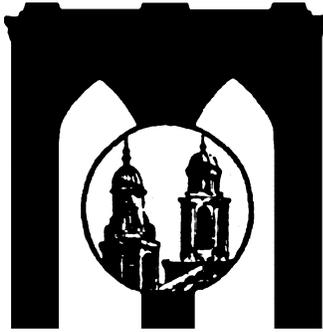


**MIDWOOD HIGH SCHOOL
RESEARCH PROGRAM
SCIENCE FAIR 2013**





2013 Midwood High School Science Fair

23 May 2013 — 3:30 to 5:30 PM

David Cohen — Principal
Michael McDonnell — Assistant Principal
Tovia Rosenfeld — Assistant Principal
Glenn Elert — Research Coordinator
Jennifer Sullivan — Research Teacher
Jessica Ross — Research Teacher
Jesse Roerich — Research Teacher
Shaniece Mosley — Research Teacher

Timeline

Period 3–9

Sophomores park boards in A214 (Research Room)
Sophomores deliver snacks, drinks, plates, etc. to A300 (AP's Office)

1:40 PM (Period 9)

Junior and Senior judges congregate in library
Junior and Senior tasks are explained
Junior and Senior judging packets distributed (time to read abstracts)

2:30 PM (Period 10)

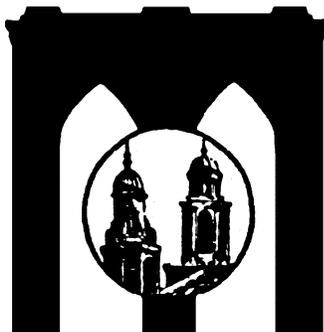
Scheduled classes on 3rd floor annex moved to main building
Junior and Senior judges perform assigned tasks
Judges use assignment packet as ticket for food in A313 (Physics Lab)
Guest judges arrive and pick up judging packets from Mr. Elert (3:00-ish)

3:20 PM (Period 11)

Sophomores move to assigned rooms, boards already in position
Sophomores given time to make adjustments to boards and self
Judging begins at 3:30

4:30–5:30 PM

Judges return to A214 (Research Room) with completed packets (calculators available)
Juniors and Seniors assist with clean up
Sophomores return boards to A214 (Research Room)
Sophomore teachers provide students with color-coded food tickets
Sophomores allowed in A313 (Physics Lab) in groups of ~30 by ticket color
Last call for food



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Judges

Alumni

Mohamed Adnan, Aleksandr Afanasyev, Sania Ahmed, Anika Ahmed, Natasha Babar, David Chen, Kirill Grinberg, Amy Guan, Irene He, Ting Yu Huang, Rabia Iqbal, Tayyaba Jabeen, Tammy Jiang, Mert Keceli, Bak Ko, Alexandra Kroger, Aviva Laurenti, Joan Li, Wenona Lok, Humera Mohammad, Nicole Ng, Vivian Ng, Annie Nguyen, Whitney Nimitpattana, Lima Nusrat, Mercy Palomeque, Demetrios Papazaharias, Benjamin Rudshateyn, Nima Simon, Sandy Tam, Christine Truong, Joshua Wadler, Cynthia Xue, Emilee Yang, Amanda Ye, Andy Yee, Wendy Yu, Susan Zheng, YaQun Arlene Zhou, Jacinda Zhou

Teachers

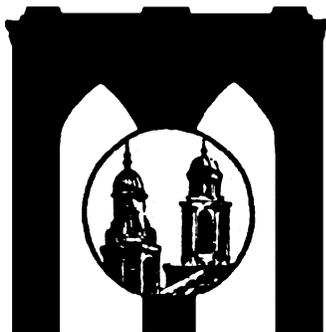
Mary Bomba, Liz Fenamore, Joel Gumbiner, W Tong Lung, Howard Spergel

Seniors

Aiysha Ashfaq, Ron Baazov, Onycha Banton, Roxana Bravo, Yong Jian Cen, Samantha Cham, Solomon Chan, Anna Chen, Ramsha Farooq, Ryan Fraser, Jasline Garcia, Anna Guo, Janae Headly, Fabliha Hoque, Israt Hossain, Yao Jiang, Jasmine Lam, Nicholas Lee, Judy Li, Winnie (1) Li Winnie (2) Li, Tiffany Liao, Jian Cong Liao, Dao Quan Lin, Pamela Liu, Tiffany Loi, Tiffany Lui, Gabrielle Lynch, Zoe Ma, Vlad Moraru, Irina Nehai, Jenny Ng, Linda Ngo, En Nekema Noel, Syeda Rasool, Ziva Rubinstein, Zainab Saleem, Kelly Shi, Crystal Soo, Evelyn Veliz, Nadege Willis, Klaudia Wojciechowska, Kate Wong, Sandy Wu, Prianka Zaman

