 6-blade balsa wood traditional turbine also was tested. Each turbine was tested from a distance of 40" under three different wind powers for 3 minutes: 1180 cubic feet/minute (CFM), 1710 CFM (Lasko Model 3733), and 1881 CFM (Dri-Eaz Model F259). Amperage and voltage were measured with a multimeter. The results suggest that a design of 3-sail cloth blades produces the highest amount of energy as measured in both amperage and voltage; the cup designs were ineffective, and the 6 balsa blades did a bit better than the control. But, because the 6-blade balsa turbine requires twice the material but produces less than twice the energy made by its 3-blade counterpart, it is not a more efficient design. The 3-sail cloth turbine produced more voltage and amperage than the control, suggesting that it offers a better future for wind energy production than traditional turbine blades.

5435

Effects of Different-Colored Lights on Radish Growth

Marcelo Perdomo and D. Shah (teacher)

Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This experiment studied the results of different lights on radish growth. Radishes were planted and grown for 24 days with either a red, blue or green light placed above each one. Each experiment was repeated three times. The radishes would receive 6-8 hours of light, would be watered every other day, and would be kept at an

average temperature of 72 degrees Fahrenheit. As the experiment went on, observations were that the radishes with the red light were maturing the fastest and were the healthiest; the radishes with the blue light were not as healthy, but were maturing at the same rate; and the radishes with the green light were maturing at a slow rate and were not very healthy. The results suggest that the red light is the best light to use for radish growth.

5436

Why Does Citric Acid Produce Electricity?

Matthew Kogan and D. Shah (teacher)

Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This experiment answered the question of charging an iPod with fruits and vegetables. The fruits were all connected by a copper wire and a zinc nail and sat for at least 30 minutes to get a flow of electricity. When two dissimilar metals are put in an electrolyte, a chemical reaction called "oxidation-reduction" occurs. There were six combinations of two fruits and each was tested four times. The highest voltage any of the combinations reached was 2 volts, but an iPod needs at least 5 volts to charge. In the end, all of the combinations produced electricity, but not enough to charge the iPod even a little bit.

5437

Which Produces the Tallest Cilantro Plants: Worm-Composted Soil, Non-Worm-Composted Soil or Non-Composted Soil?

Meghan Mathers and D. Shah (teacher)

Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This study examined the question of which is the best type of soil for cilantro plant growth out of three different types of soil. Cilantro seeds were planted into worm-composted soil, non-worm-composted soil or non-composted soil and then were watered with 15 mL per day. Once per week, the height of each plant was recorded. Each experiment was repeated three times. In worm-composted soil the height of the cilantro plant was 4.7 cm in the first experiment, 6.3 cm in the second and 3.5 cm in the third. The height of the cilantro plant grown in non-worm-composted soil was 4.3 cm in the first experiment, 0 cm in the second (because it died) and 4.5 cm in the third. The height of the cilantro plant grown in non-composted soil was 8.5 cm in the first experiment, 1.3 cm in the second and 5 cm in the third. The results suggest that non-composted soil is the most likely of the three soils tested to play a role in the height of cilantro plant growth.

5438 Blackjack Strategies' Viability Tested

Miru Yang and D. Shah (teacher)
Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This experiment examined the question of how viable online blackjack strategies are. Ten games of blackjack were played following one Internet strategy (www.online-casinos.com/) (OC) exactly, and 10 more games of blackjack were played following another Internet strategy (www.casinocashjourney.com/blackjack_single-deck.htm) (CCJ) exactly. The amount of money made or lost in a round of blackjack was recorded. The experiment was repeated four more times. It showed that the average results of both strategies were negative, meaning that money probably would be lost if these strategies were used. The CCJ strategy had an average loss of 2 dollars, whereas the OC strategy had an average loss of 3 dollars. Both strategies are not viable to use and it is most likely that most online strategies should not be used in real casino games.

5439 Effects of Material Change on Spark Distance of Leyden Jars

Monty McCabe and D. Shah (teacher)
Portola Highly Gifted Magnet Center
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Tarzana, CA 91356

This study examined the question of whether differences in materials have an effect on spark distance in Leyden jars. Three Leyden jars were created and tested multiple times using a different number of charges each time. It was found that using steel and brass had the same spark distance of 1 millimeter, which is a very small distance. The zinc one, however, created no spark whatsoever and it appeared that the zinc one let off all electricity put into it. The results suggest that differences in materials do affect spark distance.

5440 Effects of Container Material on Water Evaporation Rate

Natalie Baber and D. Shah (teacher)
Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This study examined the question of possible differences in water evaporation speed when four cups of water were placed in containers made out of paper, ceramics, stainless steel and glass. The containers were placed under a 43-watt incandescent bulb, with a 7-inch difference between the containers and the light bulb. The containers were filled with 10.0 mL of 74-degree tap water. A stopwatch was started the moment the bulb was turned on with the containers underneath. The number of hours and minutes it took for each container's water to evaporate was recorded as the water evaporated. The experiment was repeated three times. The water in the container made of stainless steel evaporated first, in 21:58 hours during the first trial, 20:41 hours during the second trial and 23:30 hours during the third trial. The ceramic mug took 30:12 hours during the first trial, 29:49 hours during the second trial and 26:56 hours during the third trial. The glass took 36:47 hours during the first trial, 30:30 hours during the second trial

and 35:02 hours during the third trial. Finally, the paper cup took the longest, with the times of 41:22 hours, 48:10 hours and 40:21 hours. These results suggest that stainless steel is better at conducting heat than paper, ceramics and glass, and that the evaporation of water speeds up when it is contained in a stainless steel container.

5441 Which Music Affects Math Performance the Most?

Natalie Rajabi and D. Shah (teacher)
Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This study was to see which music genre causes math performance to slow down the most. A human subject listened to music for a few minutes and then solved math problems while listening to the music. This process was repeated with other forms of music and no music while being timed. This experiment used five test subjects and six types of music. The results were that the experiment was different for everyone, but the majority of the test subjects took the longest time to solve the problems while listening to hip-hop music. The conclusion for this experiment is that if people listen to hip-hop music, then their math performance will decrease.

5442 The Relationship Between the Size of a Glider's Wings and the Distance It Travels

Nathan White and D. Shah (teacher)
Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This experiment found the relationship between a glider wing size and the distance it travels. The gliders were made out of Styrofoam boards and were tested with a launcher made out of a rubber band and a cardboard box. Two of each of four wing sizes were made and each was tested three times. Wing size 10x2.5 cm traveled an average of 3.38 m. Size 10.5x5 cm went an average of 2.53 m and size 15x2.5 cm went an average of 3.05 m. Size 15.5x5 cm went an average of 2.57 m. Therefore, wing A probably travels the farthest compared to the other wings, rendering it most likely the most efficient wing. With wing size D, one of the gliders had a high distance (3.26 m), but the other copy of it only went an average of 1.87 m, which shows the instability of that wing size. However, this could have been caused by different amounts of glue used on each glider.

5443 Soundproofing Properties of Different Materials

Nathaniel Moreno and D. Shah (teacher)
Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This project examines the effectiveness of different materials that can be used for soundproofing. Small, medium and large boxes made of Styrofoam, cardboard and wood were used to test how well they could reduce sounds. The project used a decibel reader to record how much sound passed through an iPod to make the sounds inside of the different boxes. This test was repeated nine times for each different type of box. The small Styrofoam, cardboard and wooden boxes reduced the sound level to 65 decibels (dB), 63 dB and 62 dB at 250 hertz (Hz); 63 dB, 69 dB and

60 dB at 500 Hz; and 62 dB, 63 dB and 65 dB at 1 kilohertz (kHz). It seems that as the wood got larger, the more insulated it became, letting less sound come through. In the end, the wood seemed to be the best insulator.

5444

Effects of Rapid Temperature Changes on the Strings of a Diddley Bow

Noah Marx and D. Shah (teacher)
Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This experiment tested the effects of rapid temperature changes on the strings of a diddley bow, which is much like a one-string guitar. The diddley bow was put in environments of -6 degrees, 78 degrees and 180 degrees, each for an hour, and was tuned to a C4. This was repeated four more times. It was found that 180 degrees made the pitch two notes lower, that 78 degrees made the pitch one-half note lower, and that -6 degrees made the pitch one note higher. The results conclude that temperature does in fact play a role in the tuning of diddley bows.

5445

Effectiveness of Different Kinds of Toothpaste and Mouthwash Against Bad Breath

Paul Shin and D. Shah (teacher)
Portola Highly Gifted Magnet Center
18720 Linnet St.
Tarzana, CA 91356

This study looked into the efficiency of tools against bad breath. In the same time range, the host of the experiment was given an ordered combination of different toothpastes with or without mouthwash. The host had the combination of kids' toothpaste with mouthwash, kids'-only toothpaste, mint toothpaste with mouthwash, mint-only toothpaste, and nothing. The process was repeated three times, with each experiment taking place once every day. In the morning the host would immediately wake up to have his breath rated. The scale was from 1 to 10, with 10 being the worst and 1 being the best. The kids' toothpaste with mouthwash averaged a score of 5, the kids'-only toothpaste averaged 8, the mint toothpaste with mouthwash averaged 5, the mint-only toothpaste averaged 6.6, and the control variable received an average of 8.6.

5446

Practice Makes Perfect

Rachel Glass and D. Shah (teacher)
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A popular saying these days is "practice makes perfect," but what is the best way to practice? The purpose of this project is to see what will improve a person's vertical jump the most over a course of three weeks. The results of this experiment will help athletes do particular exercises to help a particular skill that they want to improve. In this case it is the vertical jump. If another student wanted to try this experiment, that person would have to start by gathering six volunteers for the most accurate test results. Have all of the volunteers take the vertical jump test (or any other test for

a skill you want to test out) before they start any of the planned workout activity. After the test results have been recorded, have the subjects go back to their daily lives while doing the assigned exercise daily for a certain amount of time. Repeat this process for three weeks (or whatever period of time the tester chooses). In the end, my hypothesis was proven correct. Jumping rope is the most effective way to improve a person's vertical jump.

5447

Effects of Chocolate on the Human Brain

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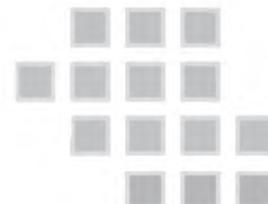
This study examined the question of whether the caffeine and happy feelings from milk chocolate affect a person's math ability. In total, all human subjects worked on four math worksheets. The objective was to finish as many problems as possible in one minute. The subjects worked on two worksheets without chocolate. Before each of the last worksheets, six pieces of chocolate were given to each subject. The experiment was repeated eight times. Six out of the eight subjects did worse after eating chocolate. Only two did better. The results showed that chocolate does not help people solve math problems faster.

5448

What Building Materials Are Most Affected By Acid Corrosion?

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This experiment sampled several common building materials to determine which were most chemically corroded by acetic acid (white vinegar). Fourteen materials were tested, including wood, clay brick, concrete, marble, granite, porcelain tile, ceramic tile, travertine, glass, steel, asphalt roof shingle, tin, aluminum and copper. The materials were pre-weighed and separately immersed into containers of acetic acid. They were removed from the acetic acid, dried, weighed daily and reimmersed into the acid baths for five days. The experiment was repeated with four sets of the 14 materials. A control set was pre-weighed and placed in containers for five days. Corrosion was measured as the amount of material weight loss after exposure to acid. Travertine had the highest percent corrosion, losing an average of 37 percent of its starting weight over five days. Next was marble, which lost an average of 25 percent of its starting weight after five days. The nonmetallic building materials corroded less, losing at most one-third of their weight. The metallic materials lost even less, proving more resistant to corrosion by acetic acid. Wood, however, was difficult to accurately weigh, as the porous samples absorbed liquid acid and gained weight. Glass, granite and porcelain tile proved to be the most resistant to corrosion by acetic acid.



5449

Effects of Boat Shapes on Aluminum Foil Boats

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This experiment showed which shapes of the bases of aluminum boats could carry the most pennies. Two boats, one 3 cm tall and one 12 cm tall, with the bases in the shape of a square with a surface area of 36 cm², were compared with a circle with a radius of 3.385 cm; a rectangle with a length of 9 cm and a width of 4 cm; a rectangle with a length of 12 cm and a width of 3 cm; and a right triangle with a base of 9 cm and a vertical length of 8 cm – all of equal height with the control. Each boat was placed into a 15-cm-high bucket of water, and pennies were placed into the boat and counted until the last penny that sunk the boat. The 3-cm boats did not seem to have a large difference in capacity, while in the 12-cm boats, the boat with the circular base carried the most pennies. This seemed to be caused by the equal water pressure on all sides of the circular boat and the unequal pressure distribution on the sides of the other boats. The circular boat was the only boat that kept the same shape after sinking. These results suggest that a boat with a circular base does the best in carrying heavy loads.

5450

Efficiency of Different Wing Designs

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This study tested the efficiency of different aerofoil designs. Three designs were tested in a wind tunnel using contraction springs, which expanded as lift and drag from the aerofoil were exerted on them. The forces on the springs were calculable at a spring constant of roughly 10,507.610 dynes/centimeter and were recorded. This test was repeated three times for each design. The aerofoil with a slight curve had about 1833 dynes of lift and about 2874 dynes of drag; the moderately curved aerofoil had about 3443 dynes of lift and had no recordable amount of drag; and the high-curve aerofoil had about 4199 dynes of lift and 4732 dynes of drag. The results suggest that a moderately curved aerofoil is the most efficient because it has very small amounts of drag and relatively high amounts of lift.

5451

Where Is the Best Place to Break a Board?

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My science experiment is about where the best place is to break a board. I had to look through many websites and magazines. Once I found I could go through with the rest of my experiment, I first decided that my hypothesis would be: If boards are hit at different places to break them, then hitting the center will break the board the easiest. I then tested the experiment and wrote down my observations. I tested the experiment many times and concluded that hitting the board in the middle was the easiest place to break it, in turn meaning that my hypothesis was correct. I then recorded the results and started to graph the observations. After all of this I

realized that it's almost impossible to break a board on the sides because there isn't much balance or space to break it. I have enjoyed working on the project and hope to look more into the subject.

5452

Girls Are More Afraid Than Boys

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The project was to see if, using a blood pressure monitor, girls or boys would be more afraid watching a scary video. The test subjects were put in a semi-dark room with a blood pressure monitor and watched a scary video. Three females were tested and two males. They all were tested on the exact same video the exact same way. Every reaction was different for each person. The first girl's blood pressure rose up to 96 and the other girl's to 111. The last girl's blood pressure rose up to 106, and the two males got 87 and 102. The girls had higher blood pressure than the boys on average. The result was that girls have more fear than boys while watching a scary video.

5453

Which Gender Has a Larger Lung Capacity?

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The hypothesis was that girls have a larger lung capacity than boys. The experiment tested the lung capacity of boys and girls through breath-holding. A group of 10 subjects in good health between the ages of 12 and 15 was chosen and broken into two groups of boys and girls. Each of the subjects was tested three times to get an accurate average length of breath-holding time. In this experiment the boys outranked the girls. The boys had an average breath-hold time of 44.0625 seconds and the girls had an average time of 34.0983 seconds. Since the boys averaged 9.96 seconds longer than the girls, this proved the hypothesis was wrong within this small sample of subjects. If this experiment was done again there would have to be a much larger group of subjects in order to get a more accurate result.

5454

How Does Helium Affect Tomato Plants?

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This study examined the effects of helium on tomato plants. A total of eight plants were used. This experiment was repeated four times. In each experiment, there were two plants, and one of them had helium added every day. Each experiment took seven weeks. The results were that helium does affect tomato plants by limiting the growth of the plants.

5455

Effectiveness of Covering Materials to Hide Body Heat

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This experiment examined the possible effect of covering a part of the human body (in this case a hand) with certain materials to find a temperature reduction that would be caused by the material insulating the body heat. Covering materials were kept for a period of one hour in a room at 74°F to maintain an identical temperature for all materials prior to testing. Then a volunteer's hand was completely covered with the material (using all of it) and the temperature was measured five times. This process was repeated with six other covering materials and the measurements were averaged. Using a laser thermometer, it seemed that aluminum foil was able to hide the heat radiating from the hand most effectively. The average temperature recorded was 72.6°F, whereas the normal hand temperature was 89°F. These results show that aluminum foil seems to be the most effective for "hiding" heat.

5456

Voltage Amount of Coin Batteries

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This study examined the possibility of a penny battery being the most effective. Batteries of dimes, pennies and half dollars were assembled into stacks of five, six, etc., up to stacks of 10. Each stack was touched to a multimeter set to volts. Volts were then converted into millivolts and recorded. For the five stack, pennies tested 432 millivolts, dimes tested 5 millivolts and half dollars tested 120 millivolts. The results suggest that a penny battery is the most effective battery compared to a dime or half-dollar battery.

5457

Effectiveness of Hand-Washing Methods on Dirty Hands

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This study examined which of three hand-washing techniques was the most effective at cleaning bacteria from hands: running water, soap and water, or liquid hand sanitizer. Two separate contaminants (dirt and yogurt) were used. A control was taken of each contaminant without use of any decontaminant. Three separate tests were done for each contaminant, for a total of 24 samples. Each sample was taken by pressing hands into a petri dish with agar and incubating at 35°C for 48 hours, with observations done at the end of every 24-hour period. After 48 hours, samples were taken from some of the petri dishes and placed under a microscope to try to identify if the colonies could be harmful. Finally, the petri dishes were disposed of in a safe manner. Observations at the 48-hour mark (showing how much of the surfaces of the petri dishes were covered) showed that soap and water was the most effective (yogurt at 8% and dirt at 47%); then water (yogurt at 15% and

dirt at 72%); and then liquid hand sanitizer (yogurt at 23.33% and dirt at 96.33%). The dirt control was 95% covered and the yogurt control was 50% covered.

5458

Effects of Different-Colored Light on Bean Plants

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This experiment tested the question of different-colored light on the growth of the common bean plant. Four boxes were covered with two layers of red, yellow, green or blue cellophane to create colored light. One bean plant was placed in each box, planted in a medium-sized plastic cup with ½ inch in potting soil, and watered with ¼ cup of distilled water every week. The control plant was placed in a box with no cellophane. The plants were measured once a week. The experiment was completed three times. The results suggest that green and yellow light do not help plants grow well, and red and blue light make plants grow faster.

5459

Effects of Size on Perception of Speed of Moving Objects

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To answer the problem of size differences in objects affecting a person's perception of their speed, a viewer observed two balls of different sizes at different times on a computer screen and answered which ball moved faster. They both moved at the same speed, but most people claimed that the smaller of the two balls moved faster. This result is probably caused by the illusion that the smaller ball travels a greater distance even though they both travel an equal distance.

5460

Is There a Correlation Between Density and Viscosity?

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This study examined the question of a possible relationship between the density of a liquid and its viscosity (the measure of resistance of a fluid to flow). A marble was dropped carefully at the same height in a selected group of six liquids, which were measured at 236.59 milliliters, at room temperature. The marble was timed until it hit the bottom of the containers the liquids were placed in. Each experiment was repeated 10 times and each time was recorded and then averaged out. Tap water, which was measured at 1 centipoise (the measurement of viscosity) and 1 g/mL (the measurement of density), was averaged at about 0.18 seconds. Rubbing alcohol, measured at 2 centipoise and 0.786 g/mL, was averaged at about 0.22 seconds. Coolant, measured at 15 centipoise and 1.11 g/mL, was averaged at about 0.34 seconds. Canola oil, measured at 57 centipoise and 0.92 g/mL, was averaged at about 0.48 seconds. Baby oil, measured at 110 centipoise and 0.81 g/mL, was averaged at about 0.69 seconds. And corn syrup,

measured at 150 centipoise and 1.38 g/mL, was averaged at about 0.87 seconds. The results suggest that the density of a liquid does not affect its viscosity.

5461

Organic Trash Converted to Biomass

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In society, pollution is causing a problem. There has to be another way to get fuel without having to harm the natural environment. Many wonder how the current usage of fuel can be changed to something more environmentally friendly. Biomass fuel is a great way for getting fuel without so many pollutants that can harm the environment. The project shows four different mixtures, each having different substances with cow manure and water. A balloon is attached to indicate the measurement of how much biomass is produced in a set amount of time per test subject. The hypothesis is that the mixture with mashed fruits will produce the most biomass. At the end of the experiment, the mixture with mashed fruits had the most biomass fuel produced.

5462

Effects on Bean Plants Planted in Different Depths

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This study examined the question of possibilities that the depth a bean plant seed is planted may affect the process of germinating. The bean plants were planted in different depths, at 2 cm high, 4 cm high and 6 cm high. One-and-a-half cups of water were added each day to each plant. Every day pictures were taken and the amount that plant had grown was recorded. In my experiment most of my plants did not grow due to several different reasons. But, of the nine seeds I planted, four of them slightly sprouted. First, bean plant seeds are not supposed to be planted during wintertime. When I first planted my seeds I was unaware of that because of my lack of experience in gardening. Second, the different depths my seeds were planted in affected them. If seeds are planted too deep under the soil they may not sprout. Also, if seeds are planted just above the soil they may die quickly because when water is given, the seeds are not under moist soil and will dry up and then die. The results of this experiment concluded that all plants have a certain time to be planted, and this time of the year is not the right time.

5463

How Does Airplane Wing Design Affect the Distance Traveled and Drag?

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This question inquired which airplane could go farther and showed ways to measure drag. A long-winged plane and a short-winged plane were tested for distance for 10 throws. These 10 throws were repeated with three different people. The long-winged plane went about an average of 5 meters, while the short-

winged plane went about an average of 7 meters. The airplanes were tested for drag with dry ice and a digital weighing scale. In the weighing scale experiment, the airplanes were 23 grams with a base each. With a headwind, the long-winged plane and the base's weight went up by 2 grams. The short-winged plane and the base's weight only went up by 1 gram. More air appeared to curve back toward the long-winged plane than the short-winged plane. These experiments suggest that the short-winged plane has less drag than the long-winged plane, and goes farther than the long-winged plane too.

5464

Effects of Temperature on Batteries

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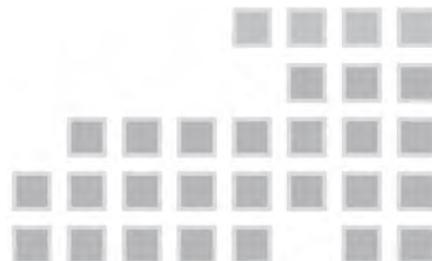
This study observed whether or not temperature affected the life of a battery. Alkaline D batteries were used, along with flashlights that required one D battery each. Each battery was placed in a different area that had different temperatures. One battery was placed in a refrigerator that had a temperature of 244.85°K; another was placed under light – which generates heat – with a temperature of 314.85°K; and the third battery was placed in room temperature, at 298.15°K. The batteries were put in the respective places at the same time for the same number of hours – 24 hours – and then they were placed in the flashlights. The flashlights were turned on at the same time and were left to run until the batteries ran out. After doing the same experiment three times, the results were all the same. The battery that was placed in a cold environment lasted the longest. The battery that was in a hot environment lasted longer than the battery placed at room temperature two out of the three times. The results show that cold and hot environments affect a battery by expanding the battery's life compared to room temperature.

5465

Plant Growth and Different Types of Water

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This project examines the question if watering radish plants with tap, distilled and recycled water affects the growth of the plants. Fifteen radish plants were planted, five in each of the three groups (tap, distilled and recycled water). Seven ounces of water were added to each of them. Each plant was measured every Tuesday of each week for six weeks. The radish plants were placed where they could get an equal amount of sun. The results indicated that recycled water made the radish plants grow taller.



5466

How Green Is a Green Roof?

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Green roofs are roofs that are partially or completely covered in plants. This experiment tested how much of a difference a green roof makes on lowering the temperature inside two identical model houses (scale model 1:3,000 of a 1,500-sq.-ft. house). The independent variable was the type of roof and the main dependent variable was the temperature inside each house. After placing the roofs outside under direct sunlight, three temperatures (the temperatures inside the houses and the normal outside temperature) were recorded every 2 hours. The experiment was repeated five times and the average temperature for each time point was calculated. The results indicated that the green roof house was lower in temperature than the house with the regular roof by 2 degrees Celsius on average. Also, at the 2 pm time point, when the outside temperature was declining past the peak, the difference between the in-house and the outside temperature was substantially lower (5 degrees versus 2 degrees) for the house with the green roof versus the regular roof. The findings suggest that green roofs moderate temperatures inside houses by serving as natural insulation, and add toward conservation of energy.

5467

The Effect of Music on Plant Growth

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This experiment examined the possibility of benefits (or hindrances) of music on plants. Nine plants were grown (three plants for the three variables) overall in this project, with three each being labeled with intense, subtle or no music. Each set received the respective type of music playing by it for two hours straight. After 16 days of experimenting, each of the plants that was exposed to the subtle music grew the fastest compared to the others, while the plants exposed to no music and intense music grew the second and third fastest, respectively. This ultimately proves that subtle music aids in plant growth, while intense music thwarts it.

5468

How Ethnicity Affects Our Choices

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In this experiment the goal was to discover whether or not the average person notices others of their own ethnicity more than those of a different ethnicity. Subjects were shown a mixture of images, all about the same size and shape, of people of different ethnicities. For 15 seconds they observed these pictures, leading them to a minute break in which more pictures were mixed into the pile already viewed by the subjects. Then the subjects were told to pick out all of the images that were seen in the previous round. This was repeated two times with each subject, but the second time the images were only of people of their ethnicity. The tester then looked at the images picked out by the subjects in each round and compared the results. This was repeated 24 times with

different people of different ethnic groups. The majority of the subjects did notice the images of their own ethnic group more. Only a fraction of the subjects were not able to pick out all of the pictures that were shown in the second round. As a result, the answer to this question is yes: People do notice others more if they are of the same ethnicity as them.

5469

How Do Different Kinds of Sweeteners Affect Yeast Growth?

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The objective of this experiment was to find out how different kinds of sweeteners may affect yeast growth. Ten dough batches with different kinds of sweeteners and two dough batches for the control were made. The dough batches were put into jars and sealed. The heights of the dough batches were recorded after one hour and two hours. Each experiment was repeated three times. The average height of glucose was 13.0; fructose: 13.2; D-(+)-galactose: 10.8; sucrose: 12.3; D-(+)-maltose: 10.3; lactose: 10.5; saccharin: 8.6; aspartame: 10.9; honey: 11.8; maple syrup: 13.1; control 1: 10.7; and control 2: 10.9. The results suggest that glucose, fructose and maple syrup are the best kinds of sweeteners for yeast fermentation, while artificial sweeteners, D-(+)-galactose and lactose are not good for yeast fermentation.

5470

Juices' Effect on the Cleanliness of Pennies

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The problem was to figure out if juices can affect the cleanliness of a penny. To figure this out, methods were chosen to contaminate the penny. Examples of these methods were rubbing in Aquaphor, spit, etc. After the pennies got filthy, they were put in their own 1.5 ounces of juice. The different juices were apple, pineapple and lemon. The pennies soaked in each of their juices for one minute, and were taken out of the juices to be examined. The experiment was repeated two more times to ensure the results were correct and final. The results showed that lemon juice cleaned the best by a small margin due to its citric acid. Pineapple and apple juice varied between second and third best. This proves that lemon juice can clean off grime the best on copper and possibly other metals.

5471

The Effect of Marinade Ingredients on Absorption

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This study examined how different marinade ingredients adsorb onto tofu. For the tests, tofu cubes were placed in solutions of vinegar, salt, sugar, wine, lemon juice, and water (which was the control solution). The tofu cubes were soaked in the solutions for two hours at room temperature. Each experiment was repeated three times. The tofu cube soaked in the salt solution gained the

most mass, with an average weight gain of 2.0 grams. The tofu cubes soaked in the three acidic solutions (vinegar, wine and lemon juice) all lost mass, with an average of -0.6 grams, -0.1 grams and -0.2 grams, respectively. The tofu cube soaked in the sugar solution had nearly the same result (average gain of 0.7 grams) as the tofu cube soaked in water (average gain of 0.6 grams). The test results suggest that salt is the best ingredient to increase absorption in a marinade.

5472

Effects of Different Mordants and Acidic and Basic Substances on Cochineal Dye

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This experiment tested the potency of cochineal dye on wool after the wool has been treated with a mordant to help the dye stick to the wool. It also tested the added ingredients of lemon juice and baking soda on the color of the wool. The wool first was boiled for 30 minutes with the mordants of either alum or tannic acid from leaves, acorns, galls and the bark of the tree *Quercus agrifolia*. Then the wool was washed and divided among cochineal dye containers while mixed with lemon juice, baking soda or nothing. The wool was boiled with the dye for 30 minutes and then taken out of the dye and washed thoroughly. The results showed that alum gave the wool vibrant colors, while the other mordants made wool with a dark color and a hint of brown. The dye treated with baking soda had a smaller effect on the wool.

5473

Effects of Color on the Flavor of Food and Drinks

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This experiment was to determine the effect that color has on food and drinks. Four white cakes were baked but three had food coloring in them: pink, green and yellow. Then four pitchers of water were filled. Three had food coloring: pink, blue and green. Then the cake was cut and the water was poured into cups and given to subjects. The subjects liked the control best of all of the colors. The choice was affected by color added to the cake and water.

5474

Amount of Energy Stored By Specific Foods

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This study investigated the amount of energy eight test foods contain, determined by how much heat energy the test foods gave off when burned. A homemade calorimeter was assembled and used to test the eight foods, which were burned inside of a combustion chamber above which 100 grams of water were suspended. The calories were determined by putting the change in the water temperature and the amount of water being heated into a formula. Macadamia nuts were found to have the most calories out of the test foods. Then came the fried ramen noodles; next, the

potato chips, the multigrain chips, the banana chips, the French fries and the seaweed; and lastly, the marshmallows. The results propose that macadamia nuts do store the most energy, and that the fattiest foods tend to have more calories than the foods with lots of sugar.

5475

Effects of “Angry Actions” on Anger Itself

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This study examined whether actions that are associated with anger (“angry actions”) cause anger in themselves. Subjects were made to sit, stand, punch and kick the air, scream, make fists at their sides and run. Punching, kicking and screaming were the “angry actions.” After they concluded each action, each subject’s blood pressure was measured. This is because anger makes blood pressure rise, and so by measuring the blood pressure of a person, you can find if he/she is angry. Punching, kicking, screaming and making fists at the sides raised blood pressure the most. Running lowered the blood pressure of the subjects. The results of this experiment suggest that “angry actions” actually cause anger in themselves.

5476

Hydroponic Method Versus Soil Planting Method

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This experiment examined whether a hydroponic method or a soil planting method would be better for growing plants, specifically lima beans. A hydroponic method is a method of growing plants in water instead of soil. Lima beans were grown in four separate trials for each method, and the heights to and times in which they grew were recorded. The lima beans grown in the hydroponic method were shorter in height, fewer in number and didn’t sprout until later compared with the lima beans grown in the soil. Three of the hydroponic lima beans sprouted, while six of the lima beans from the soil sprouted. Lima beans grown in the hydroponic method grew to an average height of 4 centimeters, compared to those in the soil planting method, which grew to an average height of 5.2 centimeters.

5477

The Effect of Temperature on Magnets

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This study examined if temperature affects a magnet’s strength. This project looked at if a magnet that is 0°C is stronger than a magnet that is 100°C. When the magnet is cold, the particles line up toward one direction. But when the magnet is hot, the particles start to move toward all kinds of directions. The experiment was repeated six times. My hypothesis was that if the magnet was cold, then it would be stronger in all of the temperatures tested. The results of my experiment showed that a magnet that is colder collects more paper clips than a hot magnet.

5478

The Effects of Gluten in Cupcakes

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This project examined the effect gluten has on height, weight, taste and texture in baking. Six batches of cupcakes, three batches using different gluten flours and three using different gluten-free flours, were baked. Each cupcake was measured for height and weighed. Then, the cupcakes were tasted by about 25 people, who wrote down their input on comparative tastes and textures. The average heights of the gluten cupcakes were 4.79166 cm, 4.58333 cm and 4.41666 cm. The average heights of the gluten-free cupcakes were 3.725 cm, 4.16666 cm and 3.74166 cm. The average weights of the gluten cupcakes were 62.0833 g, 62.5 g and 44.1666 g, 62.0833 g and 52.5 g. These results show that cupcakes that contain gluten are taller and heavier than gluten-free cupcakes. The blind taste test results showed that the tastes and textures of the cupcakes came more from what the flour was made of than of the presence or absence of gluten.

5479

Do Burnt Cookies Depend on the Cookie Sheet?

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This experiment examined different baking results on cookies. The cookies were baked on cake pans, cookie sheets, parchment paper and foil. They were baked at 375°F for 10 minutes. This was repeated three times. The results indicated that the cake pan is the most likely to burn the cookies.

5480

How Does Exercise Affect the Human Circulatory and Respiratory Systems?

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Ten subjects' heart rates and pulse oxygen levels will be tested to find this information. My prediction of the outcome of the experiment is that the heart rates of the subjects will increase and the oxygen saturation levels will decrease in the experimental group. The 10 subjects will be randomized into two groups of five. One will be the control group, while the other will be the experimental group. Before beginning the tests, a baseline will be recorded. During the first two trials, both groups will walk. In the second two trials, the control group will walk as the experimental group jogs. For the third two trials, the control group will walk again and the experimental group will run. After each trial, the pulse oxygen and heart rates will be tested using a pulse oximeter, and then the data will be recorded. The results showed significant differences between the control and experimental groups. The control group's heart rates rose from 91.2 to 178.8 (on average). Variances also showed for pulse oxygen. The experimental group's pulse oxygen dropped from 98 to 96.2 (on average), while the control group's stayed the same at 98. The results of the experiment did support my hypothesis. Therefore, this kind of experiment

is a tool that can be used to better monitor our health. It allows knowledge of our limits and goals so that we may strive to better ourselves.

5481

Do Goldfish Change Color in the Dark?

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This project is going to find out if goldfish can change color in the dark. Twelve goldfish (six black and six orange) were placed in pairs. Three of the pairs were in the light 24 hours a day, and the other three were in the dark 24 hours a day. The fish were observed once a week to see if there was any change in their color. Some of the orange and black goldfish in the light and in the dark changed color, and some of the orange and black goldfish in the light and in the dark stayed the same. Therefore, the experiment showed that the amount of light does not affect whether a goldfish changes color.

5482

Effect of Different Types of Music on Speed When Running

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This study examined the question of the difference between running to no music, pop music, rock music and also classical music. Subjects ran two laps around a track with no music, two laps around the track with pop music, two laps around the track with rock music and two laps around the track with classical music. For each trial the runners were timed on a stopwatch. The 14 runners ran every morning for four days straight. Each day, different music was played for the runners. The results showed that pop music increased the runners' speed the most. The average time for pop was 3 minutes and 4 seconds. Next was no music, with an average of 3 minutes and 10 seconds. After that came classical music, averaging 3 minutes and 24 seconds. Finally there was rock music; the average was 3 minutes and 33 seconds.

5483

Effect of Raising the Center of Mass of a Bike Rider on No-Hands Stability

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This study examined what effect wearing a heavy backpack would have on no-hands stability at low bike speeds. Two sets of trials were performed, in which the rider would ride down a flat surface with and without a backpack. The lowest speeds from each trial were recorded. The averages of the trials with and without the backpack were 9.963636363636 and 9.3076923076 kilometers per hour, respectively. This is because the heavy backpack raised the rider's center of mass, which made the rider more unstable. The results showed that you can ride slower with no hands without a backpack.

5484

The Effects of the Temperature of Water on the Removal of Raspberry Juice Stains

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This project's purpose is to see if heated or cooled water has different effects on raspberry stains. The result of this project showed that heated water removes raspberry stains really well. In hot enough water, you do not even need detergent to remove a fresh raspberry stain, in turn helping to conserve the environment. This project solved the problem of how to remove stains the faster way. Through the procedures, Photoshop recorded that the stains treated with hotter water were removed much more. These results showed that by treating juice stains with hot water, you can remove them faster than with cold water. In all, this project met the purpose it was done for.

5485

Does the Size of a Model Airplane Affect How Well It Flies?

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The experiment examined the question of whether a model airplane may fly differently due to size. To test it, three different-sized model airplanes were flown to see which flew the longest as well as the farthest. Calculation of sizes and weights was needed also. The results of this experiment showed that the largest of the three model airplanes flew the best.

5486

Effects of Different Factors on a Ball's Speed

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This experiment tested which factors, including density, weight, size and material, would have a direct effect on a ball's speed while it is rolling down a slope. A ping-pong ball, a golf ball and a tennis ball were rolled three times each down a ruler positioned on a stack of books that also was used to adjust the angle of the chute. This counted as a trial. There were three experiments with three trials each. The angle of the chute was raised to 20°, 30° and 40°, respectively. The golf ball was the fastest in seven trials, the tennis ball was the fastest in three trials and the ping-pong ball was never the fastest. The results suggest that density and material affect a ball's speed the most because the golf ball was the fastest the highest number of times.

5487

Best Cone for Flight Out of a Large, Medium and Small Cone

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This experiment was done to find which cone, out of a selection of a small, medium and big medium one, would help a bottle rocket fly the highest when attached to it. Adding vinegar and baking soda to a bottle rocket and then launching it and recording its height were how it was tested. After each rocket cone was tested twice, the average was found. Then the overall performance could be graded. The control rocket (no cone) averaged 5.5 meters. The tall rocket averaged 4 meters. The short rocket averaged 2.5 meters. The medium rocket averaged 4.5 meters. The outcome suggested that the control rocket did the best, despite having no cone. Out of the coned rockets, the medium rocket did the best and the small rocket did the worst.

5488

How Do Different Amounts of Electricity Affect Plant Growth?

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This experiment examined the question of whether or not electricity increases plant growth. Radish seeds were planted in four separate trays and the growth was monitored for 50 days. The plants in three trays were stimulated with 6, 3 and 1.5 volts of electricity using batteries. The control plants in the fourth tray received no electrical stimulation. At the end of the experiment, the radish plants were weighed. The average weight of the electrically stimulated radish plants was more than the average weight of the control plants. The average weight of the radish plants that were stimulated with 6 and 3 volts of electricity was the same. The results indicated that electricity does increase plant growth. However, the effects did not seem to vary at the higher voltages.

5489

The Effects of Coils on the Strength of an Electromagnet

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Electromagnets have allured many with their ability to attract metal, but in the search for a stronger electromagnet should more coils be added? The experiment focused on testing the strengths of 50-, 100- and 150-coil electromagnets. The number of paper clips each magnet was able to lift was used as a measurement of its strength. The hypothesis of the experiment was that the electromagnet with the most wire coils would be able to lift the most paper clips and therefore was the strongest. The results of the experiment supported the hypothesis with the 150-coil electromagnet lifting, on average, the most paper clips.

5490

Best Citrus Fruit to Use as a Battery*Dayeon Hwang and D. Shah (teacher)*Portola Highly Gifted Magnet Center
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This study examined which citrus fruit would produce the highest number of volts when connected to an LED light bulb. Oranges, limes, lemons and grapefruits were softly massaged and had copper and zinc nails inserted inside. The volts each fruit gave off were measured by a multimeter and recorded. Each experiment was repeated three times. The average the lemons produced was 0.87 V, the limes were 0.8 V, the grapefruits were 0.675 V and the oranges were 0.65 V. The results suggest that lemons make the best battery out of the four citrus fruits.

5491

Effect From Jump Rope Lengths*Esther Hwang and D. Shah (teacher)*Portola Highly Gifted Magnet Center
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This topic tested the question of effects from jump rope lengths. When the length is shorter, the number of jumps will be able to increase compared to when the length is longer. The shorter the jump rope is, the more jumps you can do, except when it gets too short. The length of the jump rope indeed has a large effect on how many jumps you can do.

5492

Strength of Magnets at Different Temperatures*Alex Hyman and D. Shah (teacher)*Portola Highly Gifted Magnet Center
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This experiment tested whether the strength of a magnet differs in different temperatures. The magnet was put in boiling water, ice water, dry ice or just at room temperature. The number of paper clips it picked up after was recorded and averaged. Three circular magnets were each tested three times. The boiling water had an average of 49, the ice water had an average of 55.89, the dry ice had an average of 57, and the control had an average of 47.9. The results showed that the strength of a magnet is increased at colder temperatures.

5493

Effect of the Height a Tennis Ball Is Dropped From on the Bounce Height*Oz Inderbitzin and D. Shah (teacher)*Portola Highly Gifted Magnet Center
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This project tested the effect of the height a tennis ball is dropped from on the height of its first bounce. The hypothesis was that the bounce height to height dropped from percent ratio would be a constant of 73.125% as long as terminal velocity or breaking point was not reached. A measuring tape was put up along a wall vertically, and a new tennis ball was dropped from heights of 50, 100, 125, 150 and 200 centimeters and filmed. This was repeated four times. The film was analyzed and a maximum bounce height point

was determined for every drop of the ball. Results showed an average bounce height to height dropped from percent ratio of 52.36% for 50 cm, 57.69% for 100 cm, 57.16% for 125 cm, 56.48% for 150 cm, and 54.14% for 200 cm. This came to an average ratio of 55.566%. Compared to my hypothesis, this was about 17.5% lower than expected, and was not completely constant. Therefore, my hypothesis was incorrect.

5494

Whether Counter-Weighted Clubs Are More Accurate Than a Standard Putter*Kamren James and D. Shah (teacher)*Portola Highly Gifted Magnet Center
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This study examined the question of whether counter-weighted putters are more accurate than standard putters. The experiment was made up of putting from 1.524, 3.048 and 4.572 meters with a standard putter and counter-balanced putters with 20-, 30- and 50-gram weights. Then I measured the distance of the hole and where the golf ball stopped and centimeter results were recorded. Each experiment was repeated three times for each putter. The results suggest that adding a counter weight to the putter is more effective and putts are more accurate.

5495

Comparison of Different Materials on Blocking Sound*Daniel Joo and D. Shah (teacher)*Portola Highly Gifted Magnet Center
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This experiment compared the sound blocking of three different materials: cork, Styrofoam and wood. Each of the materials was in 12x12x1 blocks. In this simple study, cork, wood and Styrofoam were placed on top of a box to block sound. The sound meter was placed inside a box approximately 5 feet away from a vacuum. The loudness of the vacuum was approximately 100 decibels nearby. This procedure was repeated four times. The control variable, with no top, averaged about 71 decibels because of the distance of the vacuum. The cork reduced noise by 6 decibels, with an average of 65 decibels. The wood reduced noise by 4 decibels, with an average of 67 decibels. Last, the Styrofoam reduced noise by 3 decibels, with an average of 68 decibels. The results show that cork blocks the most sound compared to wood and Styrofoam.

5496

Effects of Different Types of Music on Sweet Basil Plants' Heights*Joshna Jude Jose and D. Shah (teacher)*Portola Highly Gifted Magnet Center
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This project explored the question of the effects of different types of music on sweet basil plants' heights. There were three plants listening to each type of music: pop music, rock music and classical music. The control listened to no music at all. The experiment took three weeks. The classical music group and control group were the only two that had major increased growth. The most growth for the control group was 5 inches, while the most growth for the

classical music group was 5.5 inches. The lowest amount of growth for the control group was 1.6 inches, while the lowest amount of growth for the classical music group was 4.5 inches. The results advise us that classical music will help plants grow.

5497

The Effects of Different Fertilizers on Snap Beans

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In this experiment, I tested which fertilizer helps snap beans grow the best. Vigoro, Miracle-Gro and Alaska Fish fertilizers were each put on three pots, each with a snap bean seed in it. It turned out that the Vigoro fertilizer helped snap beans grow the tallest and the Miracle-Gro fertilizer produced the biggest and best leaves. The Alaska Fish fertilizer didn't really help the plants that much. In fact, its plant's growth was almost the same as the growth of snap beans given plain water. Knowing this can help you grow your snap beans to their full potential. When you eat snap beans, you are eating healthier. Eating healthier can lead to becoming healthier and fitter.

5498

Sound Resistance of Various Materials Against a Constant Noise

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This experiment examined the question of what material is best for soundproofing. A 65-decibel noise was constantly played from a speaker, which was put in a box. A sound meter was placed at the other side of the box. Foam, Styrofoam, cardboard, fleece and sawdust were inserted in a box, which was put in between the speaker and the sound meter. The box the materials were put in also was tested while nothing was in it. Cardboard, fleece and sawdust proved to be the most soundproof, as cardboard lowered the noise by 6.6 decibels, fleece by 5.6 and sawdust by 4.1. Next was Styrofoam, reducing the sound by 2.5 decibels; foam, reducing by 1.6; and finally the box itself, which only reduced 0.2 decibels of noise coming from out of the speaker and into the sound meter. These results suggest that cardboard is the most useful for soundproofing.

5499

Effect of Urine on Plant Growth

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If you look at the ingredients in fertilizer, it has a large urea content, where urea is the part of urine without water. Using this information, I deduced that urine would be useful to plants. I wondered if urine would grow better plants than water does and if it would compare to a high-nitrogen fertilizer. I got six mint plants and put 50 mL of water in two, 50 mL of urine in two, and 50 mL of water with 24-8-16 fertilizer in two daily for three days. The

number 24-8-16 means that the fertilizer was 24 parts nitrogen, 8 parts phosphorus and 16 parts potash (KsO). After the experiment, I concluded that urine was not effective to even keep plants alive.

5500

The Effects of Light Exposure on Plants

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To figure out whether or not light exposure affects a plant's growth, place three radish, lettuce and garlic seeds under an HID light, simulating an environment with 24/7 light exposure. Then place three more of the radish, garlic and lettuce seeds in a closet or dark place that isn't exposed to light, simulating an environment with NO light exposure. Finally, place the last three garlic, radish and lettuce seeds outside where they can receive the natural 24/7 light cycle. After two months of observation, the results came in. I found that my hypothesis was incorrect and that plants grow best in the natural light cycle. In summary, light exposure DOES affect plant life.

5501

Comparison of Hole Sizes for Escape of Different Radio Frequencies From a Faraday Cage

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This experiment investigated whether a 2.4-gigahertz (GHz) Wi-Fi signal requires a larger size hole than a 5.0-GHz Wi-Fi signal in order to escape a Faraday cage. A simple Faraday cage was made out of heavy-duty aluminum foil. A wireless router was placed inside the Faraday cage and a 1-cm hole was made and the signal strength was measured. Then, the hole size was increased and the strength was measured again. This was repeated with increasing hole sizes. The experiment was repeated three times. Contrary to the expected results, the 2.4-GHz signal actually required a smaller hole than the 5.0-GHz signal to escape. The results did not support the hypothesis that a 2.4-GHz signal requires a bigger hole than a 5.0-GHz signal to escape a Faraday cage.