Juniors

Christopher Ayala, Shahodat Azimova, Aziza Babaeva, Allen Barbarovich, Yasmine Brown-Williams, Varvara Budetti, Alisha Bunting, Amy Cao, Bryan Chan, Xin Yi Chen, Sammi Chung, Leonidas Eracleous, Samuel Genchikmakher, Kharene Gittens, Ying Tong Guo, Tasnim Halim, Remi Henry, Stefanie Henry, Rodolfo Hernandez, Shadika Jahan, Joel Jose, Mosammed Kabir, Jasmin Kim, Cindy Li, Shirley Li, Jessica Liang, Ting Lin, Andy Liu, Ellysa Magloire, Tiffany Mai, Nikia Miller, Kiara Nunez, Chukwunonso Nwasike, Fionne Pham, Akeem Pinnock, Shubh Rana, Almas Shafiq, Adam Soliman, Jeffrey Tsui, Jenny Wang, Helen Wu, Ashley Yip, Jonathan Yuen, Annie Zheng



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- 314-07 Nahida Alam
Does Color Affect Memory?
- 320-04 Rolens Ambroise
Variations in reaction time caused by
using a cellphone
- 320-13 Rosa Basevich
Can electrolytes effect resistance
- 316-08 Hussain Bokhari
Dye-Sensitized Solar Cells: The Future
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- 320-10 Jacky Cham & Richard Wu
The Effects of High and Low pH on
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Relievers in Acetic Acid
- 319-10 Bailey Deng & Shawn Liew
The Stronger Foundation
- 319-17 Dina Deng
Aspirin For Plants
- 318-09 Paul Dinov
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- 318-01 Michael Divgun
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- 318-07 Hasan Farraj
Does Coffee, Cola, or Tea Stain Your
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- 314-19 Daniel Goldstein
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- 318-15 Michelle Guan & Jennifer Ferd
"C" These Fruits!
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- 320-16 Tamneya Hauter
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- 319-03 Tobias He
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- 316-07 Jing Wei Hu
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- 314-21 Shanna Huang
How do liquids that go down the drain affect soil?
- 319-23 Oscar Huey
Which Solvent Has the Best Ability to Remove Permanent Marker
- 314-10 Zainab Iqbal & Marisol Morales
Brain Dominance
- 314-15 Sabrina Karasik & Yana Grebenyuk
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- 318-13 Taulant Kastrati
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- 314-11 Isheta Khanom
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- 319-06 Marina Korovyanskaya
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- 316-11 Anastasia Koshik
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- 316-06 Angelika Kowalska
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- 320-22 Aleksey Ladina
- 320-17 Fanny Lee
The Effect of Group Work on Critical Thinking
- 318-17 Joanne Lee
Garlic vs Ginger: Which Herb is More Effective?
- 314-03 Melissa Lee
Would You Touch a Door Knob Again?
- 319-11 Betty Leung
The Effect of Inclination on Solar Panels
- 318-14 Vincent Leung
The Effects of Coffee Grounds on Plant Growth
- 320-20 Nancy Li & Vivian Tan
Speed Up !
- 320-03 Zhuan Liang
Aspirin on Plant Growth?!
- 320-01 Sophia Liao & Barbara Zamilatskaya
Catch This Tempo
- 320-02 Lucy Lin
Which Affects Your Heart More? Is it Hard Rock or Soft Piano Music?
- 316-22 Sandra Lin
Which Brand of Aluminum Foil Works Best?
- 318-12 Ron Livchits
Effectiveness of germ-killing sprays on keyboards
- 318-19 Raymond Lopez
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- 316-03 Raymond Lopez
Isolation of Caffeine from Tea
- 314-02 Daniel Lozovoy
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- 319-12 Parmeet Manchandani
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- 316-18 Floren Moskvitn
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- 319-08 Scarlett Neuberger
How do different acids affect the growth of bacteria?
- 318-04 Ada Ng
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- 316-16 Richard Oletsky
Electrolytes: Sports Drinks vs. Juices
- 318-05 Christine Ou & Mavis Zhou
Rate of Dissolution for Pain Relievers: Generic vs. Brand name
- 316-01 Bernice Pham & Johnny Warn
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- 319-02 Carol Pignato
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- 314-12 Monique Powell
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- 319-14 Vinitha Punnoose
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- 314-13 Stanley Purygin
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- 318-06 Jiang Jie Qu
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- 319-07 Sunita Rakkhal
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- 314-01 Dajana Reci & Anna Stafeyeva
Grow Plants Grow!
- 319-20 Dianna Roman & Valeriya Falkovich
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- 316-05 Benjamin Ross
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- 316-20 Tiffany Sanabia & Dominique Semple
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- 318-20 Patrice Sanderson
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- 314-05 Carmine See & Madeeha Sheikh
Bone Decay in Soda
- 316-14 Ester Shamailova
The Strength of Glue
- 320-09 Rina Shuster
Does Vitamin D or Vitamin C help pansies grow taller?
- 320-06 Shruti Singh
Effect of Temperature of Juice on pH Change
- 314-09 Feyisola Soetan
Understanding Lactose Intolerance
- 319-16 Emily Sokolson
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- 319-04 Michael Taormina
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- 319-19 Beyhan Taylan
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- 316-02 Glenmore Thomas Jr.
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- 320-07 Patryk Trzonkowski
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- 319-22 Emily Tung
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- 320-21 Roman Vinokur
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- 318-10 Sarah Walsh
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- 319-24 Emily Wang
How Acids Affect the Oxidation for Apples and Pears.
- 314-16 Grace Win
How Does Laundry Detergent with Phosphate Affect Plant Growth?
- 318-11 Sandy Wu & Candice Zhong
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- 314-14 Javlon Xaydavov
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- 320-15 Jordan Yan & Kenny Isufi
Comparison of Vitamin C Concentration of Orange Juice and Apple Juice
- 318-08 Sabrina Yang
The Effect of Toothpaste on Bacteria