5502

What Wood and Glue Combinations Are Strongest?

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This study involved testing the strengths of wood and glue combinations. Glue was applied to the wood connections and left to dry for 24 hours. This experiment used five types of glue and four types of wood. The types of glues were tacky glue, Titebond Wood Glue, Elmer's Wood Glue, Gorilla Wood Glue and epoxy. The experiment was tested three times. An average was created for the combined three times. The worst glue overall was the tacky glue, which got the worst scores for every category except one. The best glue overall, Gorilla Wood Glue, had the best average for Redwood and Radiata pines.

5503

Effect of Aspirin on Basil Plants

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This study examined if the use of 162 mg of aspirin crushed and mixed with water and then used on basil plants would help the basil plants grow more than regular water would help them. Every day five basil plants were watered with the aspirin/water solution and three were watered with regular water. The heights of the plants were recorded every few days. Instead of helping the basil plants grow, the aspirin killed some leaves or completely destroyed the plants. The results suggest that aspirin kills basil plants, but use of less aspirin possibly could help.

5504

Can You Sort Quicker Than Quicksort and Heapsort?

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This experiment investigated whether it is possible to invent/improve an algorithm that can be used to sort incrementally available data. A new algorithm that uses binary searching in order to sort the sets was created and tested on computer-generated sets against quicksort and heapsort, and the times of each algorithm were recorded. The test was repeated eight times for 100, 1,000 and 10,000 elements added each time to the original list. Compared to quicksort, the new algorithm was about 0.2 milliseconds faster when 100 elements were added, 0.5 milliseconds when 1,000 elements were added, and 0.6 milliseconds when 10,000 elements were added. Compared to heapsort, the new algorithm was around 0.4 milliseconds faster when 100 elements were added, 0.25 when 1,000 elements were added, and 0.25 when 10,000 elements were added. The results show that the new algorithm was faster than quicksort and heapsort.

5505

Sleep and Its Effect on Productivity

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This study examined the question if sleep affects productivity, with 10 hours of sleep being the recommended amount and five hours being half of that. Sleep does have an effect on productivity and the rest of the body because sleep recharges you to wake up and go through another day.

5506

Effectiveness of Common Metals in a Thermopile

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This study examined the effectiveness of three common metals for generating voltage when used in a thermopile. Thermopiles with eight hot and seven cold junctions were made with either copper and annealed steel wire, copper and aluminum wire, or aluminum and steel wire. The thermopiles were taped to a ceramic plate and frozen for 15 minutes in a conventional freezer, and voltage was recorded at 10-second intervals for 1 minute while the hot junctions were heated with candles. The copper-steel thermopile generated on average 4.5 ± 0.4 millivolts, while aluminum-steel and copper-aluminum generated 4.05 ± 0.8 millivolts and 1.0 ± 0.2 millivolts, respectively. This suggests that steel and copper are the best metals for a thermopile made of common metals.

5507

Can Bacteria Be Killed By Hot Sauce?

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This study examined the question if bacteria can be killed by hot sauce. The hot sauce is made with a type of chili, blended with water. The bacteria, made in a petri dish, takes about seven days to grow. The hot sauce is estimated to kill bacteria in two/four days. The result is that the bacteria was killed with the hotter hot sauce more than with the lighter hot sauce.

5508

Effects of Different Environments on Oxidation

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The experiment explored the question of how oxidation is changed in different environments. The experiment was tested with iron washers. There were six environments that the iron washers were tested in. The control group was in normal air. The experimental groups consisted of five different conditions. There was a humid air sample, which was exposed to humid, moist conditions. There was a sample in which the washer was submerged in water. There also was a sample that had the washers submerged in saltwater. Another sample had the washer submerged in vinegar. The last sample had a washer submerged in a solution of baking soda and water. After four weeks of observing with multiple samples, there was very little, if any, visible rust on the washer left out in the air. The humid sample had spots of rust where the water condensed. The water sample had a large amount of visible rust, the same as with the saltwater sample. The interesting effects, though, were in the baking soda and vinegar samples. The baking soda sample had no visible rust on the washer. The vinegar sample, however, had a great difference. There was a different compound. This different compound is named ferric oxide, or iron(III) oxide. After weighing the samples, it seemed that the vinegar sample had oxidized far more than the other samples.

5509

Effects of Altering the Design of a Bridge Based on Its Shortcomings

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This experiment explores the effect of rebuilding a suspension bridge based on its flaws. One suspension bridge was built and tested for wind and weight. It held up 8.2 lbs. and wasn't badly damaged by wind. The second bridge had strings running underneath the road deck, rounded edges of the deck and tighter strings, and had the ends of the main cables attached to the towers underneath the deck. It withstood 11.4 lbs., which is 39% more weight, and wasn't as affected by wind as the first bridge was, although the vehicles on the bridge were equally affected. This information suggests that the changes did help the bridge withstand more weight and resist wind, but the changes didn't divert the wind from the vehicles on the bridge.

5510

Effect of Bristle Angle on Bristlebot Speed

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This experiment examined whether the angle of the bristles on a bristlebot, or toothbrush robot, affects its speed. Three bristlebots were created from the heads of toothbrushes: one with backward-slanted bristles, one with straight bristles and one with mixed (straight, backward-slanted and forward-slanted) bristles. A pager motor and button cell battery taped on top of each toothbrush head served as a vibrating force that propelled the bristlebots. The three bristlebots were timed five times each traveling down a card stock chute. The slanted bristlebot averaged 1.806 seconds, the straight bristlebot averaged 3.316 seconds and the mixed bristlebot averaged 2.256 seconds. The results suggest that bristles slanted backward make a bristlebot move faster than straight or mixed (forward- and backward-slanted) bristles.

5511

Rusting of Pennies in Saltwater and Freshwater

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This study examined which water (salt or fresh) would make pennies rust faster. Pennies were placed into cups of saltwater and freshwater for 5 minutes and put out on a paper towel. They were left out on the towel to rust for an hour. The pennies' rust was recorded every 10 minutes in a total of six tests. In the beginning tests, the pennies didn't really rust much and had the same rate of rusting, but they started to rust more afterward. The saltwater and freshwater were the independent variables and the dependent variable was the time for rusting. The saltwater was the experimental and the freshwater was the control. The category of the experiment was chemistry. The results were that the penny in saltwater rusted more and faster than the penny in freshwater.

5512

The Effect of Music on Memory Tests

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This experiment studied the effect music has on the brain during a memory test. Five books, 10 markers and one roll of tape were arranged in a specific order. The subjects were then asked to memorize the order of the objects in 30 seconds. Each member of the control group completed the task without music. Each member of the experimental group listened to music when completing the same task. The experiment was repeated 10 times for each group. The subjects listening to music achieved higher scores than those who did not listen to music. These results indicate that music has a positive effect on memory.

5513

Effects of Food Type on Trap Closure Speed and Duration of Closure of a Venus Flytrap

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This experiment builds on a body of knowledge in the field of carnivorous plants. It investigates an area in which little is known: In a Venus flytrap, does food type affect the speed of trap closure or the duration of its closed state? The hypothesis was that food type would not affect the speed of trap closure, but would affect the duration of the closed state. An experiment was conducted involving six Venus flytraps labeled plants #1-6, which received six separate foods. Trap closing time was measured using a slow-motion camera running at 600 frames per second. The duration of closure was measured using time-lapse video cameras shooting at one frame every 80 seconds. The experiment was repeated three times over the course of six weeks. When the experiments were complete, it became clear that, contrary to the hypothesis, food type affected not only the duration of trap closure, but also the speed of closure. Closing times varied from 0.139 seconds to 52.815 seconds; and duration of closure varied from 6 hours 32 minutes to 19 days, 21 hours 41 minutes. While the findings from the experiment have no known practical application at this time, they advance the knowledge of carnivorous plants. And as the study of these plants advances, new applications may emerge for data such as this.

5514

Effects of Mint on the Temperature of Water

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This experiment tested whether mints could cool down water. Four different types of mints were used in this experiment. Four cups were filled with water. Each type of mint was put into its designated cup and timed for 1, 2 and 5 minutes. After the time elapsed, the drop in temperature was recorded with a thermometer. The results were recorded and found that mint doesn't affect the temperature of water.

5515

The Effects of Huddling on Conserving Body Heat

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This study examined if huddling affected the cooling rate of warm-blooded animals. Four identical glass bottles filled with 150°F water were spaced at various intervals and their temperatures were recorded every 2 minutes for 30 minutes. The data showed that when the bottles were closer together, their cooling rate was slower, which means that they retained heat better. When the bottles were farther apart, their cooling rates got faster, meaning that the farther the bottles were away from each other, the worse they got at conserving their heat. The results conclude that huddling does, in fact, affect the cooling rate of warm-blooded animals, in that it helps them conserve body heat, making the cooling rate slow down.

5516

Which Tennis Ball Is the Best?

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The purpose of the project was to find out which tennis ball is the best and see how manufacturers can improve what they've made. The hypothesis, "If a height test is conducted with brands Dunlop, Babolat, Wilson and Penn, then Babolat will win the height test and be named the best tennis ball to play with," was proved false. Instead, Wilson was found as the best ball to play with. Also, the idea that height is directly related to longevity was neither proved nor disproved. All in all, the most important piece of information proved was which ball was the best.

5517

What Makes Ice Melt Faster?

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In this experiment, what was tested was what substance when added to ice will make it melt faster. Salt, sugar, baking soda and Splenda all were added to ice and timed to see which would have the best results. Each of these substances has its own qualities that may or may not react with the melting time. The original hypothesis was that all of the substances would melt the ice more quickly than the ice would melt without any substances added to it. Later it was found that some of the substances helped preserve the ice and had the opposite effect of what was originally believed. This is an important experiment to test because it helps out with everyday obstacles. An everyday obstacle that this experiment would relate to is the strong days of winter when the roads cannot be driven on because of the thick layer of ice. If salt was added to the ice-covered roads, then the melting time would increase drastically. Imagine being able to get rid of the ice on the roads much more quickly? Using salt would strongly help improve one's day.

Overall, this experiment was very helpful in testing the information that was acquired. The results were very accurate and consistent through all of the times of the tests. This experiment

was very successful. This experiment is recommended for others who have similar interests. It is pretty simple but gives excellent information and results.

5518

Which Type Gives You More Coverage: Physical or Chemical Sunscreen?

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This experiment answered the question of whether physical sunscreen or chemical sunscreen is better. Physical and chemical sunscreens were applied to UV beads, placed in a sunny area and then the shades of the beads were measured. Each experiment was repeated twice. Surprisingly, the chemical sunscreen provided about two shades more coverage than the physical sunscreen.

5519

Effects of Food Ingredients on Melting Ice

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This study examined if sugar, sodium (salt) and acid affected the rate at which ice cubes melted. Three types of liquids were used to test the experiment: Sunkist soda, water and apple juice. Times were recorded for how long the ice cubes lasted. The experiment showed that sugar and sodium helped preserve the ice cubes longer, while acid in this experiment had no apparent effect. The results suggest that no sugar and no sodium would mean an easy-melting ice cube.

5520

Effect of Metal Corrosion Using Coins With or Without Saltwater

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This examined metal corrosion using coins, water and saltwater. Six coins of quarters, dimes, nickels and pennies were used, plus water and saltwater. Three coins of each were put in regular water, and the rest of the other three coins of each were put in saltwater. They were checked every one to two hours for five days. The coins in the saltwater corroded faster than those in the freshwater. The salt in the saltwater sped up the time for corrosion of the coins.

5521

How Viscosity Affects Shock Absorptions

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This study examined the question of how viscous liquids can absorb shock. The study involved using water, syrup, corn syrup, canola oil, honey and antibacterial hand soap to examine the velocity of a marble dropped into each liquid, and then calculating viscosity. Each experiment was tested three times. The liquids were then transferred to small containers eggs were dropped into, going

as high as needed until the eggs were broken. The results showed that both corn syrup and honey were good shock absorbers. Upon further observation the corn syrup was deemed greater, for honey would return an equal or greater force to the egg being dropped.

5522

Effects of Coca-Cola on Steak, Chicken and Salmon

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This study analyzed the question of whether the acidity in Coca-Cola can dissolve proteins such as steak, chicken breast and salmon. The testing was done by placing pieces of steak, chicken breast and salmon into containers filled with Coca-Cola and observing them for five days. This experiment was repeated three times with no indication that the proteins dissolved in the Coca-Cola solution. The results show that Coca-Cola can shrink the meat in size but cannot make it dissolve.

5523

Optical Illusions

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This experiment's goal was to see whether people perceive optical illusions differently. The hypothesis for this experiment was that if people of different ages and sexes were shown five optical illusions, then they would see them differently. Many people were tested for this experiment. The people who were tested were shown five optical illusions and were asked what they saw first in the illusions. The data were then recorded on a paper and later transferred into charts. The results of this experiment were that males and females had close percentages of what they saw for the optical illusions.

5524

Garlic: The Bacterial Inhibitor

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Objective: This experiment was to study if garlic could inhibit bacterial growth. It was expected that the chemical called allicin in garlic could inhibit bacterial growth. **Materials and Methods:** Twelve petri dishes, agar powder, garlic and Q-tips were required. Using gloves, the agar was prepared carefully, so as not to add contaminants. Garlic was added to two of the plates while the others had samples of bacteria/organisms taken from the mouth and shoes, and then streaked onto the plates. The plates were sealed and left at room temperature where the growth in colony-forming units (CFU) was recorded every day for a week. **Results:** The results showed that in the petri dishes that had garlic, there was very little to no growth in CFU per plate. There was a lot of growth on the plates without garlic. This is an obvious difference. **Conclusion:** The results showed that the hypothesis was correct. This in turn should contribute to more projects, providing a good alternative way to make medicine and heal the sick.

5525

The Difference Between Albino and Pigmented Mice's Food-Tracking Abilities

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The purpose of this experiment was to show the difference in food-tracking abilities in a maze between albino and pigmented mice. Each mouse was kept in its permanent cage until just prior to its testing time. Then, each mouse was placed into a separate holding cage for 30 seconds so that the mouse could become acquainted with the smell of the food treat to be found at the end of the maze. Each mouse was placed at the starting point of the maze and was observed as the mouse made its way through until it found the food treat at the end of the maze. Once there, the mouse was allowed to eat its treat and then was pulled out and put back into the original cage. This trial was done three times with each mouse while video was taken and time was kept. When the times for each mouse were averaged, it was found that the pigmented mouse had overall faster times. However, the times for each individual mouse, as well as the comparative times of pigmented versus albino mice, were not consistent. The results of this experiment suggest that pigmented mice likely have a superior ability to track food, and that the disorganized development in the eyes of albino mice may hinder their tracking ability. In that prior studies show that there is almost no difference in the ability of either category of mice to smell, it would stand to reason that the difference is visual.

5526

Effect of Three Different Strength Resistance Bands – 5 kg, 10 kg and 15 kg – on the Height and Degree of Split While a Rhythmic Gymnast Does a Split Jump

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This study examined the question of which resistance band would be most preferable to train with. The gymnast subjects trained with the three kinds of resistance bands 10 jumps a day. This was repeated for five days. Then the gymnasts each did three jumps after training with the respective resistance band. After the training and photography, the results showed that the 10-kg resistance band was the most helpful to both the split degree and the height of the jump.

5527

Colors That Can Be Remembered the Best in a Short Time

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This study was done to find out what color allows people to remember the most written material. Three seniors, three adults and three children each were given a code that they studied for two minutes and then wrote down what they could remember from the code. This was done seven times total with the colors red, orange,

yellow, green, blue, purple and black. The end results were that people remembered orange and red the best, while they remembered yellow and black the worst. The results also showed that middle-aged people have the best memory in comparison to young people and the elderly.

5528

Effects of Soil Amendments on Snap Pea Growth

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This project studied the effects of different soil amendments on *Pisum sativum* var. *macrocarpon*, or the snap pea plant. Five plants were placed in plastic bowls filled with 236.6 mL of water every day for seven days. This experiment was performed three times. The results showed that plain dirt grew to 8.89 cm; Miracle-Gro grew to 13.97 cm; chicken poop grew to 3.81 cm; mulch grew to 3.81 cm; and coffee grounds went through no progression at all. In other trials, Miracle-Gro still led in germination and growth, while chicken manure had the second-best results. Miracle-Gro was the best supporting plant growth amendment interacting with *Pisum sativum* var. *macrocarpon*.

5529

Effect of Different Wavelengths of the Visible Spectrum on Snap Pea Growth

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This study examined the height and growth of *Pisum sativum* under various wavelengths of the visible spectrum. Plants were grown under red, orange, yellow, green, blue and purple wavelengths with 475 mL of water every day for seven days. The experiment was repeated three times. Plants under yellow, blue and green wavelengths remained at 0 cm. The "red" plant grew to 6.5 cm, the "orange" grew to 10.8 cm, and the "purple" grew to 10.9 cm. The "purple" plant grew to be the tallest.

5530

Lung Wars: Which Gender Has the Largest Lung Capacity?

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This study examined the question of males and females having different lung capacities. One male and female of the same height and age were asked to hold their breath. The same stopwatch was used to record how long they could hold their breath and the time was recorded. There were three groups, A, B and C. In all three groups the male had a larger time record. These results suggest that males have a larger lung capacity.

5531

The Most Efficient Renewable Energy

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This experiment was a comparison of three renewable energy sources, wind power, hydropower and solar power, to determine which of these is most beneficial. Each energy source was tested to see how much energy it would produce over a specific period of time, such as a year. In the experiment a simulated year was created using actual facts and data points, such as wind speed and water height drops, but without major facilities and things of that nature. In determining hydropower's energy, several liters of water were poured from heights ranging from 20 to 24 meters. For wind energy, a wind turbine was held out the window of a car while the car was in motion. The driver drove according to the different speeds of wind found in wind farms. For solar energy, I used small solar panels that were representative of panels used in solar parks or solar plants. The solar panels were held in the sun and were exposed to different lighting scenarios based on the simulated seasons. With all three energy sources, calculations were used throughout the experiment to calculate such things as watts and equivalence. At the end of the experiment, hydropower proved to be the most beneficial renewable energy source.

5532

How Different Blades on a Wind Turbine Affect the Voltage Produced

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This experiment was designed to test different blades on a wind turbine and to see how much voltage is produced by the turbine. Three different blades (oblong, rectangular and triangular) were attached to a mini homemade turbine to produce electricity. Then voltage was measured. Each blade was tested for one minute, and the process was repeated four times. The blades also were tested at three different wind speeds. Overall, the triangular blades produced the most volts, with rectangular and oblong in second and third, respectively.

5533

Sunlight and Vinegar: Which Kills More Bacteria in Sneakers Worn Recently?

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This experiment showed what reduced the number of bacterial colonies more in the soles of sneakers: sunlight or vinegar. The left sneakers of the different sneakers worn recently (the day before the experiment) were put in sunlight outdoors (the sneakers were laid on store advertisement papers with nothing covering them) and the right sneakers were sprayed with vinegar indoors (in a closet) with a sterile spray bottle. They were kept untouched for two hours and swabbed (on the soles) before and after they were either sprayed with vinegar or exposed to sunlight. This experiment was repeated three times, each with a different sneaker worn

recently. The recorded data of the number of bacterial colonies showed that vinegar killed all or many of the bacterial colonies when sprayed onto the soles of the sneakers in a place with no or less bacteria. Sunlight did not reduce any of the bacterial colonies; the bacterial colonies increased, possibly from the bacteria outdoors.

5534

The Number of Kernels Left Unpopped By Different Brands of Popcorn

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This experiment tested the number of kernels left unpopped after cooking versus the number of popped ones for the well-known brands Orville Redenbacher's, Act II and Jolly Time (with each brand tested twice). The experiment involved converting the results into a sense of serving size, and then averaging the two outcomes for each brand and recording the results. The hypothesis was that if the popcorn came from different brands, then there would be significantly different results. However, after the experiment, the results were actually similar to each other.

5535

What Is the Best Technique to Use in Order to Make the Most Three-Pointers?

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My project looked at the best technique to use to make the most three-pointers possible. I used four different subjects who shot 20 times for 15 days with all three techniques: underhand, from the side of the head and in front of the head. I also measured the temperature at the time of the experiment for each subject using a thermometer. My hypothesis was that the front-of-the-head technique would yield the most baskets with the least amount of stress on the shoulders. My final results proved my hypothesis correct: Three out of the four (75%) subjects tested made the most three-pointers using the front-of-the-head-technique with the least amount of stress on the shoulders.

5536

The Results of Solution Conductivity

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The purpose of this experiment was to test which solution conducted the most electricity and why. The different solutions that I used were detergent, alcohol, antacid tablets, baking soda and shampoo. I first had to build a device that could measure how much electricity each solution conducted. Each solution was tested for its conductivity by the brightness produced in the LED light. When using this device it not only tested the electricity, it tested the brightness to be accurate and have more than one source of information. Also when using this device, I saw that there were

major differences in the amount of light produced. This device helped me conclude which solutions would produce the most volts without looking at the voltmeter. These were antacid tablets and shampoo. Antacid tablets and shampoo had the most volts because they had the most ions.

5537

Do Males or Females Judge Color More Accurately?

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This project answered the question, "Do males or females judge color more accurately?" The experiment started with the hypothesis that females judge more accurately than males. To see if this was true, a group of 12 volunteers made up of both males and females of different ages were gathered and were shown a set of colored flash cards. After showing them each card, they were asked to name the colors that they saw. All of the data needed was collected and the results were that the female volunteers named 18 more colors correctly than the male volunteers. The results were 60-78. Based on the experiment and research, females judge color more accurately than males, not only because they usually know the names of a lot more colors, but also because most females perceive colors better than males.

5538

Enjoy Now ... or Later? Delaying Gratification

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This study tested the question of whether a child should eat a marshmallow now or wait 15 minutes for a second marshmallow. A child was given a marshmallow or told that the instructor had a marshmallow for him/her. If the child rang the bell before 15 minutes, he/she did not receive a second marshmallow. However, if the child waited all 15 minutes, the child got two marshmallows. The experiment was repeated 12 times. The children with a marshmallow in the room waited an average of 6 minutes until they rang the bell. The children without a marshmallow in the room waited an average of 11 minutes. The results suggested that the group that did not have the marshmallow in the room was more likely to delay gratification.

5539

Effect of Eye Color on Peripheral Vision

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This study investigated different eye colors and their effect on peripheral vision. Twenty 12- and 13-year-old subjects were tested by doing a peripheral vision test. Different-colored shapes on craft sticks were held up to the subjects using a measuring device. The degree of the angle at which the subjects could identify the shape and then color on each stick was recorded. The test was done three times. The average score for color detection of blue eyes

was 66°, 18° for brown eyes, 6° for green eyes and 10° for hazel eyes. The average score for shape detection was 38° for blue eyes, 31° for brown eyes, 39° for green eyes and 26° for hazel eyes. The results suggest that hazel eyes have the strongest overall peripheral vision. The conclusion is based on the average overall score from both color and shape detection for each eye color. Since the average score for both color and shape for hazel eyes was 18°, they had the strongest peripheral vision. The lower the degree results, the stronger the peripheral vision.

5540

Comparison of Efficiency on a Slope for Aerodynamics and Weight

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This experiment involved the comparison of cars with different characteristics. The first step was carving pre-cut pinewood derby cars into different aerodynamic shapes and having their weight vary. Then the products were tested on an angled surface and the times were recorded and compared. The process was repeated three times per car with four cars. The one that weighed the most had better results than the others and resulted in the conclusion that weight was more efficient on slopes.

5541

Testing Dog Intelligence and Pack Behavior

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This study examined the intelligence and pack behavior of two dogs (Jake and Denna) with IQ and pack behavioral tests. The dogs were put through a series of tests involving motor skills, emotional intelligence, and logic and reasoning to test their intelligence. The results showed that Jake was smarter overall, but Denna was just as intelligent emotionally. To study their pack behavior, they were forced to choose between two members of the "pack." The results for this test showed that the dogs follow the "pack" system very closely and have immense loyalty to the Alpha.

5542

Will Watering Black-Eyed Pea Seeds With Soda or Red Food Coloring Affect the Plants' Growth?

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This project was made to figure out if plants watered with different liquid substances besides water would help plant growth increase or decrease. Six cups filled halfway with soil were placed on a windowsill and labeled A, a, B, b, C and c. Two black-eyed pea seeds were placed in each cup. Cups A and a were watered for six weeks with water. Cups B and b were watered with a red food coloring and water mixture. Cups C and c were watered with soda (Coca-Cola). These plants were watered with room-temperature

liquids (60-70 degrees) and with the same amount every day. The experiment took place over a period of six weeks and the growth was recorded at the end of each week. The results suggested that water is the best for plants.

5543

Effects of Different Liquids on the Dissolution of Tylenol

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This study examined the effect of different types of liquids on the dissolution time of Tylenol (acetaminophen). Three types of pills were tested (tablets, caplets and gel caps) and five types of liquids were tested (tap water, hot water, 7UP, distilled white vinegar and apple juice). Fifteen mL of one of the five liquids were put into a cup, and the pill was placed inside after. The test was repeated a total of 45 times (15 for each type of pill, with each liquid used three times each). The pill and liquid combination that dissolved in the least amount of time was the tablet when placed into hot water. (The average dissolution time was 49 seconds.) The results suggested that tablets are the pills that dissolve the fastest, and heated water is the liquid that dissolves pills the fastest.

5544

How Does Radiation Affect Plant Growth?

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The purpose of this experiment was to investigate the effects of radiation on the growth of plants. In this experiment, there were seven pots with four pinto beans in each of them. One pot was the control group, which was not microwaved, and the rest of them were microwaved for different durations of time. The times that were used were 30 seconds, 1 minute, 1.5 minutes, 2 minutes, 2.5 minutes and 3 minutes. The hypothesis was that the control group would grow the best, and the microwaved beans would grow the least. The results showed that the radiation from the microwave did have an effect on the plant growth. The plants that were microwaved did not grow at all. The only plant that grew was in the control group. In conclusion, the hypothesis was correct because the control group grew the best, and the ones that were microwaved grew the least – in this case they did not grow at all.

5545

Insulation Investigation

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It's always nice to settle inside with a cup of hot chocolate and a warm blanket when it's snowing. But usually we're too busy sipping our chocolate to think about the fact that our house (along with a heater) is keeping us warm. Good insulation in a house is the key to being comfortable when it's cold and when it's hot. In

my experiment, I tested three types of different insulation to see which was the best. Out of cotton, Styrofoam and bubble wrap, I predicted that Styrofoam would be the best insulator because of its millions of tiny trapper air bubbles. After taping these materials to the outside of cardboard boxes and sticking the boxes into the refrigerator for periods of 15 minutes and 30 minutes, I discovered my prediction was incorrect. Bubble wrap insulated the little cardboard home 6 degrees Fahrenheit after 15 minutes, and 4 degrees after half an hour. This is because bubble wrap has trapped air, which prevents and blocks heat exchange. Therefore, bubble wrap is the best insulator. (But don't insulate your house with it.)

5546

Will a Population of Blind Collembolans Increase If They Are Kept Under 50-Watt LED Red Lights?

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The purpose was to find out if a population of Collembolans would increase if placed under red LED lights. The hypothesis was that a population of Collembolans would remain constant with the control since the Collembolans *Onychiuridae encarpatus* are a blind species of Collembolans, commonly called a springtail. The procedures followed were placing one part charcoal to nine parts plaster of Paris in a container, and then closing the lid tightly and turning the container until the contents were mixed. Some of the powdered mixture was placed into a bowl, water was added and it was mixed until it was the consistency of yogurt. Afterward, the plaster of Paris mixture was dropped into the petri dishes and tapped on the table to evenly spread it throughout the petri dishes. The new Collembolan environments were allowed to dry for a few days. All 18 of the Collembolan environments were moistened with water and yeast was added for the Collembolans to eat. Ten to 14 Collembolans were placed in each petri dish. The number of Collembolans in total was the same in the control as it was in the experiment. A structure was built out of PVC pipe to string the lights on and hold the felt that covered the experiment during the day. The lights were disconnected at night. Nine petri dishes were placed under the red LED lights and nine petri dishes were placed on the counter as the control. The Collembolans and Collembolan eggs were counted as data. At the end of five weeks, 60% of the Collembolans and 33% of the Collembolan eggs were in the experiment, and 40% of the Collembolans and 67% of the Collembolan eggs were in the control. The hypothesis was incorrect; the number of Collembolans did increase under the 50-watt LED lights.

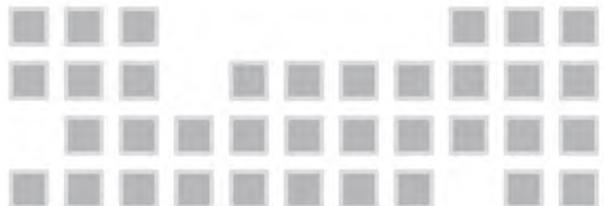
5547

Will a Population of Collembolans Increase If Given a Diluted Solution of Apple Cider Vinegar As Their Source of Water?

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The purpose of this experiment was to determine if Collembolans (*Onychiuridae encarpatus*) would survive and thrive if hydrated with a diluted solution of apple cider vinegar instead of water. One cup of water per one teaspoon of apple cider vinegar was used as was suggested by a health website as a tonic. As a class hypothesis, it was believed a population of Collembolans would increase if watered with the apple cider vinegar tonic. Collembolans are tiny insect-like animals with a springtail used for jumping. First, one part powdered charcoal and nine parts plaster of Paris were placed into a container, the lid was closed tightly, and the container was shaken until the ingredients were completely mixed. Then, it was placed into a bowl and water was added. It was mixed until it was about the consistency of yogurt. The mixture was poured into petri dishes and tapped on the table so it would spread evenly throughout the petri dishes. They were left open and allowed to dry for a couple of days. Each group had a petri dish marked as control. Water was added and a petri dish marked as experiment was added with the diluted solution of apple cider vinegar. The same number of Collembolans was dropped into each petri dish per group. A few grains of yeast were added to each petri dish for the Collembolans to eat. The number of Collembolans and Collembolan eggs were counted on school days two or three times a week. This was recorded as the data. In the experiment, with the apple cider vinegar, there were 54% of the Collembolans and 84% of the eggs. In the control, there were 46% of the Collembolans and 16% of the eggs. The hypothesis was correct: The Collembolan population increased when watered with apple cider vinegar.



5548

Will a Population of *Onychiuridae encarpatus* Increase If They Are Fed Rice for Food?

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The reason for this experiment was to determine if a population of Collembolans would increase if fed cooked rice for food. The class believed as a hypothesis that a population of Collembolans would increase being fed with white rice. Collembolans are tiny arthropods, with a head, thorax and abdomen, and they have special jumping organs called a springtail. For the procedure, one part charcoal to nine parts plaster of Paris were placed into a plastic container with the lid closed tightly. The container was turned until the charcoal and plaster of Paris were completely mixed. Some of this powdered mixture was placed into a bowl; water was added and it was stirred until it was completely mixed. Then it was poured into petri dishes and tapped on the table to spread it evenly throughout the petri dishes. All of the environments were allowed to dry for a few days. The petri dishes were marked for control and experiment. Water was dropped into the environments for the Collembolans' liquid. Equal numbers of Collembolans were placed in each petri dish for the control and experiment. Yeast was added to the control and rice was added to the experiment for the Collembolans to eat. After five weeks, the number of Collembolans and Collembolan eggs were counted as data. Fifty percent of the Collembolans and 38% of the Collembolan eggs were found in the control, and 50% of the Collembolans and 62% of the Collembolan eggs were counted in the experiment (1,218 Collembolans and 1,214 Collembolan eggs were counted)! Based on the data, the hypothesis was correct; the population of Collembolans did increase while being fed white rice when consideration was given to the number of eggs produced by the Collembolans.

5549

The Effect of Drugs on the Growth of Plants

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The purpose of this project was to find out if plants can tell the purity of an area of soil. My experiment proved that plants grow in an environment that is healthy for them. I added over-the-counter drugs to the great northern bean plant as it was growing; as a result I found out that how some medicine is so bad for your health it can cause damage as well as help you. The plants proved that the drugs in the soil are the reason for the slow or no growth. So according to my research, it takes acetaminophen 45 minutes to kick in, it takes Advil or ibuprofen 50 minutes to kick in, and it takes Aleve or naproxen sodium one to two days to show its results. By looking at that data I hypothesized that the medicine would cause

the soil to get toxic, which would make it very hard for the plants to grow. I believed that the test plant would have the fastest growth. The plants with the medicine that is least harmful to the growth of new cells would have the next-fastest growth rate. The results showed that my hypothesis statement was correct and that the medicine made the soil toxic and unhealthy for the plants. Therefore the plants didn't grow, except for the plant with the acetaminophen in its soil. I have learned many things from this project, and one of them is that plants do not grow in areas where the soil or the ground is toxic. So the amount of vegetation in an area can tell how clean the soil is. My results showed me that acetaminophen isn't as harmful to plants as other types of medicine.

5550

Which Gender Has Better Short-Term Memory?

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The purpose of this experiment was to determine whether men or women have better short-term memories. Four males and four females were the subjects. Each person was given a chart with exactly 20 images and was given precisely 30 seconds to memorize as many images as he/she could. After the timer ended, the subjects received a sheet of paper and a writing utensil. Then they had to write down what they remembered from the table in 60 seconds. The experiment resulted with a mean of 9 objects remembered by females and 9.25 objects remembered by males. The results proved that males and females have very similar short-term memories, but males may have a slightly better one.

5551

The Madden Experiment

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The purpose of this experiment was to determine if playing a sports-themed video game like Madden NFL 25 will encourage you to get active and exercise or affect you in a way that you become lazy after playing it. To determine this, I made a few test subjects do 25 sit ups and rate on a scale of 1 to 10 how difficult the sit ups were. Afterward, they played a four-quarter game (5 minutes per quarter) of Madden. After the 20-minute game of Madden, I had them do 25 more sit ups and rate on a scale of 1 to 10 how difficult they were again. The results were surprising. After playing Madden, the sit ups got 20% to 40% more difficult. The subjects also seemed to complain about the sit ups the second time. This drew me to conclude that after playing Madden, people will get lazier and will be less motivated to get active, and if they do get active, they will not have as much energy.

5552

Do Cooked Lentils Grow Faster Than Raw Ones?

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The purpose of this experiment was to determine whether sprouts would emerge from cooked lentil seeds or raw lentil seeds. Two different groups of lentils were tested in this experiment and they were, of course, cooked and raw. The cooked lentils were boiled for 10 minutes over a small flame on a stove. Both lentil groups were then placed on two separate plates and covered with moist cotton balls. They were kept in a large room with fluorescent lighting in a secluded area so they could not be disturbed. Each day, their progress was noted and their sprouts, if any, were measured. Almost every day lots of water was added, for they appeared to grow best in large amounts of water. Eventually, after a period of 15 days, it was determined that the raw lentils grew faster than the cooked ones, reaching about 20 centimeters at most. In fact, the cooked lentils didn't even grow at all. Yes, white buds of sprouting filaments were found on some, but they were barely noticeable. After awhile of staying moist, the cooked lentils began to rot and proved to be incapable of growing sprouts, unlike the raw lentils. My hypothesis, being that the cooked lentils would outgrow the raw ones, was proved to be wrong.

5553

Does Time Perception Affect Age?

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The purpose of this science experiment was to determine whether or not age would have an effect on time perception. My hypothesis was that the older the test subjects, the less amount of time they would guess had passed in a timed situation. To do this, I used a water bottle so the test subjects had something to focus on, and I used a stopwatch to time them. I also needed different age groups (I used ages 4-20, 20-50 and 50+) and test subjects to perform the experiment on. When 20 seconds were up, I asked them how many seconds they thought had passed. After recording the data, I analyzed it and found that the older subjects tended to guess a shorter time. This determined that time perception differs with age, and my hypothesis was correct.

5554

Will More Pinto Bean Seeds Germinate If Watered With Sugar Dissolved in Water?

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The purpose of this experiment was to determine the effect sugar would have on a seed's germination. As a hypothesis it was indicated that more seeds would germinate if watered with a solution of water and sugar. A solution was made with five parts water to one part sugar. The 20 jars were marked 10 for experiment and 10 for control. The solution was poured into 10 jars containing cotton balls marked as experiment. Three bean seeds were placed on top of the cotton balls. For the control, water was poured into 10 jars

containing cotton balls marked as control. Three seeds were placed in the jars on top of the cotton balls. The seeds in the experiment were watered two to three times a week with the sugar solution. The seeds in the control were watered with water two to three times a week. At the end of the experiment, 28 seeds germinated in the control and seven seeds germinated in the experiment. Sugar did not help speed up the growing process of the seeds. The sugar actually lessened the amount of seed germination in the experiment. Therefore my hypothesis was incorrect.

5555

Will Video Games Make a Person's Blood Pressure Increase?

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The purpose of this experiment is to determine if subjects' blood pressure rises when they play video games. My hypothesis is that a subject's blood pressure will increase due to the extra movements and brain activity. Blood pressure is based on a person's activity, stress or relaxation. First a subject's blood pressure was taken and recorded at rest. Then the subject played the video game for 5 minutes and the blood pressure was taken and recorded again. Each subject was tested separately. For the results, 65% of the subjects' blood pressure increased, 30% decreased and 5% stayed the same. My hypothesis was correct; 65% of the subjects' blood pressure increased. So, in conclusion, the evidence suggests that video games do increase a person's blood pressure.

5556

Does Light Reflect Differently When Substances Are Dissolved in the Water It's Pointed At?

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The purpose of this experiment was to investigate how light reflects differently with different materials. The hypothesis was that the substances (sugar and salt) dissolved in water create a shield-like reflection, which allows the light to reflect in a different direction. Light is said to be both a wave and a particle. Observing how light interacts with different materials allows one to get more information about these materials. The procedures followed were getting three large containers and filling them up with water, and then pouring a bag of salt in one container and a bag of sugar in the other. The last container was left with only water as the control. After that, I mixed the two experiment containers until the sugar and salt had dissolved completely. Next, a laser was pointed at one container at a time. The control was tested before testing the experiments. The angles of the reflection of the light were measured and recorded as data. These procedures were repeated five times for each experiment and for the control, which was water. At the end of five experiments, the average angle for the sugar water was 39 degrees, and for the saltwater was 25 degrees. The control didn't have any angles; it was a straight line across. The data suggest that the sugar and the salt crystals are what allow the light to bend in an angle. In this case the sugar crystals turned out to give a bigger angle than the salt crystals or the water.

5557

Will Collembolans Survive and Reproduce Their Population If They Drink Only Gatorade?

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The reason for this experiment was to determine if a population of Collembolans would increase if they drank Gatorade. The hypothesis was that the Collembolans would survive and reproduce with the Gatorade, but would reproduce faster with water (the control). Collembolans are tiny arthropods with a head, thorax, abdomen and springtail. For the procedures, one part charcoal to nine parts plaster of Paris were placed into a plastic container. The lid was closed tightly and the container was turned until the ingredients were completely mixed. The powdered mixture was placed into a bowl, water was added, and it was stirred until it was completely mixed. Then it was poured into two petri dishes and tapped on the table to spread it evenly through them. The habitats were dried for several days. The petri dishes were marked with tape for control and experiment. Water was dropped into the control environment and Gatorade was dropped into the experiment habitat for their liquid. Fifteen Collembolans were placed into the control and experiment petri dishes. Yeast was added to the two petri dishes for the Collembolans to eat. After six weeks, the number of Collembolans and Collembolan eggs were counted as data, and 83% of the Collembolans and 33% of the Collembolan eggs were found in the control. In the experiment, 16% of the Collembolans and 14% of the Collembolan eggs were counted. During the six weeks, 277 Collembolans and 98 Collembolan eggs were counted! The data suggested the hypothesis was correct; the Collembolans survived and reproduced with Gatorade as their liquid but reproduced faster in the control.

5558

How Does Word Color Affect Memory?

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The purpose of my experiment was to see if colored words improve memory. My hypothesis was that darker colors would be easier to retain in memory, and that brighter colors would make it more difficult to memorize the information. There were three groups involved in my experiment: the control group, the trend group and the random color group. The control group used a set of cards with a date and corresponding event written in black ink. The trend group used cards written in colors corresponding with the event (sad=blue, danger=red, etc.). The random color group used cards that were written in any random color. I tested 10 subjects who memorized one of each type of card two times. From the information I gathered, the control group cards were easier to memorize. Therefore, the cards written in black ink were easier to memorize, making my hypothesis true.

5559

Will a Population of Collembolans Survive If Given Coca-Cola Classic As a Source of Water?

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The purpose of the experiment was to determine if Collembolans (*Onychiuridae encarpatus*) would survive if hydrated with Coca-Cola Classic instead of water. As a hypothesis, I believed a population of Collembolans would increase if watered with Coca-Cola Classic. First, one part powdered charcoal and nine parts plaster of Paris were placed into a container, the lid was closed tightly and the container was shaken until the ingredients were completely mixed. Then the ingredients were placed into a bowl and water was added. It was mixed until it was about the consistency of yogurt. The thick liquid was poured into petri dishes and they were tapped on the table so the liquid would spread evenly throughout the petri dishes. It was allowed to dry for a couple of days. Coca-Cola Classic was added to the petri dish labeled experiment and water was added to the petri dish marked control. The same number of Collembolans was added into each petri dish (nine). A few grains of yeast were added to each petri dish for the Collembolans to eat. The number of Collembolans and Collembolan eggs was counted every one to three days. In the experiment with the Coca-Cola Classic, there were 43% of the Collembolans and 42% of the Collembolan eggs. The control had 57% of the Collembolans and 58% of the eggs. The hypothesis was incorrect because the control increased to a higher percentage than the experiment.

5560

Which Fruit Has More Vitamin C: Apples, Grapes, Tomatoes or Oranges?

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The purpose of this experiment was to see which juice had more Vitamin C in it: apples, grapes, tomatoes or oranges. As a hypothesis the orange juice was thought to have the most Vitamin C. Vitamin C is a necessary vitamin that helps the skin and heals the body. It can be found mostly in fruit or fruit juice. First, ½ teaspoon of cornstarch with 1 cup of water were placed in a saucepan. Then the pan was placed over low heat and the ingredients were stirred until the cornstarch was completely dissolved. The cornstarch solution was poured into a jar and allowed to cool. In this same jar, the solution was mixed with 1 cup of water and 4 drops of iodine. This made the solution blue, thus becoming the test standard. The test standard was confirmed by adding a crushed 250-mg Vitamin C tablet, which was dissolved in 1 cup of cold water. Samples of apple juice, grape juice, tomato juice and orange juice were poured into separate cups. The juices were tested with the test standard by placing drops of each juice until the blue color disappeared. This process is called titration. The number of drops was counted as data. Each juice was tested five times and the number of drops was averaged. The average number for the grape juice and apple juice was 5 drops. The average number for the orange juice was 4.2 drops, and the tomato juice had 4.4 drops. The apples and grapes had the most Vitamin

C, but the oranges and tomatoes had lower amounts. As a result the hypothesis was incorrect because the grapes and apples had the most Vitamin C.

5561

Which Fruit Has the Most Glucose?

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The purpose of this experiment was to determine which fruits contain the most glucose and thus to determine the highest sugar content. The hypothesis was that strawberries would have the highest amount of glucose. Three fruits were tested 10 times: strawberries, grapes and oranges. First, the fruits were cut in half. Then, the fruits were placed on paper plates. A control was created by dipping the glucose test strip into a cup of water for 30 seconds. (There was no change.) Each fruit was moistened with water and a glucose test strip was pressed against the edges of the fruit. The amount of glucose in the strip was then determined by comparing the color to the glucose scale. The data were recorded for all three kinds of fruits that were tested. The oranges averaged at a 15 in glucose. The strawberries averaged at an 80, which was the highest number in glucose. And the grapes averaged at a 5 in glucose. At the end of the testing, the strawberries ended up being the highest in glucose and the grapes were the lowest in glucose. The hypothesis was correct.

5562

Do Plants Grow Faster When Grown Using the Plant Fertilizer Osmocote?

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The purpose of the experiment was to determine if plants grow faster and taller using a plant fertilizer nutrient. The fertilizer used in this experiment was the Osmocote brand. The hypothesis was that the plants using the fertilizer Osmocote would grow faster and that this is an improved way to grow plants. The Osmocote substance is a plant food found in most nurseries or garden stores and it is mostly used to grow plants, including vegetables. Two *Peperomia* plants were used for the experiment. First, 20 pieces of the two *Peperomia* plants were cut into 2-cm lengths. Then 10 plastic cups were labeled S-1 to S-10 for the control and the other 10 were labeled F-1 to F-10 for the experiment. The 20 plastic cups in the control and experiment were filled with soil. Then the Osmocote plant food was mixed into the 10 plants in the experiment group. All 20 plants were placed next to a window with adequate sunlight. The plants were observed daily, and any changes were noted in a notebook for 26 days. The plants were watered once each day. On the 26th day the plants were removed from their plastic cups and the length of the roots and stems were measured to see the difference and effect of the Osmocote fertilizer. The results showed that the average length of the roots and stems in the control was 3.01 cm, and the average length of the roots and stems in the experiment was 4.06 cm. Most of the roots in the experiment were longer than in the control. The hypothesis was proven correct; *Peperomia* plants with the Osmocote fertilizer had longer roots and stem growth than without the fertilizer.

5563

Effects of Acid Rain on Plants

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The purpose of this experiment was to find out the effects of acid rain on plants at a certain pH level. Two groups of Alaska pea plants were grown, a control group and an experimental group, with each group containing two plants. The control group was watered with tap water, while the experimental group was watered with a mixture of tap water and lemon juice containing a pH level of 3.3. This experiment was done over a 20-day period. The result of this experiment showed that the experimental group didn't mature as fast as the natural (control) group. The plants in the control group grew big, healthy leaves and had a fast increasing height rate, while the plants in the experimental group weren't very healthy. The leaves took a much longer time to grow and the plants struggled much more to survive, demonstrating a stunted growth. With this information, we can use a new scientific discovery known as phytoremediation – the direct use of living plants to remove or neutralize contaminants – to remove enough of these contaminants in the soil to help plants grow, which helps improve our environment.

5564

Will a Population of Collembolans Survive If Fed Jalapeño Peppers?

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The purpose of this experiment was to find out if a population of Collembolans could have an alternative source of food other than yeast. The hypothesis was that the population of Collembolans would decrease if fed jalapeño peppers. The procedure started with placing nine parts plaster of Paris in a container with one part powdered charcoal (activated) and mixing it with water. Next the mixture was poured into petri dishes and tapped so it would spread throughout the petri dishes. Then it was left to dry for a couple of days. After the mixture was dry, it was moistened with water. Thirteen Collembolans were added to each petri dish. Grains of yeast were added to the control, and slices of jalapeño peppers were added to the experiment. The Collembolans were counted as data. At the end of five weeks the average for the control was 32 Collembolans and 0 eggs. For the experiment it was 24 Collembolans and 2 eggs. In conclusion, my hypothesis was correct; the population of Collembolans decreased when fed jalapeño peppers.

5565

Does Storing Orange Juice At Different Temperatures Affect Its Acidity?

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The purpose of this experiment is to determine if putting orange juice at different temperatures will affect its acidity. As a hypothesis, it is believed that storing orange juice at warm temperatures

will makes its acidity stay the same and putting the orange juice in cold temperatures will raise its acidity. The average pH level of regular orange juice is 3. As a control, orange juice was left in a refrigerator at its regular temperature, which is approximately 30 degrees F. For experiment 1, the cup was left on the counter with a room temperature of approximately 65-72 degrees F for a day. For experiment 2, the bottle was left in the refrigerator with a temperature of approximately 33-45 degrees F for a day. The pH paper was dipped into both containers and the pH levels were recorded. Then, the same thing was done except the orange juice was left on the counter and in the refrigerator for two days. After that, the pH level of the orange juice was recorded. The procedure was done three times to make sure that the experiment was correct. As a result, for experiment 1, the average pH of the orange juice that was left on the counter for one day was 2 and the one for two days was 3. For experiment 2, the average pH for one day was 4 and for two days was 3. And for the control, the average pH for one day was 2 and for two days was 5. In conclusion, the hypothesis was incorrect. Storing orange juice at cold temperatures made it less acidic.

5566

Will Magnets Affect the Height of Kidney Bean Plants?

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The purpose of this experiment was to determine if putting magnets near kidney bean plants affects the height of the plants. As a hypothesis, it was believed that magnets do affect the growth of kidney beans. Kidney beans are named after their kidney-like shape. They have been called the world's most nutritious food. They are grown and used by a variety of countries and cultures in a variety of ways. Two magnets were glued to the sides of 36 pots using superglue. The magnets were put in a position so that the forces of the magnets were pulling toward each other. Soil was placed into 72 pots. Seventy-two kidney beans were planted at a half-inch deep in each pot. The beans were watered every day. The growth of the plants was measured every day and written in a logbook. The results were that the control grew an average of 26.67 cm and the experiment grew an average of 24.13 cm. Based on the data the hypothesis was incorrect; the control grew taller by about 2.5 cm.

5567

Antibacterial Effectiveness on Zones of Inhibition

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The purpose of this experiment is to determine which antibacterial agent/disinfectant creates the largest zone of inhibition when placed with *Staphylococcus* bacteria from the nasal and buccal mucosa. (The bacteria are *Staphylococcus aureus* or *Staphylococcus epidermidis*.) I used the disk diffusion test (Kirby-Bauer) to complete this experiment. This helped me to know which antibacterial agent was the most effective at killing bacteria long term (over a two-week period). During my experiment, I steril-

ized all of my materials to ensure that no outside bacteria grew. Then I filled my petri dishes with nutrient agar and streaked them with bacteria. I had two control petri dishes to make sure that the bacteria were growing properly, and I had 17 petri dishes with different antibacterial agents. Some of my antibacterial substances were household cleaners, soaps and ointments. My hypothesis was that all of the substances would create a noticeable and easily measured zone of inhibition because they all are designed to kill bacteria. The results proved my hypothesis correct because all of the petri dishes, except the control, developed a zone of inhibition. The best antibacterial in my experiment was Erythromycin Topical Solution (Bausch & Lomb), since it had the largest zone of inhibition of 32 mm. I obtained the second-greatest zone of inhibition from OdoBan (30 mm), followed by citric acid (19 mm), hydrogen peroxide (18 mm), and Solarcaine First Aid Medicated Spray (11 mm). The substances that had the smallest zones of inhibition (below 10 mm) were all ointments and medicines. These observations led me to conclude that OdoBan is the best household cleaner to disinfect your home because it will kill bacteria long term, since it had a very large zone of inhibition over a two-week period. The medicines and ointments had the smallest zones of inhibition because they are meant to be used on your skin, so it is actually okay that they did not kill that much bacteria. This is because if the common *Staphylococcus* bacteria that I used were killed, then the normal flora of bacteria in our body would be removed. In conclusion, my experiment was successful in proving that antibacterial substances affect the zones of inhibition of bacteria.

5568

Tenderizing Meat

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This experiment was designed to determine the best meat tenderizer of the following: kiwi, beer, commercial meat tenderizer, buttermilk, Coca-Cola and coffee. Steak was cut into 1-inch by 1 1/2-inch cubes, and was placed in plastic bags with a tenderizer for 15, 30, 60 and 120 minutes. The meat was then cooked for 3 1/2 minutes on each side. The sheer force required to pierce the meat was measured with the aid of a press. Three trials/samples of meat for each condition (time and tenderizer) were used. The averages for each trial were calculated. The findings were inconclusive.

5569

Pickles

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The purpose of my project was to see which of the cucumber slices would pickle the most quickly in a week in different solutions. For the experiment, I used four cups. Control was the cup with the word "Control" written on the side of the cup. It contained only water. Cup 1 had a solution of sugar in the water and two slices. Cup 2 had a solution of salt with two slices. Cup 3 had a solution of vinegar and water with two slices. I hypothesized that Cups 1 and 2 would have darker pickles than the Control and Cup 3. At the end of the experiment Control and Cup 2 had darker pickles.

Cup 1 had sugar crystals at the top near the plastic, while Cup 3 had mold. All of the cups had clouded water at the end of the week. Due to osmosis, Cup 2 had darker pickles since the water from the cucumber moved into the water because it had salt.

5570

Cooking With the Sun

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The purpose of my project was to determine which type of solar oven cooked rice faster and why. I reached a conclusion by building two solar ovens and comparing the cooking rate of the rice over the span of two weeks. From this procedure, I learned the parabolic solar oven cooked the rice faster than the lightweight box solar oven, with the difference of about four days. The reason why the parabolic solar oven cooked faster was because it absorbed more heat. My research showed that since the shape of the parabolic solar oven is openly facing the sun, no matter where the sun is, the oven is still able to absorb a good amount of heat. On the other hand, the lightweight box solar oven has closed-in sides, which block out some of the sunlight; therefore, it only works best at noon, when the sun is directly above the box. However, surrounding the box in black paper and adding magnifying glasses definitely helped the lightweight box oven absorb more heat than it would have without those materials. In conclusion, the parabolic solar oven is the easier and faster oven for cooking with the sun.

5571

Saltwater and Snapping Turtles Don't Mix

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My research project was based on finding out whether or not snapping turtles were affected by saltwater in ways other than dehydration. To test this, I took turtle shell pieces and put them in different environments. One of them I obviously put in saltwater. The next one I put into freshwater, a snapping turtle's natural environment. Finally, I made a control by leaving a turtle shell piece inside a container with only air. I then checked their progress every night for 10 days. In the end it was conclusive that saltwater caused the turtle shells to decay much faster.

5572

Comparing the Growth Among Salt, Sugar and Artificial Sweetener Crystals

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This experiment was conducted to see whether crystals of sugar, salt, and artificial sweetener grow differently. Three glass jars were taken and filled with 1 cup of boiling water. Three cups of sugar were added to Jar 1, 1 ½ cups of salt were added Jar 2 and 2 cups of artificial sweetener were added to Jar 3. Three pencils were taken and each had a piece of string tied around it. One pencil was laid across the top of each jar. The jars were placed motionless for

two weeks. After two weeks, each pencil was removed from its jar. The sugar crystals grew the longest. The salt crystals were apparent as well. The artificial sweetener crystals had not grown at all. This experiment proved that crystals of sugar, salt, and artificial sweetener do grow differently.

5573

How Much Gas Does Your Favorite Beverage Produce?

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In my experiment I figured out many things, but first of all I did quite a bit of preparation before I could do the experiment itself. For one, I always had to have boiling water ready so that I could stick my bottle that was filled with the liquid in the water and get an accurate result. I also had to use the same type of balloon throughout the whole experiment. So onto what I did to set up the beverage. I used a glass bottle and filled it up halfway with a drink, and after that I poured a tablespoon of vinegar into the liquid. Then I put the balloon over the lip of the bottle and put it in the water for intervals of 5 minutes. I figured out many things, like how some liquids were fizzier than others and some liquids were not as fizzy as I thought. I first of all thought that apple juice would have enough gas to make the balloon inflate, but there really was no measurable change in the balloon's circumference. Also I knew Sprite and Coke were really fizzy, but guess which drink had the most gas? The answer was Sprite. What was amazing was that Sprite had the same amount of gas at 5 minutes as Coke at 20 minutes. That balloon really inflated for sure.

5574

The Magic of Oxidation

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This experiment was conducted to find out which component would allow a message written in lemon ink to show. The hypothesis was that a heat source would allow the lemon message to show. Lemons, an iron, four sheets of paper, an eos lip balm and a high-lighter were used for this research project. For each test, lemon juice was poured onto each paper. After it dried each component was tested upon it. The results showed that there were no changes for each of the components except with the iron. The paper turned a light brownish color. The hypothesis was correct. The iron's heat allowed the lemon juice to show on paper.

5575

Does the Surface Area of Water Affect the Amount Evaporated?

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The purpose of this experiment was to test what effect the surface area of water would have on the rate of evaporation. First, a pre-experiment was conducted, in which a glass measuring cup and a

metal cup measure were filled with 1 cup of water and then placed outside. After 48 hours, the results were recorded and showed that much more water evaporated from the metal cup measure than from the glass measuring cup. This was due to the fact that metal is a better conductor of heat than glass. Because of this realization, the containers used in the actual experiment were both made of the same material. During the actual experiment, two glass measuring cups, both filled with the same amount of water, were placed outside. One of these measuring cups had a larger surface area than the other. Both measuring cups were placed outside for 24 hours. After 24 hours, the results were recorded and compared. The results showed that the same amount of water had evaporated from both containers, even though they had different surface areas.

5576

Filtering Our Water

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This experiment's main objective was to determine which materials best filtered dirty water. The given materials were carbon, nylon, sand and pebbles, and the same amount of each material was put into a tube so that the dirty water could be filtered. There also was another study done to see if a strainer that was put underneath each material would make a difference compared to when there was just the material filtering the water. To rate how well the water was filtered, the pH factor, clarity and the amount of debris in the already-filtered dirty water were taken into account. The results for the study using the materials without the strainer showed that carbon was the best and was followed by nylon, sand and pebbles in that order. The results for the study using the materials with a strainer showed that carbon and nylon were the best and were followed by sand and pebbles in that ranking order. In conclusion, the three best materials to filter water are carbon, nylon and sand.

5577

Does Soda Make Plants Grow Taller?

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This project's purpose was to find out whether soda can actually cause plants to grow taller than plants that consume water. My hypothesis was that plants would not grow taller due to the fact that soda has a massive amount of sugar that the plants would take in. In this experiment, I used two identical plants: one with soda and one with water. For soda, I used Sunkist and I watered daily until the 15-day interval was over. After the results were in, the soda caused the plant to die quickly since soda wasn't an efficient substitute for water in a process called photosynthesis. Overall, soda could not do what water could do for plants.

5578

Changes in the Reaction to Colors and Shapes

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The purpose of this experiment was to find how the brain's reaction to colors and shapes changed over time. This experiment was done with three groups of test subjects, each group consisting of three people of similar age, and they reviewed 14 slides of a PowerPoint. On each slide were the names of colors that did not match the font color they were shown in. For example, if a slide said "Red" on it, the color of the word was in any other color but red. The subjects, as they went through the PowerPoint, were asked to say the color of the font out loud in order to move onto the next slide. The results of this experiment showed that Group 1 (consisting of elementary students) finished all of the slides at an average of 17.78 seconds and correctly named 13 out of the 14 slides. Group 2 (consisting of junior high students) finished all of the slides at an average of 26 seconds and correctly named 13 out of 14 of the slides. Group 3 (consisting of middle-aged adults) finished all of the slides at an average of 58.8 seconds and correctly named 12 out of the 14 slides. This experiment concluded that as the brain ages, the reaction toward color weakens in comparison to the reaction toward shape.

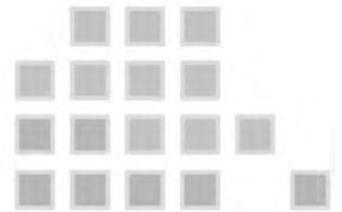
5579

What Wood Works?

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The purpose of my project is to identify which of three common types of construction wood is least susceptible to moisture. This can be important for many reasons. Most importantly, moisture can create many different problems for wood such as rotting, malleability, fluctuation in density, and many other issues that can prevent the wood from serving its initial purpose. In my project, I conducted an experiment in which I tested three broadly used types of wood on their susceptibility to moisture by placing them in water for two weeks and measuring their mass in water absorption while observing how their characteristics changed. My results concluded that harder woods, such as oak, became more brittle and rotted the most, but lighter woods changed the most in mass. These results can provide useful information for everyday endeavors with construction. If you need a wood that can't rot and break down with moisture, use a light, airy wood like poplar. If you need a wood more for indoor use that will hold up for a very long time, go for more of a hardwood. If you need something in between, a wood such as alder is useful.



5580

Osmosis in Potatoes*Josephine Neyyan and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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The purpose of this experiment was to find out how osmosis works. Osmosis is the process of movement of a solvent across a membrane from the less concentrated solution to the more concentrated if two solutions of different concentration are separated by a semipermeable membrane. Potatoes were used to see how this works. Two bowls were filled with the same amount of water, one with saltwater and the other with freshwater. A half of a potato was put in each one and left there for a few hours. The hypothesis was that the salinity level of the saltwater would decrease after adding the potato. After some time, the potatoes were taken out. The potato in the saltwater had shrunk and withered, while the freshwater potato had become very crisp. The freshwater potato had a length of 9 cm and a width of 6.2 cm, which was the original size. The saltwater potato had a length of 8.3 cm and a width of 5.7 cm. The salinity level of the saltwater before the experiment was 10.0 and after was 8.11. So the hypothesis was correct. The water inside the potato in the saltwater left it and diluted the saltwater, which is why the salinity level decreased. The experiment was repeated four times with different salt levels and potatoes, and each time the potato in the saltwater shrunk and the salinity level of the water decreased. Osmosis is of great importance in biological processes where the solvent is water. The transport of water and other molecules across biological membranes is essential to many processes in living organisms.

5581

Music for the Mind*Peter Trujillo and C. Drucker (teacher)*Robert Frost Middle School
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Objective: The experiment was done to see if listening to music had an effect on how well someone performed a task, and if the music helped his/her concentration. **Materials and Methods:** A subject did a task while being timed. Then an hour later the same subject did the same timed task, but this time while listening to music. **Results:** The music did seem to have an effect on the test subject as he/she did the task; the times were different for both tests. **Conclusion:** Music does indeed have an effect on the mind of the test subject.

5582

How Does Watering Plants With Different Liquids, Other Than Water, Affect Their Growth?*Bryan Gittins and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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This experiment was conducted to see if watering plants with liquids other than water affects their growth. There were two types of plants used: sugar snap peas and radishes. Every day at 5 p.m. the plants were watered, each with a different liquid: one with water as the control, one with antioxidant green tea, one with Gatorade, one with apple juice, and the last with sparkling lemon water. At

the same time each day the plants were measured in centimeters. Once all of the data were collected the peas that were watered with sugary liquids did fairly well or died. The peas watered with antioxidant green tea grew the fastest and became the healthiest plants. As for the radishes, the water (control) grew to be the tallest plants. All of the ones watered with the sugary drinks died or never even sprouted out of the dirt. In the end it was surprising to learn that in some cases liquids other than water can be used to grow plants faster.

5583

Desalination*Brashna Dost and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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My science project was on desalination. I found a way to make saltwater potable. I used and tested different ways to do this. First, I boiled the saltwater, which caused the water to evaporate on the lid, but the salt still remained. But I had to let it cool in order for the salt to evaporate as well, just like the hydrologic cycle. I also put the saltwater in the microwave, but microwaving the water didn't work as well as boiling. In addition, I froze the water, which didn't even help because salt still remained in the water. And I also checked how much energy was being used. I tested the kWh by going outside and checking the electric meter, but I first ran a baseline. To be accurate, I turned off everything in the house that used electricity except for the refrigerator and microwave. I then made a guesstimate of how much energy would be used to desalinate water. What I learned while doing this project was that it is possible to make saltwater potable. According to my results, boiling is the best way to desalinate saltwater but it uses the most energy. The Earth includes about 97.5% saltwater but only about 2.5% freshwater. One day we will run out of freshwater with nothing to drink and grow plants with, because plants don't grow with saltwater. This is why I chose this topic; I thought it was important for people to be aware of the amount of water they use every day. I learned so much from this project. Before, I just thought that water could never be wasted because we get water out of our faucet every day, but that isn't the case. Working on this project helped me realize that we waste so much water yet we don't care and don't realize it. It's time for people to be aware of how much water they are wasting and start using less water. We must be cautious. So, in case of an emergency, we now know how to make saltwater potable.

5584

Do Cats Have Unique Paw Prints?*Julia Macias and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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The objective of this experiment was to demonstrate whether or not cats can be identified by their individual paw prints. The hypothesis was that, like with human fingerprints, cat paw prints are not identical, which would make cats easier to recognize. Four different cats were used for this experiment, as well as a stamp pad and a timer. The cats' paws were put on the pad with applied pressure and then stamped onto index cards. After all of the data were gathered and recorded, the paw prints' visibility and differences were noted. The first cat's paw had crescents; the second and

fourth cats' paws had line patterns; and the third cat's paw had curves. In the end, I found that they all had individual patterns and markings, making each cat's paw prints different. This information can be applied to revolutionizing our current cat tracking systems. Since recent studies have shown that microchips damage tissue and can cause cancer, this method of recognizing animals through paw prints is natural and safer. This information also could lead to the control of cat populations, because cats that are not neutered could be identified and then undergo neutering. It also could control the population of feral cats. Overall, this study has proven that cats have unique paw prints, and that based on this knowledge, we can restructure our tracking technique of using microchips.

5585

Will Motivational Music Cause People to Solve a Puzzle Faster?

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The objective of this experiment is to assess the effects of motivational music on the performance and efficiency of the human brain while solving puzzles. This experiment seeks to investigate whether playing motivational music will improve the speed of a person in solving puzzles. To carry out this experiment, 40 different individuals were randomly selected to serve as subjects. Each individual was taught the mechanics of the Rubik's Slide. The time limit was set to 2 minutes. The number of puzzles each subject was able to solve within the given time was tallied. Afterward, the subjects were allowed to rest for 1 minute. The Rubik's Slides were put on reset. The subjects were asked to put on earphones and were given an option among eight different types of music. The subjects were then tasked with solving as many Rubik's Slide puzzles as they could in the 2-minute time limit while listening to their chosen motivational music. The number of puzzles they were able to solve was tallied again. After gathering all of the data, 12 out of the 40 people (30%) were able to do better without music and 28 out of the 40 people (70%) did better with motivational music. Based on this data the hypothesis is correct. Therefore, motivational music improves a person's speed in solving puzzles.

5586

Will a Population of *Onychiuridae encarpatus* Increase If Fed Apples for Food?

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The reason for this experiment was to determine if a population of Collembolans would increase if fed apples for food. The hypothesis was that their population would increase if fed apples. Collembolans are tiny hexapods with three main body parts: a head, thorax and abdomen. They have a special jumping organ called a springtail, which helps them jump. For the procedure, one part charcoal to nine parts plaster of Paris were placed in a plastic container, the lid was closed and then the container was turned until the powder was completely mixed. This powdered mixture was placed in a bowl and water was added. It was stirred until it was the consistency of yogurt. The plaster of Paris and charcoal liquid were

poured into two petri dishes and tapped on the table to make it spread throughout the petri dishes. It was allowed to dry for a few days. These Collembolan environments were moistened with water. A few grains of yeast were placed in the control environment for the Collembolans to eat. A few, very small in size, bits of apples were added to the experimental environment for the Collembolans to eat. Fifteen Collembolans were added to each environment. The number of Collembolans and Collembolan eggs were counted and recorded as data. Sixty-seven percent of the Collembolans were counted in the control and 51% of the eggs were counted in the control. Thirty-two percent of the Collembolans were counted in the experiment and 48% of the eggs were counted in the experiment (673 Collembolans were counted altogether, as well as 273 eggs). Based on my data, my hypothesis was incorrect. The Collembolan population did not increase when fed apples for food.

5587

Will a Population of Collembolans Increase If Fed Honey As Their Food?

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The reason for this experiment was to determine if a population of Collembolans would increase if fed honey as food. The hypothesis was that a population of Collembolans would increase being fed with honey as food. Collembolans, tiny arthropods with a head, thorax and abdomen, also have an extraordinary jumping organ called a springtail. For the procedure, first one part charcoal to nine parts plaster of Paris were placed into a plastic container. Second, the lid was closed tightly and the container was turned until the ingredients were completely mixed. Third, some of the powdered mixture was placed into a bowl, water was added, and it was stirred until it was completely mixed. Then it was poured into two petri dishes and tapped on the table so it would spread throughout them. The new environments were allowed to dry for a few days. Some water was dropped into the petri dishes to give the Collembolans some liquid. Twelve Collembolans were placed in the control and in the experiment. Yeast was added to the control and a few drops of honey were added to the experiment for the Collembolans to eat. At the end of two months, the Collembolans were counted as data in the control and in the experiment. Ninety-one percent of the Collembolans were found in the control and 9% of the Collembolans were found in the experiment. The hypothesis was incorrect; the Collembolan population did not increase by eating honey as food.

5588

Space Seeds on the International Space Station

Students in Class Periods 1, 2, 4, 5, 6 and T. Miller (teacher)
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The purpose of this experiment is to determine if tomato seeds that have been on the International Space Station for 22 months will have the same germination rate as tomato seeds that have not been in outer space. This experiment was a blind study sponsored by Tomatosphere. The hypothesis determined by vote was that the tomato seeds that stayed on Earth would germinate more. Enve-

lopes containing tomato seeds (Heinz H9478) were sent from the Tomatosphere Project. Half of the envelopes containing the seeds were marked T and the other half of the envelopes were marked V. It was not known which seeds had been in space for 22 months. Half of the seed pots were marked T and the other half of the seed pots were marked V. Seed-starting soil was placed into each of the pots. One-hundred-and-one T seeds and 101 V seeds were planted, with the T seeds and V seeds in different pots. The pots were placed under grow lights. All of the pots were watered to keep them moist. The plants were observed three times a week for 27 days. A seed was considered germinated when two seed leaves had appeared. At the end of 27 days, 56 T seeds had germinated (55%) and 71 V seeds had germinated (70%). The data were submitted to the Tomatosphere website and we were informed that the seeds in the packages marked V had been on the International Space Station for 22 months. Our hypothesis was incorrect; the tomato seeds that had been on the International Space Station for 22 months had a higher germination rate.

5589 Lightening Chemicals + Dark Hair = ???

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The purpose of the experiment is to really see what people are doing to their hair when they dye and lighten their hair to fit in with today's trends, especially since most people's natural hair color tends to be dark like brown and black. Five different things were put into dark brown hair: lemon, bleach, dye, bleach/dye, and Sun-In, to see what each does to hair. The items that were not harsh to the hair, Sun-In and lemon, had little to no effect on the hair, meaning it was exactly or very similar to the control hair; the control hair was dark brown, straight, had no noticeable damage and felt soft. The chemicals that did damage the hair – bleach, dye and bleach/dye – appeared to be more pigmented and longer lasting than the others. Although they came out looking better, more damage was done to the hair. As a result, the hair felt extremely rough and dry and had multiple split ends. In conclusion, you get what you pay for, but in this case the currency is hair. The more damage to the hair the better the results, and the less damage to the hair the worse the results.

5590 What Color of Bird Feeder Do Birds Prefer?

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The purpose of this project was to learn about the differences in bird feeding behavior based on their choice of colored features. As a hypothesis it was believed most of the birds would choose the yellow bird feeder from which to eat. A bird is a warm-blooded vertebrate distinguished by having its body more or less completely covered with feathers and the forelimbs modified as wings. First, four bird feeders were painted: one yellow, one red, one brown and one green. While the paint was drying, a sugar and water solution was made using one tablespoon of sugar for each plastic cup of water. These were placed next to each bird feeder. After that, seeds and the sugar and water solutions were added

to each bird feeder after they dried. Then, the numbers of birds were counted that came to each bird feeder in less than 15 minutes. This step was repeated five times a week for four weeks. Twenty-nine percent of the birds flew to the red bird feeder, 28% flew to the green bird feeder, 27% flew to the yellow bird feeder and 17% flew to the brown bird feeder. The data suggest the hypothesis was incorrect because more birds flew to the red bird feeder than to the yellow bird feeder.

5591 Does Sound Affect How Humans Perceive How Time Passes?

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The purpose of this experiment was to understand if sound has any effect on how people think time passes, and if it makes it seem that time slows down or passes by faster. The hypothesis was that people would think time speeds up a significant amount when listening to music. The procedures were that subjects sat in a chair and placed sound-canceling headphones on their ears for 5 minutes. After 5 minutes they were asked how long they thought they were sitting in the chair and their answers were recorded. The headphones were removed and replaced with earphones that played smooth elevator music for 5 minutes. Then the subjects were asked how long they thought they were sitting in the chair and their answers were recorded. The procedures were repeated again, except 8 minutes were used as the time factor. Finally, the data were gathered and a conclusion was drawn. After the data was tallied up, the results for the control (no music) were that 7 out of 28, or 25%, thought time moved faster without music. In the experiment (with elevator music), 21 out of 28, or 75%, thought time moved faster. In conclusion, the data suggested that time does seem to pass by faster with sound, as proposed in my hypothesis.

5592 Which Type of Sugar Will Produce a Faster Reproduction Rate When Put With Yeast to Make a Balloon Expand: White Sugar or Brown Sugar?

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The reason for this experiment is to establish which type of sugar, when added with yeast, will have the faster reproduction rate on the expansion of balloons. It is believed that white sugar will produce a greater effect when put with yeast to expand a balloon. Glycolysis is the process that happened in this experiment, because this is when yeast uses sugar to produce pyruvate. Then pyruvate is converted into ethanol and carbon dioxide, which makes the balloon inflate. For the procedures, four empty water bottles, two for the control and two for the experiment, were used. Each of the four bottles was filled up with warm water to about a third of the bottle. Two spoons of yeast were distributed to each of the four bottles. In two bottles, two spoons of white sugar were added, while in the other two bottles, two spoons of brown sugar were added. Each bottle's cap area was covered with a balloon.

After that the bottles were shaken a few times to let the warm water, yeast and sugar mix together. The bottles were left alone for 15 minutes. Notes were taken, and then the bottles were left alone for another 10 minutes, for a total of 25 minutes for each experiment. The measurements of the balloons were taken and written down in the logbook. The procedures were repeated 20 times total (10 for the control and 10 for the experiment). I found out that the average measurement for the control (containing white sugar) was 25 centimeters, while the average measurement for the experiment (containing brown sugar) was about 26.1 centimeters. After collecting all of the data, it was found that the hypothesis was incorrect, because based on the measurements, the white sugar had a slower reproduction rate than the brown sugar. This meant the brown sugar's reproduction rate had the greater effect on expanding the balloon.

5593

Effects of Metals in Different Liquids

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This science experiment shows how different fluids affect the rate of rust on different metals. Doing this project could help people in future generations and even today figure out an approximate time for when they need to replace something. This could help people prepare financially so hopefully they won't get into financial debt. This project requires three types of fluids (water, a saltwater solution and vegetable oil). You also need a few different types of metal (iron, copper, zinc, aluminum, stainless steel and brass), and screws or nails (three of each). Place each type of metal in a cup and fill it up with half a cup of each type of liquid. Then observe what happens to the screws and nails each day and write it down. At the end of the experiment you can tell about how long it takes for a certain type of liquid to rust a certain type of metal.

5594

Do Singers Have a Larger Lung Capacity Than Non-Singers?

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I did an experiment to see if singers have a larger lung capacity than non-singers. I tested this theory by gathering five boys and five girls who were in the school choir for two years and another group of five boys and five girls who don't know how to sing and aren't athletes. I then gave each of them a balloon to see how much each person could blow the balloon with one breath. I found out that singers do have a larger lung capacity than non-singers because when the singers blew up their balloons, they were much bigger than the ones blown up by the non-singers.

5595

Optical Illusions Mystery

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The purpose of this experiment was to compare the averages of the results of seven optical illusions tested for 10 boys and 10 girls. Seven optical illusions were used, each of them tested in the same order, and the participants were given approximately 6 to 7 seconds to provide their answers. My hypothesis was that the averages of the boys would be higher than for the girls, and it was proved to be true. Research shows that even though there is no real answer to the commonly asked question, "Who's smarter: boys or girls?" data demonstrate that girls tend to mature faster while boys have an advantage in intelligence.

5596

Bridge Design

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For my science project, I decided to investigate whether different types of bridges are stronger than others. I then wanted to understand why. I chose to test four types of bridges: simple span bridges, arch bridges, suspension bridges and truss bridges. To test the strength, I measured the amount of weight each type of bridge could carry and used it to find the strength-to-weight ratio for each type of bridge. I repeated this three times with each bridge to ensure accurate results. After performing the experiment, I discovered that the strongest bridge type was the truss bridge, which had a strength-to-weight ratio of 97.97. This meant that it could carry up to 97.97 times its weight. The next-strongest bridge was the suspension bridge, which had a strength-to-weight ratio of 90.48. The third-strongest bridge, the arch bridge, carried 51.2 times its weight. Finally, the weakest bridge, the simple span bridge, carried 40 times its weight.

5597

How Does Heat Affect the Time It Takes for a Tornado to Form?

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This science project was to find out whether or not the temperature of water affects the time it takes for a tornado to form. The hypothesis was that too low of a temperature would cause a tornado to need more time to form, and too high of a temperature would cause too much steam and the tornado might not form. For this, a tornado box was made and used. A hot plate was used to heat the water to a certain temperature level. A thermometer was used to measure the temperature, and the tornado box was used to maneuver the air currents to form a tornado. Three temperatures were tested, with two trials for each. In each trial, dry ice was placed into the water and the box was placed over the hot plate immediately after. The timings were then averaged and the lowest time average was with the 100-degree Celsius level. This showed

that the higher the temperature of the water, the more steam it generated. The more steam there was, the less time it took for the cold air to spiral into the form of a tornado/cyclone. This showed that the hypothesis was inaccurate and that more steam was needed for a lower time of formation of a tornado. So, the temperature of the water does affect the time it takes for a tornado to form and rotate at a reasonable speed.

5598

Does the Process of Evaporation Remove Impurities From Water?

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In this science experiment, samples of water were tested to see if evaporation could remove impurities. To do this, water samples were collected from various sources such as creeks, lakes, beaches and rivers. Then, using a kit that tested the drinkability of water, data were collected on each sample. By using strips that changed colors according to the levels of a certain substance in the water, it was discovered that these water samples would be harmful if consumed. This is because most of the samples had bacteria, lead, pesticides, unsafe amounts of nitrate and nitrite, acidic pH levels and too much hardness. After the observations, each sample was boiled and had its steam obtained for condensing. The newly condensed samples of water were retested. It was proven that evaporation does indeed remove impurities from water because there were no signs of bacteria, lead or pesticides. The nitrate and nitrite were at healthy levels and the pH levels were at neutral. The hardness also had been reduced. So, the differences between the water samples before and after evaporation justify the question of this experiment.

5599

The 5-Second Rule

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The purpose of my experiment was to test if the 5-second rule was true. I placed an Oreo and a slice of ham on the floor for 5 seconds, 1 minute and 5 minutes. I then rubbed a cotton swab on the food and rubbed it in a petri dish. After about a week, I pulled out the petri dishes and found different types of bacteria that had grown on them. I took pictures of each one and recorded the results. In the end I found out that the ham, overall, had more bacteria because it is a wet food. The moisture of the ham locked in the bacteria and kept it from falling off. I also noticed that the foods that were on the floor for longer periods of time had more bacteria. I concluded that any food that has come in contact with the floor is contaminated.

5600

Internal Combustion With Water

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How could we make a cleaner, more efficient and cheaper version of an internal combustion engine? First we tried to make an engine that could work with carbon dioxide. After extensive research we realized that carbon dioxide is not combustible. Then we started to look at water which, by electrolysis, could be separated into oxygen and hydrogen. We first used a 9-volt battery to run an electric current through the water and separated the gases. Ordinary table salt served as the electrolyte. The positive pole of the battery would create oxygen, while the negative pole of the battery would create hydrogen through a redox reaction. The two gases then would travel up separate tubes and be burned inside the engine. Then we thought we could make it even cheaper by using solar panels instead of batteries to split the bond of hydrogen and oxygen. We are trying to adapt fuel for our engine to use in an internal combustion engine. The reaction with the two gases is much more potent than the reaction using typical gasoline. The enclosed space of the pistons could be made smaller to create the same amount of force as a gasoline engine. This would allow for extra pistons in vehicles to create the same torque but with less space. This new form of energy would be so much more accessible than just gasoline. The system also would be self-sustaining because the only by-product of this reaction is water, which would be the only pollutant. This fuel also would be cheaper than a gallon of gasoline, which is more than four dollars at the moment and is being quickly depleted worldwide. Water is less than two dollars a gallon at most and is ever-present on Earth. Finally, the only time water would ever need to be refueled is after most to all of it has evaporated away by the electrolysis process, which generates heat.

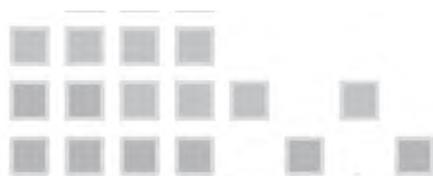
5601

Toward Building a Hydrogen Ion Engine

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Given the effects of global warming due to the internal combustion engine, we thought it was important to devise an inexpensive alternative. We theorized that perhaps the cheapest source of fuel for an automobile would be water. We devised a simple electrolysis apparatus to separate hydrogen and oxygen from water. Both gases are possible fuel sources but hydrogen is lighter, meaning it would have higher energy per volume. Our electrolysis device used table salt as the electrolyte. Our energy filled a small balloon with hydrogen. The project was a success. Future steps in developing our hydrogen engine would be to connect a gas converter so that hydrogen would generate sufficient electricity to run a small car.



5602

Which Fruit Juice Works the Best for Invisible Ink?*Kira Widran and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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First, you write on three different papers with three different fruit juices: apple, orange and lemon. Then you put them over the stove on low heat and time how long it takes for each message to appear. After that, you repeat it on high heat, and compare the times to see which fruit juice works the fastest to make invisible ink. I found out that lemon juice worked the best out of the three juices used to create invisible ink.

5603

Can Lemons Help Make Invisible Ink?*Ramffery Oropeza and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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My procedure in this experiment was to find out if lemons could make invisible ink. I followed a simple procedure given to me by my teacher. The materials I used were lemons, water, a bowl and a Q-tip to mix the ingredients together. Next I wrote something or any word on a piece of paper with the Q-tip. After I let it dry for a bit I saw that nothing was there. I then held the paper to the light and saw that I could see the things I wrote on it. During this experiment I found out that lemons can make invisible ink. At first I thought lemons weren't strong enough for that, but I tested it and it worked. It turned out that household items can be used for this experiment. What I learned at the end was not to always give up if something sounds dumb, because if you try it out you may find out that it might work. So I'm glad I did this project; it not only taught me how lemons make invisible ink, but also not to give up.

5604

How Do Different Terrains Affect the Growth of Plants?*Ty Tanaka and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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I took five different terrains: soil (as a control), water with paper towels in it, rocks, sand and cotton. I took about 10 radish seeds and planted them in each terrain. I used plastic cups to hold each of the materials. After I planted each of the seeds, I watered each of the cups and placed them in a location where they could get constant sunlight. I watered each cup each day and recorded how many plants grew and how tall every few days to see how each of them was doing. In the end, I found out that the paper towel seeds grew best. I was really confused and surprised at first but later I found out that the paper towels I used were made out of recycled materials, so the seeds probably got extra nutrients that helped them to grow.

5605

Bread Toasting Times*Maya Peck and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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The purpose of this experiment was to find out what types of bread take longer to toast and why. There were four different kinds of breads: whole wheat, white, gluten-free and sourdough. Each type of bread was put into the toaster at low heat for 1 minute, 2 minutes and 3 minutes. The results showed that the gluten-free bread took the longest to toast and the white bread took the shortest amount of time. The gluten-free bread is made up of different compounds than the other three types of bread so that is why it is thought to take longer to toast.

5606

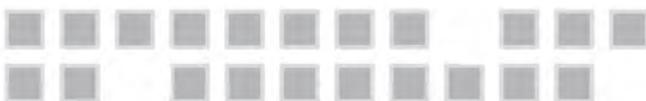
The Effects of Video Games*Nolan Origer and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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This experiment was conducted to find the effects that video games have on the average person's mind. Specifically, attention span and impulsiveness were compared. Eight subjects were tested before and after playing 30 minutes of video games. The test taken was the T.O.V.A., or Test of Variables of Attention, which is a professional tool to measure attention. The results showed very little change in attention span before and after the subjects played video games. However, impulsiveness increased dramatically after they played the video games. Impulsiveness is the speed at which subjects react, but not necessarily how accurate their response is. Therefore, I can conclude that video games cause people to make quick decisions, which are not necessarily right.

5607

Acidic Substances*Kevin Phan and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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For my experiment, I took different liquids and placed paper in each liquid. The control was water, and the other substances were orange juice, milk and Pepsi soda. I put four cups of these liquids with the same amount of liquid in each cup. Then I took pieces of paper that were alike and placed them in each cup. Then I waited for about a 5-minute period, recording the pieces of papers' changes during this time. I found out that the more acidic the substance, the more erosion that took place. So the water/control experiment was very basic and only caused little damage to the paper. But on the other hand, Pepsi was very acidic and caused the paper to dissolve much more, therefore proving the theory.



5608

Electromagnetic Fields: Does Size Matter?*Miggy Dimayacyac and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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This project's purpose was to find out if an object's EMF (electromagnetic field) reading is proportional to its size. A K-II meter device was used for EMF readings. The K-II measured in milligauss based on the lights or levels on the K-II device. Readings were taken on common household objects that were powered by electricity. The hypothesis was that an object's size would be directly proportional to its EMF reading. The final results proved the hypothesis wrong, as common household objects like a large television emitted a level 3 (yellow light, 2.5 to 10 mG), whereas a much smaller Samsung Galaxy S4 emitted a level 5 (red light, 20 or more mG). The conclusion was that an object's size is not directly proportional to its EMF reading.

5609

Music's Effect on Concentration and Test Scores*Siena Avila and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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For this project, I used 10 magnet eighth-graders, five girls and five boys, and put them in a room together. I gave them a series of different math tests that had basic multiplication, division, addition and subtraction problems on them. The difficulty of the problems was at a fourth-grade to fifth-grade level. I put on a song from a specific genre of music and started the timer for one minute. There were three genres and a control group. The three genres included opera, heavy metal and Broadway, along with the control group with no music. I then recorded how many problems were completed by each student within the time limit and how many they got correct. The results showed that while the students did subtraction, Broadway music was the best to listen to. While the students did addition, Broadway and opera music tied as to which helped them focus the most in the four categories. Lastly, while the students did multiplication and division, opera music was the best to listen to.

5610

Sports Drinks or Natural Fruit Juices?*Rijul Saxena and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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I set out to find out which liquids, between sports drinks and fruit juices, would provide more electrolytes to help while exercising. To do this, I used a multimeter to measure the number of electrolytes in each liquid. The fruit juice liquids tested were lemon/lime water (really dense with lemon/lime juice); orange juice freshly squeezed directly from the orange; and fresh coconut water straight from the coconut. The commercial sports drinks tested were Propel, Gatorade and POWERADE. The results showed that coconut water straight from a coconut was significantly higher in the number of electrolytes than any other liquid tested. It overshadowed any other liquid by at least 95 milliamps. This surprised me, as my guess was that lemon/lime water would be the winner. In addition,

the highest number of electrolytes in sports drinks was only about 23 milliamps, which was a little under but very near the measurements of the other fruit juices. After compiling all of the results, it was concluded that coconut water is the best liquid for electrolyte consumption.

5611

How Can I Convert Wasted Heat Energy Into Usable Electrical Energy?*Joseph Kwok and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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This science experiment helped to show how I was able to use a TEG (Thermoelectric Generator) to convert heat energy directly into usable electrical energy. I connected the TEG to the multimeter by means of electrical wire and I turned the knob to 200 milliamps. I then tested heat on both sides of the TEG and determined which side was positive and which was negative. Once I found the differential between the positive and negative sides, I started to experiment with different heat sources and measured the thermoelectricity output on the multimeter when the knob was turned to 2 volts. I connected the TEG to a small light bulb to see whether it generated enough electricity to power it and it worked. I learned that it is possible to directly convert heat into electricity, but the downside to the current methods of thermoelectricity is that too much heat escapes – so much that it only has 10% efficiency. If we could increase the efficiency, the world of thermoelectricity would change. It would become very important in today's world because of all of the wasted heat that collects at our polar caps because we don't know how to use it.

5612

Is It Safe to Mix Commonly Used Household Cleaners Together?*Marisa Mackie and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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This project tested the mixture of several commonly used cleaners to determine if that posed a health risk to humans. The test consisted of mixing equal parts of the selected cleaners in pairs. My hypothesis was that mixing different chemical types would produce dangerous solutions. The experiment showed that most mixtures did not produce dangerous solutions. However, the experimental results did support my hypothesis by showing that a couple of the mixtures resulted in dangerous, and even deadly, solutions. I found that mixing commonly used household cleaners together might not always produce dangerous solutions, but the fact that it does even once makes it an unsafe action.

5613

Creating a Simplified Hyperloop Scale Model

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This project is a simplified scale model of the Hyperloop prototype (a new form of transportation proposed by Elon Musk) using elements of Maglev train technology. The goal was to move a capsule through a tube using a fan for levitation and electromagnets for propulsion. The tube containing the passenger capsule was a clear, rigid, 6'-long PVC plastic pipe with a 2.5" outer diameter and 1/16" wall thickness. The capsule itself was constructed out of a white plastic bottle about 2" long with a maximum diameter of approximately 2.25". For levitation, a 40 mm x 40 mm x 10 mm, seven CFM computer case fan screwed into the capsule was used to suck in air and force it out through slits at the bottom of the capsule. For capsule propulsion, three electromagnets were constructed using three 6-pin PC mount transformers and then powered in sequence to simulate a linear induction motor. The results proved that the fan allowed the capsule to levitate, reducing the amount of friction. In addition, the project demonstrated that using transformer electromagnets in a sequence allowed the capsule to move forward. Using a more powerful fan, stronger electromagnets and lighter materials most likely would improve the capsule speed. The hypothesis that it was possible to construct a scale model using a fan for levitation and electromagnetic propulsion was correct. Next steps could be to expand the prototype in length and potentially add more elements of the Hyperloop, such as a near vacuum in the tube.

5614

How Do Different Materials Affect Air Resistance?

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This experiment was conducted to find how different materials affect air resistance, by way of finding what material created the best parachute. Six parachutes were dropped from a height of 9' 6" using aluminum foil, paper, a paper bag, a plastic bag, cotton fabric and nylon. Each parachute was dropped a total of 10 times. The hypothesis was that the nylon parachute would fall the slowest. However, this hypothesis was disproven when the aluminum parachute dropped the slowest. Therefore, an aluminum-based material would make the best parachute under these conditions.

5615

How Much of Oil's Volume Would Change When Heat Is Added?

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The main purpose of this project was to find the reaction and the rough estimate of how much oil volume would change when heat was added. There needed to be certain materials and certain steps to accomplish this project. The materials that were needed were a sink, 100 mL of oil, two graduated cylinders, a stove, ruler, pencil,

notebook and towel. I first cleaned the graduated cylinders to make sure they were not contaminated. Then I dried them off with a towel. The next step was to pour 50 mL of oil into both graduated cylinders. One of the graduated cylinders served as the control and the other had the heat increased on it. The bubbles should have shown up and showed the sign of displacement. After doing this for about 5 minutes, I waited several days and did it twice more. When conducting the project, there were no signs of displacement in the next two trials. Then I put in a little water and there was a sign of displacement. This shows that oil only will react to extreme heat, which would be hazardous to conduct. This also shows that there will be displacement when water is added. In conclusion, you would need extreme heat to see if the oil would react to it.

5616

What Genre of Music Affects Heart Rate the Most?

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For my project, I let four participants listen to a playlist of songs. The 12 songs chosen were divided into genres. For every genre, there were two songs. The genres the participants listened to were pop, dubstep, reggae, country, rock and R&B. First I measured the heart rates of the participants before they listened to any songs. This was known as the "control group" of heart rates. After the participants listened to each genre's two songs, I measured their heart rates. By doing so, I could identify which genre caused the most change to their heartbeats after they listened to each genre. I found that dubstep and country affected the participants' heartbeats the most out of the six genres played for them. When dubstep and country were played for the participants, three of the four participants' heart rates drastically rose. In other words, their rates increased while one of theirs lowered. In conclusion, fast, upbeat songs cause a change in heart rates. What is more, acoustic sounds also affect heart rates.

5617

What Prevents Apples From Turning Brown the Most?

Joseph Lou and G. Zem (teacher)

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This experiment was done to see the effects of oxidation on apples and browning, and also to see what different types of liquids could prevent apples from browning when the apples were dipped inside them. The hypothesis was that lemon juice would prevent apples from turning brown the most. Sliced apples were dipped for five minutes into water, lemon juice, vinegar, orange juice, ice water, saltwater and sugar water. Afterward, the apple slices were taken out and placed on a sheet of aluminum foil. After each hour, pictures were taken of the color of the apples and the observations were recorded in a table. A total of five trials were done and each lasted for five hours. The results showed that when sliced apples were dipped into lemon juice, it did indeed slow down the browning process and prevent oxidation from occurring as quickly. The results also showed that saltwater and orange juice could prevent browning.

5618

Plants Versus Caffeine*Catherine Jang and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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The purpose of this experiment was to find the effect of caffeine on plants. It was very interesting because I started knowing the effect of caffeine on humans. I was able to compare the difference between humans and plant life. I made a hypothesis before starting the project that I thought the caffeine would have the same effect on plant life as on human life. When I tested the experiment, I found that my findings were correct. This was very easy to find in terms of height. To do the experiment, one just needs a ruler to measure the progress of height and the difference between the plant that is given water and the plant that is given caffeine. In conclusion, from this experiment I learned about the difference in growth of plants given caffeine versus plants given normal water.

5619

Can Exercise Affect Memory?*Jessica Getter and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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Does exercise improve short-term memory? For this experiment I had four people, varying in age, take a simple memory quiz. After that I had them jump on a trampoline for two minutes, rest for one minute and take a different memory quiz of the same difficulty. I expected the results of the second quiz to improve because I have read from several sources that exercise can improve short-term memory. The results of this experiment surprised me, however. The results of the second memory quiz did not improve from the first one; they were completely unrelated. What I learned from this is that for exercise to improve memory, the exercise should be longer and more strenuous over the course of several days, weeks or months. So if one wants to do well on a test, he/she should exercise a bit each day over the course of a week or so.

5620

The Attraction of Magnets*Shabeer Fauzi and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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In this science project the main goal was to see if there was a magnetic force in electricity to produce a magnet. Because electricity has a force I was testing if I could make a magnet. The procedure was simple and easy. For the first step I needed to ask an adult to use wire cutters to strip 2 inches of insulation from both ends of the wire. Then I wrapped the insulated part around a nail tightly and left about 6 inches free of wire on each end. After that I laid it on a wooden table and laid pencils perpendicular to the nail at each end. Then I covered it with paper. After that I taped two D batteries together touching opposite ends. Then I connected the free end wires to the sides of the batteries. Then I placed some iron filings over the paper and saw that there was a magnetic force. The thing I found about my project is that the magnets we use to connect or attach our things have the same magnetic force as the one tested out. This could lead to us in making magnets.

5621

How Does Physical Activity Affect Academic Achievement?*Caitlin Serna and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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How does physical activity affect academic achievement? In my experiment, I gave a person a simple math worksheet and he/she had to do as many problems as he/she could in 1 minute. Then the same person did 15 minutes of physical activity (running on a treadmill) and took a similar math test again. After that I compared the number of problems completed and the number that were solved correctly. My hypothesis was that physical activity would help academic achievement. I tested everyone in different situations. One person walked up and down a hill. Another did physical activity before and then participated in my experiment. The other two did the experiment just as according to plan. The results helped me conclude that my hypothesis was wrong. Only one of my subjects did better with physical activity, while the other three did worse.

5622

What Are the Absorption Rates of Different Liquids?*Krithika Karnati and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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I got four liquids for this experiment: water, milk, vinegar and oil. I then observed the rates of absorption for these liquids. After doing my actual experiment of pouring 20 mL onto paper, I recorded how much was absorbed and recorded the time of absorption. I calculated the rates as mL/min. Before the experiment, I hypothesized that water would have the fastest rate and oil would have the slowest rate. After conducting the experiment and calculating the data following many trials, I came to the conclusion that my hypothesis was right. Although I didn't specify whether milk or vinegar would be faster, milk did get absorbed faster.

5623

Stress Versus Temperature*Amy Lan and G. Zem (teacher)*Ernest Lawrence Gifted/Highly Gifted Magnet
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Has stress ever been a big part of your life? The purpose of this project was to find out which age group was the most affected by stress. To begin, I got a few people from the age groups of 10 to 20, 40+ and 50+. I gave them a set of math problems and asked them to finish all of the questions accurately before a 10-minute timer ended. I measured their stress levels by taking each test subject's temperature before and after the test as well as asking them to rate how stressed they felt before and after the test. My hypothesis was that I believed stress affects body temperature the most as age decreases. After comparing the average body temperature of each age group, it turned out my hypothesis was correct. The results could have been because the younger-aged test subjects rated themselves as being really stressed before the test even started. I learned that the original stress that one of the test sub-

jects experienced also could add to an overall body temperature increase. In the end, stress has a big impact on everyone's lives, but sometimes accumulating stress makes the difference.

5624

Reaction Time

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In my experiment I decided to test whether the reaction time would be higher with someone texting and driving than when he/she is talking and driving. I also decided to see if the type of phone used has an effect on the times (while using a video game). I decided to call my project react time to shorten the name. Once I did my experiment I discovered that part of my hypothesis was correct because, in the case of both types of phones, the texting and driving reaction time was higher than the talking and driving reaction time. But, I did realize that the reaction time averages were much higher on the keyboard phone than they were on the iPhone. From this I have learned many things and one of the most important things is that I should never ever drive and use a phone in any way while in the car. I also learned that it is very unsafe to text while driving because you actually have to look at your phone for awhile to type the message that you want. So due to this it causes you to have a higher reaction time, which basically means that it takes more time to see what's going on around you. And it could cause you to crash compared to when you aren't being distracted and you can react faster and avoid the accident. And so those are the things that I did and took away from this project. Just a reminder: Never use your phone or any other distracting item while driving a car!

5625

Cute Aggression

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For my experiment I consulted 20 of my classmates – 10 boys and 10 girls – to test the concept of cute aggression. Cute aggression is the sensation you get whenever you see something cute – for example, the urge to squeeze a puppy. Throughout my experiment I showed each person the same 20 cute pictures and recorded their reactions. As I did my surveying, I classified each reaction as no reaction, a normal reaction or a big reaction. After I gathered all of my data, I used my ratio of 20 opportunities for any three of those reactions and found percentages for each. I found out that girls had the most reactions and predominately bigger reactions than males.

5626

What Fruits Will Ruin Your Gelatin Dessert?

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My experiment tested which fruits prevented gelatin from solidifying, and also tested if heating those fruits would stop the activity

of their enzymes. I used six different fruits: mango, papaya, pineapple, strawberries, blueberries and raspberries. Mango, papaya and pineapple are all fruits that have large amounts of protease. Strawberries, blueberries and raspberries contain no protease. I had a cooked and raw version of each fruit. There was one type of fruit in each bowl of gelatin. After letting the gelatin sit in the refrigerator for four hours, I checked each bowl to see if the gelatin had solidified or not. All of the raw fruits that contained protease (mango, pineapple and papaya) prevented the gelatin from solidifying. The raw fruits with no protease (strawberries, blueberries and raspberries) allowed the gelatin to go from a liquid to a solid. However, every single cooked fruit allowed the gelatin to solidify. The conclusion of this experiment is that raw fruits containing protease will prevent gelatin from solidifying. Raw fruits without protease will not affect the gelatin. However, heat denaturation of the fruits with protease will deactivate the protease enzymes. Therefore, cooking fruits that contain protease will make them not have active protease anymore. Gelatin is able to solidify with the fruits that have inactive protease enzymes.

5627

Why and How Are Teenagers Addicted to Social Media?

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Have you ever seen teenagers on their devices consistently in public rather than improving the oral communication that we have long used? That is why I did my project on teenagers' addiction to social networks. My hypothesis was that teens are so addicted to social media partially because this generation is more dependent upon others' perspectives rather than on their own self-esteem. The nature of this generation is more vulnerable to others. I thought that teenagers utilized social networks because of the manipulative trigger to the mind of gaining positive feedback. I believed that once users received a comment or "like," they would want more and more, which would convert the mind's environment to depending upon social networks as their motivation to feel good. I created a student survey for about 40 people at my school with eight questions asking them how often they check their devices, the social networks they use, and why they think social media is addicting. Most of the students said that it was because of positive feedback. I found out that 50% of students claimed they used social networks for positive feedback. My hypothesis was correct.

5628

Can Running Elevate Your Mood?

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The purpose of this experiment was to examine the effects running can have on a person, specifically on one's mood. I wanted to see if running or jogging a certain distance at a comfortable pace could temporarily improve the mood of the person running. A small group of participants, of different ages and fitness levels (including me), ran up and down a sidewalk at a distance measured

at about 0.24 miles. Individual participants ran the short distance at a pace comfortable to each, and then filled out surveys to report their mood and energy levels directly after completing the run and 15 minutes post-completion. Everyone I tested reported feeling happier and/or more energetic after the run. For some it kicked in about 15 minutes after the run and for some it came immediately. These results proved that running at a comfortable pace is a good mood elevator.

5629

Age and Our Taste Buds

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The main purpose of this project was to find a better and more complete understanding of our taste buds, which we use daily. So first I made four different mixtures of food using the list I had organized. Then I distributed a little amount of each mixture to different people from different age groups. I told them to close their eyes and to use their sense of taste to guess what the food was. After I did this, I asked them to say everything they tasted in the food and gave them a score based on how close they were to the actual food given to them. Next I graphed their results and this helped determine which age group scored highest. I found that the younger people tended to have more effective taste buds compared to the older people. According to the data recorded, the kids from about 12 to 14 scored fairly higher than the adults from ages 46 to 47, who scored higher than the people from the age of 68.

5630

Is Chocolate Bad for You?

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The purpose of this project was to prove that dark chocolate is healthier than milk chocolate. Two experiments were conducted and extra research was included. One experiment was done to prove that milk chocolate contains huge amounts of fat compared to dark chocolate. This experiment was made by provoking a fat bloom on the chocolate. Fat blooms are created by continuously and gradually heating and cooling the chocolate. The heat melts stable beta crystals. When they recrystallize with the cooling, they do it slowly and therefore grow much larger than originally, thus pushing the fat particles onto the surface. This creates white crystals on the surface. By practicing this process for three days, I was able to push a large number of fat crystals of the milk chocolate. The dark chocolate produced very few crystals. This demonstrated that milk chocolate contains enormously more fat than dark chocolate. The second experiment was to prove that milk chocolate contains larger amounts of sugar than dark chocolate. This experiment was done by provoking a sugar bloom. Sugar blooms are created by moisture. To create moisture, the chocolate was heated from a cool temperature abruptly. This fast dramatic change of temperature made the chocolate "sweat," thus creating moisture. The moisture caused the sugar to dissolve in the chocolate, and when the moisture evaporated, sugar crystals appeared on the surface. The sugar blooming can cause a change

in color on chocolate and a grainy texture. This is what happened to the milk chocolate after the experiment, thus demonstrating its extravagant amounts of sugar. The extra research included facts widely known, as well as others that are unknown to most of the population. One fact is how antioxidant flavonoids called flavanols in dark chocolate increase blood flow and prevent cell damage and inflammation. This also absorbs UV light, which increases blood flow to the skin, and so improves the skin's hydration and texture. Another interesting factoid found is how butyric acid, included in some milk chocolate, is a chemical classified as toxic. It may lead to abdominal pain and collapse. These and many more facts were used to show the health benefits of dark chocolate and the effects of milk chocolate. With both experiments I was able to prove unhealthy characteristics of milk chocolate. These experiments, combined with the additional research on the health benefits of dark chocolate and the effects of milk chocolate, allowed this project to exhibit the reasons why dark chocolate is healthier than milk chocolate.

5631

Get the Music Pumpin'

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The purpose of my experiment was to determine if music can affect your blood pressure. My follow-up question was that if it can affect blood pressure, which genre of music (classical, heavy metal rock or pop) would increase or decrease blood pressure the most. My hypothesis was that it would affect blood pressure. I also thought that the classical music would decrease blood pressure the most because of its calm, slow and steady tempo. In addition, I thought that the heavy metal rock would increase blood pressure the most because of its fast tempo and intensity. To begin my experiment I took four volunteers and measured their blood pressure before and after each musical genre, for a total of six times. I used a sphygmomanometer for this procedure. I then recorded those measurements onto a chart to compare the different rates of blood pressure among the volunteers. In conclusion, my hypothesis was wrong, because the pop genre of music lowered blood pressure the most. Furthermore, I guessed that the heavy metal rock would increase blood pressure the most, but instead the classical increased it the most. After these shocking results, I realized you have to take in the variables. For example, the volunteers could have been tired, or they could have heard any background noises. In the future, I would do this experiment more than once to have a better reading, and I would prepare the experiment in a quiet room. I had fun during this experiment, and learned so much.

5632

Do Humans Read Scrambled and Unscrambled Words the Same?

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The purpose of our experiment was to find out if people read scrambled and unscrambled text with the same speed. A similar study done at Cambridge University showed that a person can

read a word with the first and last letters in place, but with the interior letters scrambled, at the same speed as he/she does an unscrambled word because the brain reads entire words instead of single letters. This information helps to understand how the human brain processes things like sensory input or its understanding of language and words. Our hypothesis was that people would read both scrambled and unscrambled words at the same speed. Our test subjects were students from our school who read a passage of scrambled text while we timed them. Then they read the same passage with it unscrambled. We tested more than 30 people and found that the majority read the passages at the same speed, but the longer the scrambled words got, the harder it was to read them, and the volunteers hesitated a little. This delayed their reading time a bit, but not enough to change the average significantly. We found the average time to be about 30 seconds for a single five-word sentence of scrambled and unscrambled text. According to the tests, the reading speed of our subjects for scrambled text was the same as when they read unscrambled text. We also observed that the readers read both scrambled and unscrambled text fairly easily with little hesitation. In conclusion, as supported by our research, since people were reading the individual words at the same speed in both texts, they were reading the entire words rather than the individual letters. Although longer words were harder to read, an intelligent person easily could decipher the encrypted text at breakneck speed. This confirms that the brain processes entire words, not individual letters. Our hypothesis was correct.

5633

What Type of Wood Burns the Longest?

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The purpose of my science fair project was to find out what type of wood burns the longest. I chose five types of wood commonly used: apple, maple, mesquite, pine and grape. According to my research, maple wood is dense and so my hypothesis was that the maple would burn the longest. My results proved my hypothesis correct. The maple turned out to burn the longest, followed by the apple. My conclusion is that for long-lasting warmth you want to use maple wood because it burns the longest.

5634

How Do Phosphates in Detergents Affect Freshwater Marine Life?

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The purpose of our experiment was to find out how phosphates in detergents affect freshwater marine life. As we started our research, we found out that some phosphates may be helpful to the environment, but the ones found in detergents are toxic. Phosphates are a chemical in detergents that help remove grease, and when washed down the drain they empty into the ocean. When the phosphates empty into the ocean, they have a negative effect on marine life. To test the effect they have, we got three *Elodea* plants from the local fish store and placed them into

three different jars. One jar was labeled as the control (with plain water and no detergent); the second jar was labeled as having one tablespoon of detergent; and the third was labeled as having two tablespoons of detergent. We placed one *Elodea* plant in each jar and observed them every couple of days for two weeks. We noticed that the plant in the control jar stayed the same throughout the length of our experiment, but the plants in the other two jars had dramatic changes. The plant in experiment jar one started to lose color, but not as fast as the plant in experiment jar two. The plant in jar two was completely white and wilted by the end of the experiment, and the plant in jar one was brownish but also wilted. This experiment proved that phosphates in detergents have a very negative effect on marine life and we need to avoid dumping them in our oceans.

5635

Which Type of Water Contains the Most Bacteria?

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The purpose of our experiment was to find out which type of water contains the most bacteria because we were curious about what we actually are drinking and using. We used toilet, tap, bottled, swimming pool and runoff water. Our hypothesis was that runoff water would contain the most bacteria. First we made agar, a bacteria growth medium, and filled petri dishes halfway. After it dried, we used cotton swabs to spread the various waters on the agar. We placed these in a warm area for two weeks to let the bacteria grow. After the two weeks, we counted the colonies of bacteria and identified what type they were. The results concluded that runoff water had the most bacteria because the colonies were too many to count (this also is known as TNTC). Our hypothesis was correct.

5636

Which Type of Baseball Bat Will Make a Ball Go the Farthest?

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I wanted to find out which materials and dimensions of different baseball bats make a baseball go the farthest. My experiment was fun and simple. I tested an aluminum 32-in.-long, 22-oz. Easton bat; an aluminum 29-in.-long, 20-oz. Easton bat; an aluminum 31-in.-long, 28-oz. Easton bat; a wood 30-in.-long, 23-oz. D-Bat; and an ash wood 32-in.-long, 30-oz. Rawlings bat. My hypothesis was that a light aluminum bat, particularly the 29-in. Easton, would make the ball go the farthest; and that a heavy wood bat, the 30-in. D-Bat, would make the ball go the least farthest. After measuring the distances of the baseballs off of each bat and calculating the averages for each set of tests, the graph showed that the wood 30-in. D-Bat had the highest average and the 32-in. Easton had the lowest average. In conclusion, the D-Bat was the one that had the best average in hitting the ball the farthest, but there were other important factors that contributed to the results – such as a different hit on each try, different qualities of the same wood bat, different environments and the skills of each batter. Having

controlled these factors as much as possible, the D-Bat was the best overall.

5637

Which Towel Brand Is the Strongest and Which Is Cost-Efficient?

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The purpose of this experiment was to find out which brand of paper towel is the strongest and which is cost-efficient. I chose to test Bounty, Scott and Sparkle. Bounty cost \$2.15, Scott cost \$1.25 and Sparkle cost \$1.20. According to my research, one roll of Bounty has 103 sheets and each sheet is doubled-layered. Its measurements are 6 inches by 11 inches. Scott has 102 towels and is single-layered. Each towel is 11 inches by 7.3 inches. Sparkle has 60 sheets and is doubled-layered. Its measurements are 11 inches by 10.4 inches. For this experiment, I used the same-sized sheets of paper towels from each brand and after I poured 1/3 cup of water on each, I placed quarters on it to see how many it would hold. On average, Bounty held 152 quarters. Scott held 147 quarters and Sparkle held 46 quarters. The cost per sheet for Bounty is 2.08 cents, for Scott 1.22 cents and for Sparkle 2.0 cents. In conclusion, Bounty is the strongest of the three paper towels, followed by Scott and Sparkle. The least expensive is Scott and it is considerably strong – very close to Bounty – so I would conclude that Scott is the most efficient paper towel.

5638

Do Liquids Evaporate at Different Rates?

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The purpose of our experiment was to find out if various liquids evaporate at different rates. After researching we found out that liquids evaporate according to the different contents, densities, boiling point temperatures, and hydrogen bonds in each liquid's molecules. Based on our research we hypothesized that alcohol would evaporate first because it has the least amount of water and density. We tested five liquids: alcohol, water, saltwater, Diet Pepsi and grape juice. We got 15 cups and labeled them according to the five liquids but three times each, because we did three trials for each liquid. Next we poured one ounce of each liquid in the cups and placed them outside on a windowsill to evaporate. We observed every other day for a week and recorded the results. The liquids evaporated in the order of alcohol, water, saltwater, Diet Pepsi and grape juice, proving our hypothesis correct.

5639

Does the Color of Hair Affect How Much Static Electricity It Can Carry?

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The purpose of my experiment was to see if hair color changes how much static electricity it can carry, because static electricity

affects many people's hair and it can be a problem. According to my research, I found out that many people use different hair products that prevent static electricity and this could affect the results I was looking for, so I had to make sure I tested hair that had not been treated with many products. I also found out that most blond-haired people have thin hair, which can be affected by static electricity more than thick hair. I tested five brunets, five blonds and five red-haired people. I used a balloon to rub on my subjects' hair and I observed the reaction. I found that the people with blond hair carried static electricity the most, but not because of the color. It was mostly because of the thickness. Dark hair tends to be thicker than blond hair. My hypothesis was correct.

5640

What Is Best for Cut Flowers?

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The purpose of my experiment was to find out the best way to keep cut flowers fresh the longest. I tested cut flowers by placing one in room temperature water, one in sugar water and one in ice water. My hypothesis was that the flower in the ice water would last longer because I have noticed that flowers are kept in refrigerators at the store. I observed the flowers for over a week and found out that the flower in the ice water remained fresh the longest. The flower in the sugar water came in second and the one in room temperature water came in last. My hypothesis was correct. If you want to keep your cut flowers in a vase fresh the longest, I would recommend ice water.

5641

Do Cookie Sheets Matter?

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The purpose of our science fair project was to find out which cookie sheet bakes cookies the best. We used four different cookie sheets: insulated, steel, aluminum and nonstick. Our hypothesis was that aluminum would bake the cookies the best because it's thin and it conducts heat better. We baked the cookies on each cookie sheet for the same amount of time and at the same temperature. During this experiment we observed that the aluminum sheet baked the cookies the best. Steel burned the cookies, nonstick made the cookies under-cooked, and insulated made the cookies greasy. Therefore our conclusion is that aluminum cookie sheets bake cookies the best, proving our hypothesis correct.

5642

What Foods Contain the Most Starch?

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The purpose of our experiment was to find out which type of foods contained the most carbohydrates. We learned in our research that carbohydrates are starches and starch is a polymer of sugars. Too

much starch in our diet is not healthy, so we wanted to find out which foods have the most in order to avoid them and stay healthy. Iodine is a starch indicator and the food changes color depending on the amount of starch it contains and the number of iodine drops added. The more starch, the darker the color. We tested five different common foods: apples, bread, broccoli, carrots and white rice. Our hypothesis was that the white rice would have the most starch. We tested each food by counting the number of iodine drops it took to change the color. We added 3 drops of iodine on the apple, 12 on the bread, 2 on the broccoli, 2 on the carrot and 10 on the rice. Our results showed that the bread and white rice had the most starch. The carrot and the broccoli had the least amount of starch.

5643

What Is the Best Light Bulb to Grow a Big Bertha Plant?

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The purpose of my experiment was to find out what is the best light bulb to grow a Big Bertha plant. I noticed that the Big Bertha plants grow quickly. I researched that when you plant indoors using a light, you must always give a gap between the bulb and the plant leaves. My hypothesis was that the fluorescent light bulb would help the Big Bertha plant grow the best. In my experiment I used three plants. I placed them in darkrooms away from each other, let them grow for 35 days under three different lights, and gave them each a cup of water once a week. The lights I used were a 60-watt soft white bulb, a 60-watt crystal clear bulb and a 60-watt fluorescent bulb. The fluorescent bulb had the brightest and most vibrant light that did not give off a lot of heat; the crystal clear bulb had a sharp light to it and gave a lot of heat to the plant; and the soft white bulb had the least amount of brightness and gave heat to the plant. I observed my plants on a daily basis and found out that the fluorescent bulb helped the plant grow the best, because it was the tallest of them all, it did not have any discolored leaves and it looked the healthiest of them all. On the 35th day I measured each plant's height and found out that the plant under the fluorescent bulb grew to 48.72 cm, the plant under the crystal clear bulb grew to 47.78 cm and the one under the soft white bulb grew to 43.89 cm. In conclusion, my results showed that the fluorescent light bulb was the best for growing a Big Bertha plant, which proved my hypothesis correct.

5644

Do All Drinks Evaporate At the Same Rate?

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The purpose of this experiment was to find out the rate at which drinks evaporate. My research consisted of processes of evaporation and variables that could change the rate of evaporation. One such bit of information was that the amount of sugar in a liquid can slow down the rate of evaporation. My hypothesis was based on this information, indicating that not all liquids will evaporate at the same rate because some liquids have more sugar content than

others. The liquids tested were Shasta Orange, some NutriShake, rubbing alcohol and tap water (control). I recorded the amount of liquid remaining once a day for five days. For the first couple of days, the liquids had a relatively similar amount of liquid remaining, but in the last three days, the amounts changed compared to the first two days. In the end, the Shasta Orange and the tap water had the least amount of liquid evaporated, with 7 mL compared to 11 mL of the NutriShake and 13 mL of the rubbing alcohol, which evaporated the most. Since the amount that evaporated in five days from each liquid was not the same, my hypothesis was correct and my conclusion is that liquids evaporate at different rates due to the amount of sugar content or other particles.

5645

What Kind of Milk Spoils the Fastest?

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The purpose of my experiment was to find out what kind of milk spoils the fastest. I used whole cow milk, 2% fat cow milk, fat-free cow milk, whole goat milk and low-fat goat milk. My hypothesis was that the whole goat milk would spoil the fastest because I found out in my research that milk with more fat will spoil faster. To do my experiment I used clear drinking glasses, one for each type of milk, and left them out in the open for five days. Every day I checked to see if each type of milk had spoiled and recorded my observations. Both types of goat milk spoiled later than the other kinds of milk. My hypothesis was incorrect because the whole cow milk spoiled first instead of the whole goat milk. According to my research, the reason for this is that the fat globules or particles of fat are bigger in the cow milk than in the goat milk.

5646

Does the Vitamin Content in Oranges Change Over a Period of Time?

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The purpose of my experiment was to see if the vitamin content in oranges would change over a period of time. I did some research online and found out that oranges have Vitamin A, Vitamin B, Vitamin C, fiber, folate, pantothenic acid and calcium. I learned that the *Journal of the American Dietetic Association* did a test on fruits like oranges, mandarins and grapefruits to see if the vitamin content in these fruits would change over time, and it found out that the vitamin content did change in a two- to four-week period. Based on my research I hypothesized that the vitamin content in oranges would change over time, and I believed it would take from 10 to 15 days for the vitamin content to change. To test the vitamin content I used an iodine titration method. I used five freshly picked oranges and tested them every five days. I found out that after six days, one orange had a decrease in the vitamin content of 31% and two others had a decrease of 28%. Based on my experiment, I can conclude that the vitamin content in oranges does change over a period of time and my hypothesis was right. The vitamin content in oranges changes over time and it starts as early as six days after they're picked from the tree.

5647

Does Color Affect Memory Recall?*Hosaam Gawad, Luke Gutierrez and A. Antoniou (teacher)*Robert Frost Middle School
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Our science fair project was to find out if different colors help people remember things better. We conducted two experiments on 20 middle school students. One was with different-colored cards and the other was with the same-colored cards. All of the cards had different words on them and the students were tested to remember the words on the cards. We wanted to see if the different-colored cards would help the students remember what was on them better than the ones with the same color. Our hypothesis was that the different colors would help memory. According to our results, seven out of 20 students (35%) got cards with the different colors correct and 12 out of 20 (60%) got cards with same color correct. The students thought that the different colors helped their memory, but according to the results they did not. Our hypothesis was wrong because we also thought different colors would help memory, as this was supported by our research that suggested the brain processes better with different colors. In conclusion, the majority of the students better remembered the words on the same-colored cards.

5648

What Materials Work As the Best Insulator?*Jane Lee and A. Antoniou (teacher)*Robert Frost Middle School
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The purpose of my experiment was to find out which material was the best insulator. I wrapped four 2-oz. paper cups with my materials: Styrofoam, cardboard, plastic wrap and foil. After filling each cup with 2 ounces of 90° water, I then measured their temperature every minute for 10 minutes. My hypothesis was that the Styrofoam would serve as the best insulator because of the air pockets it contains and its low density. My hypothesis was correct. My results showed that Styrofoam was the best insulator and cardboard was the second best. In conclusion, the best insulator for heat is Styrofoam, so if you want to keep things warm after you've heated them, use Styrofoam material to keep them warm.

5649

Heat Absorption Versus Color*Joshua Perez and A. Antoniou (teacher)*Robert Frost Middle School
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The purpose of my experiment was to find out if the amount of heat absorbed by an object really depends on the object's color. When I did research on my topic, I learned that dark colors have more emissivity than light colors do. Emissivity is the ability of an object to absorb light, where light colors reflect most light. Based on my research, my hypothesis was that yes, the amount of heat absorbed by an object does depend on its color; the dark colors will absorb more heat than the light colors. To test my hypothesis, I used jars filled with water and wrapped different-colored

construction paper – five light colors and five dark colors. I then categorized the colors into pairs, with one light and one dark color (red/blue, orange/green, pink/purple, etc.). I used a lamp and shined the light on each of the five pairs of colors (each pair for one hour). At the end of each hour, I checked the temperatures with a thermometer. The results of my experiment were conclusive. Out of the five pairs of colors, all of the dark colors were higher than their light-color partner. For example, white's temperature was 69°F, while its partner black was 74°F. The temperature for red was 72°F, and for blue was 73°F. My data showed that color does affect the amount of heat absorbed by an object and that darker colors absorb more heat than lighter colors. My hypothesis was correct.

5650

Which Fire-Making Method Works the Fastest?*Kira Jackson and A. Antoniou (teacher)*Robert Frost Middle School
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My science fair project was to find out which fire-starting method is the fastest and most efficient. The reason for this experiment was to be prepared in case of an emergency, because the two most important things in a survival situation are fire and water, and often you will need fire to boil unpurified water so that you can drink it without risk of illness. There are four methods that I tested: flint and knife method, steel wool and battery method, magnifying glass method, and bow and drill method. I thought the steel wool and battery would be the quickest. After testing, I found that I was correct. Rubbing a 9-volt battery together with steel wool instantly creates amber, and to create a fire you have to put that together with bush/a dry, dead stash. In second place was the flint and knife method, third was the magnifying glass method, and last was the bow and drill method, which was extremely difficult and failed. In conclusion, steel wool is a great fire starter; whether with a battery, flint or a magnifying glass, it is something to definitely pack in a survival kit.

5651

What Temperature of Water Speeds Up Crystal Growth?*Mary Kassab and A. Antoniou (teacher)*Robert Frost Middle School
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The purpose of my experiment was to find out what temperature of water speeds up the formation of borax crystal growth. I tested growing crystals with room temperature water, boiling temperature water, and refrigerator temperature water. My hypothesis was that boiling water would create the most crystals. The materials I used were three jars, pipe cleaners, thread, the different temperatures of water, a scale and borax. Over time, I observed that the jar with boiling water was growing the most crystals, while the others had very little growth. After seven days of growing the crystals, I took each pipe cleaner out and measured their mass. Then I subtracted the mass of the pipe cleaners before the crystal growth and subtracted the two. My results were that the mass of the crystals from the jar with boiling water was 24.4 g. The mass

of the crystals from the cold water was 0.2 g and the mass of the crystals from the room temperature water was 3.7 g. This shows that boiling water speeds up the process of borax crystal growth and creates the most crystals. My hypothesis was correct.

5652

What Solution Freezes Fastest?

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The purpose of our experiment was to find out which of the two solutions we tested would freeze the fastest. We tested sugar water, saltwater, and plain water as the control. We read that if you add a solute to water it lowers its freezing point. Our hypothesis was that the water would freeze first. We repeated the experiment six times and observed for six hours. Water froze first, in three hours. Sugar water froze second, in about four hours, and saltwater froze in about five hours. Our conclusion was that the water froze first because it had no solute in it. Our hypothesis was correct.

5653

Do Mice Really Prefer Cheese?

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The purpose of our experiment was to find out if mice really prefer cheese. According to our research, cheese is not part of a mouse's diet and the belief that mice like cheese is a myth. Pet mice usually eat store-bought mouse food, timothy hay vegetables and other treats. Our hypothesis was that mice do not prefer cheese because it is not part of their diet. We used mouse food, a honey treat, cheddar cheese, American cheese, Gruyère cheese and Smoked Gouda and let the mice choose. We observed the mice for more than two weeks and every time they chose mouse pellets or honey treats. Neither one of the mice ever ate or even nibbled the cheeses. In conclusion, our hypothesis was correct because the mice did not care about the cheeses and liked the other foods better.

5654

What Drink Stains Teeth the Most?

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The purpose of my experiment was to figure out which drink stains teeth the most. In my research, I found out that drinks don't stain the teeth; the pigments of food and drink particles get stuck in microscopic ridges in the teeth and etch into them. This results in the yellowish and grayish colors of teeth. Red wine, black tea, Pepsi, Gatorade and coffee are some of the drinks that leave pigmentation on teeth the most so I decided to use them in my experiment. My hypothesis was that the red wine would stain teeth the most. I used eggshells to serve as teeth because of the similarity in chemical composition. I inserted an eggshell in each

of the five drinks and I checked every 12 hours for three days. I rated the color of the eggshells from 1 to 10, with 1 being white and 10 being a very dark shade of the color of the drink. While examining the data after my experiment, I found that red wine did the most damage to the eggshell. At the end of three days, the red wine eggshell was a dark purplish gray that even was eroded in some parts, and was rated a 10. Next came black tea and Pepsi, a lot lower than wine, at about a 3.5. Next came coffee, at a 3, and then Gatorade at only about a 2. This shows that my hypothesis was correct, and that red wine does the most damage to teeth.

5655

Nut Energy

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The purpose of our experiment was to see if it is possible to get energy from a nut and, if yes, which nuts produce the most energy. We tested almonds, peanuts and pecans. Our hypothesis was that the almonds would produce the most energy because they are denser. To see if nuts could produce energy, we put water in a small can with two holes in each side so that we could put a BBQ skewer through it. Then we lit the nuts on fire and put a larger can around them with the smaller can on top. We took the temperature of the water before we lit the nuts on fire and after to see if the temperature rose, and it turned out that nuts did produce energy. Our hypothesis was wrong because the pecans produced the most energy. The temperature of the water before the experiment was 71.6°F. The temperature of the water after the pecans were lit was 110.2°F, which shows that it rose by 38.6°F. The temperature of the water after the peanuts were lit was 109.1°F, so it rose by 37.5°F. The temperature of the water after the almonds were lit was 107.5°F, so it rose by 35.9°F. By doing this experiment, we learned that a tiny nut contains stored chemical energy that can raise the temperature of water enough to boil it. When we eat nuts, our bodies use up their energy to do work. In conclusion, almonds contain the least amount of energy and pecans the most.

5656

Which Liquid Freezes Fastest?

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The purpose of my experiment was to find out if liquids freeze at the same rate. I tested water, milk, apple juice and dish soap. In my research I found out that the purest liquid is water because it doesn't have any sugar or other additives. The fewer ingredients a liquid has, the faster it will freeze. So my hypothesis was that water would freeze the fastest and dish soap the slowest. I measured the temperature of each liquid after they had been in the freezer for 30 minutes to see which dropped to the lowest temperature. That was an indication of which liquid would freeze first. Water froze the fastest as it got to -1.1°C in 30 minutes; apple juice was second by reaching 3°C; dish soap was third, reaching 4°C; and milk was last, reaching only 6°C. In conclusion, my hypothesis was partially correct. Water did freeze the fastest; however, milk froze the slowest, whereas I thought the dish soap would be the slowest.

5657

What Agent Cleans Post-1982 Pennies the Best for the Coin Collector?

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The purpose of this experiment was to determine what cleaning agent works best on post-1982 pennies. We were prompted to conduct this experiment because we enjoy collecting coins and like seeing them sparkle. One day we noticed that newer pennies feel different in that they are lighter in weight, feel thinner and the color is not the same. After research, we found that in 1982 the copper ratio in pennies was dramatically changed from 95% to 2.5%. Conversely, the zinc ratio went from 5% to 97.5%. These are staggering facts. These changes were due to inflation and the value of copper increasing. Typically, a collector can use hot sauce, baking soda and vinegar, denatured alcohol, acetone and even hydrogen peroxide to clean pennies. In the case of the post-1982 pennies we found that the best cleaning agent is a rubber eraser. The eraser is gentle and restores the luster of the coins without damaging their integrity. The other cleaning agents are too corrosive and acidic. In fact, they react negatively with the zinc and turn the pennies black. This is the reverse for pre-1982 pennies, which are cleaned and restored with the use of the traditional home-cleaning agents. We thought that the traditional agents would clean the pennies and make them shine so we tested with a rubber eraser, hot sauce and a mixture of baking soda and vinegar. Our results were that the eraser cleaned the best, then hot sauce, and last the baking soda and vinegar. Our hypothesis was wrong.

5658

Pollution: OH NO!

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Objective: To find out what types of liquids would help our polluted bamboo grow better and faster. **Materials and Methods:** Eight transparent glass containers, each with water bamboo, Scotch Tape and pebbles were used. The liquids tested were milk, vitamin water, tap water, aquarium water, fruit punch, pickle juice, fertilizer and lemonade, with each type added to one of the glass containers. **Results:** The liquids that helped the bamboo grow more rapidly and healthier were the vitamin water, tap water, fruit punch and pickle juice. On the other hand, the milk, lemonade and fertilizer stunted the growth of the bamboo and turned it yellow and drier as time went on. **Conclusion:** The liquids with the vitamins helped the bamboo grow and the overpowering liquids stunted the bamboo's growth. For example, it seemed that the pickle juice helped the bamboo because it has preserving things in it, and the vitamin water helped because of all of the nutrients in it.

5659

Improving Water Quality of the Big Tujunga River

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Objective: To measure the pH and conductivity of rainwater, and determine if the rainwater has an effect on the pH and conductivity of the river water. The quality of the river water can affect animals and plant life. An example would be if the water's pH was low (acidic), then the water could be bad for animals and plants. But if it doesn't rain much or at all, then the river water's quality will decrease, making the river water less beneficial. **Materials and Methods:** One small trash can will be used for collecting rainwater samples. A VWR Scientific Conductivity Meter will be used to measure conductivity of the river and rain samples. A Beckman 240 pH/Temp Meter will be used to find the pH of the river and rain samples. In this experiment, the Big Tujunga River is the river water sample for when I need it. Before it rains, put the small trash can outside so it can collect the rainwater for samples. After it rains, go to the river and get a sample there. Then measure the pH and conductivity of both the river and rainwater samples. **Results:** Over the collection time period, the pH of the rainwater increased from 5 to 9, while the conductivity decreased from infinite to around 80 micromhos. However, the river pH and conductivity were not affected greatly because there was too little rain. **Conclusion:** The quality of rainwater improved with each rain, and it could be beneficial to the river quality if there was more rain.

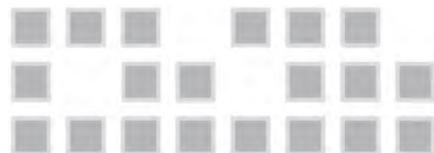
5660

Sparkling Water

Talar Asdourian and C. Drucker (teacher)

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Objective: The objective was to see if SODIS is a viable option for sterilizing water. SODIS means solar disinfection. **Materials/Methods:** The prepared petri dishes each had either agar or Knox Gelatin in them. They each had placed in them three drops of either boiled creek water, untreated creek water or water put through the SODIS process. They were checked at 24, 48, 72 and 96 hours. **Results:** The petri dish that had untreated water grew the most colonies. The plate with the second-highest number was the one with boiled creek water. The one with the third-highest number was the plate with the water that had been treated with the SODIS process. Finally, the one with the lowest number of bacterial colonies was the plate treated with SODIS and boiling water. **Conclusion:** SODIS is a viable option for treating water, but it is better if you boil it as well. The SODIS and the water that stayed under the SODIS the longest amount of time grew the fewest number of colonies. SODIS is a viable option to clean your water. It can be used in poor countries to treat water and make it safer to drink.



5661

The Mystery of Mint

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Objective: This experiment was to see whether mints have a cooling effect on temperature overall, or whether they simply create a cool sensation. It was expected that since mints have menthol, and there is TRPM8 in the mouth, the reaction between the two would cause a cool sensation that wouldn't lower the actual temperature. This might be further proved since there isn't any TRPM8 in other objects. **Materials and Methods:** Two cups, each at relatively consistent "normal" (room) temperatures, were heated. Mints were added to one cup with different numbers of mints, from one to five every 5 minutes or 10 minutes. The cups of water were monitored until the end of the testing period. **Results:** The cup with the plain water accelerated in cooling the most, while the cup with the mints accelerated in cooling the least. This showed that the mints slowed the cooling process and didn't even cool it as fast as the plain water cooled over the entire experiment (variations one through five). **Conclusion:** The more mints that are added to water, the slower the cooling process will be depending on the time intervals at which they are added in and the number added.

5662

Get Back Bacteria

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Objective: This project compared the success of different disinfectants when they were used on bacteria in a kitchen. It was expected that the disinfectants were going to clean a lot of bacteria, which they did. **Materials and Methods:** Raw meat was rubbed on a cutting board with six equal sections as well as a separate section. The bacteria then were swiped with Q-tips the next day and put onto petri dishes with an agar solution in them. A different disinfectant was used on every section. As the bacteria grew over 10 days the results were recorded into data tables. **Results:** The section with vinegar used on it killed more bacteria than any other section. **Conclusion:** The conclusion is that the vinegar and Clorox Bleach worked the best for killing bacteria. Vinegar ended with a total of 18 colonies and Clorox Bleach ended with a total of 22 colonies. The two worst disinfectants were Windex Multi-Surface Cleaner and Palmolive Dish Soap, finishing with a total of 26 colonies each.

5663

Sun or Artificial Light

Alyssa Di Giorgio, Christina Di Giorgio and C. Drucker (teacher)
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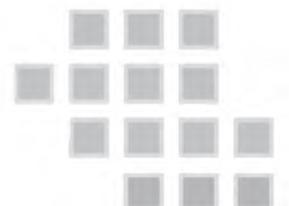
Objective: The experiment was to determine whether lima beans would grow better under the conditions of sunlight or artificial light. The lima beans were put under sunlight, white light, red light, blue light and pink light. The data were recorded after two days. **Materials and Methods:** There were five plants in total. Four out of the five plants were put under different-colored light bulbs. The first plant was put under sunlight. The second plant was put under a white light bulb. The third plant was put under a red light bulb. The fourth plant was put under a blue light bulb. The fifth plant was put under a pink light bulb. They were watered each day and after two days they were measured and the data were recorded. Pictures were taken of the plants to show their physical state after two days. **Results:** The plants under the artificial light grew more and were a lot healthier than the plant in the sunlight. **Conclusion:** The experiment was to discover whether lima beans would grow better under artificial light or sunlight. The conclusion was that the lima bean plant should be grown under artificial light for the best growth.

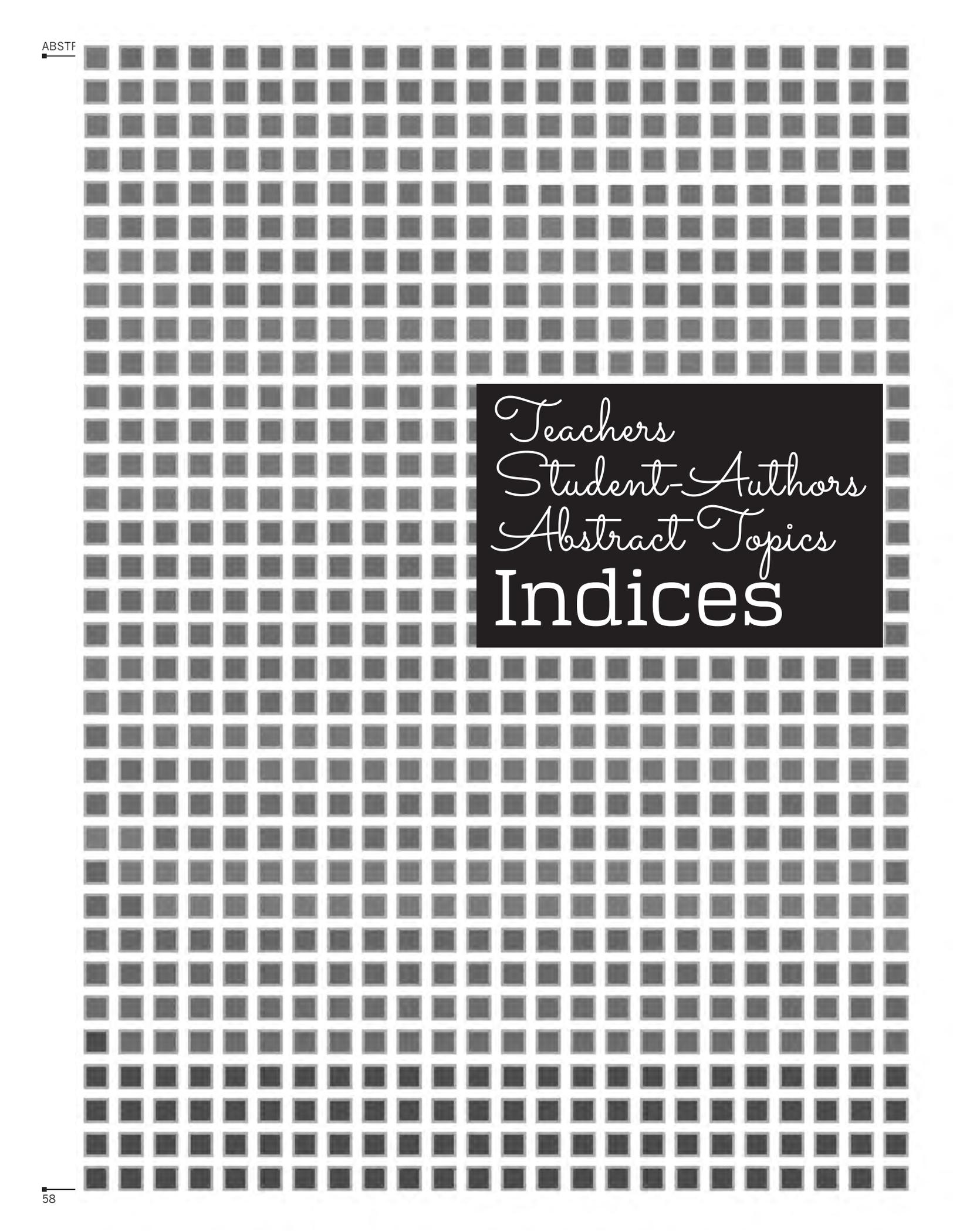
5664

Grow Plant, Grow Yo!

Sassan Nowshiravani and C. Drucker (teacher)
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Objective: How can changing the color of light affect the way a plant grows? The goal of this project was to find out if plants can grow under colored lights. **Materials and Methods:** The materials that were needed were three pots, three sunflower seeds, two lamps, two colored light bulbs and a water source. I made sure to water the plants with equal amounts of water, checking the plants regularly. **Results:** The results showed that the sunlight plant was the leading plant in growth, while the other two died. This most likely happened because they didn't have enough light to make enough food. **Conclusion:** In the end the sunlight plant was still alive. This did not support the hypothesis that the blue light plant would grow the fastest; it did for a short while but in the end it died.





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Student-Authors
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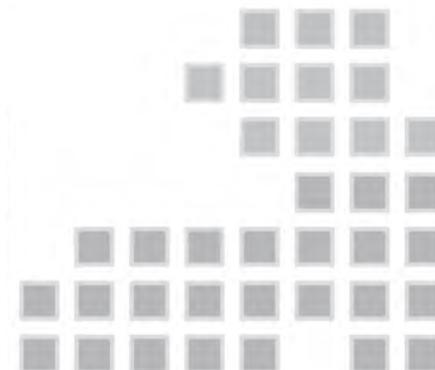
Ernest Lawrence Gifted/Highly Gifted Magnet
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