318-03 Jocelyn Yeung
Does sugar help preserve carnations?

316-10 Hillary Yip & Karry Ho
The Effect of the Amount of Fertilizer on
Plant Growth

320-18 Jessica Yip
The effectiveness of different types of
wipes

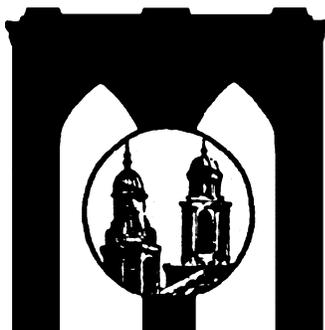
320-14 Corinna Yong
How Can Sight Affect Taste?

314-17 Manashir Zarbailov
What liquid has the highest surface
tension?

316-17 Julia Zelenko
To Go or Not To Go?

319-13 Bella Zilber
Which product stains teeth the most?
Coffee, Tea, Water, or Coke?

319-21 Bing Zou
Kill the Bacteria with Mouthwash!



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Abstracts

318-22 Preventing the Loss of Water Vapor

Muhammad Abdulla

(Roerich – Products)

Plastic wraps are common products used to prevent water vapor from escaping in food and keeping them fresh. Polyethylene and polyvinylchloride are organic compounds found in many plastics. In this experiment, I tested to see which plastic wrap prevents water vapor from escaping the best and if the type of environment has an effect on the water vapor loss. I tested Saran Wrap, Reynold's Plastic Wrap and Glad Wrap (Kresdale). I filled 20 mL of water in six test tubes and covered them with the different plastic wraps. These test tubes were placed at room temperature. Another set of six tubes that underwent the same set-up were placed in a cool environment (the refrigerator). For ten days I observed and recorded water level changes. I found that the Glad Plastic Wrap had the least amount of water loss in both environments. At room temperature the average water loss in the test tube with the Glad Plastic Wrap was .6 mL. In the cool environment the average water loss for the Glad Plastic Wrap was .3 mL.

314-07 Does Color Affect Memory?

Nahida Alam

(Mosley – Behavior)

The purpose of this project is to determine whether or not color affects memory. It is predicted that color does affect memory. In this project twenty five subjects were given two lists of 25 words to memorize, one list was printed out in colorful ink and the other list was printed out in black ink. The subjects also had to memorize the placement of both colorful and black and white pictures. In both tests the subjects had to memorize within amount of time. The average results showed that the subjects memorized one more word from the words printed out in color ink than the words printed out in black ink. The subjects also took less time to remember the placement of the colorful pictures than the placement of the black and white pictures. The subject remembered the placement of the colorful pictures in less than a minute and took over a minute the remember the placement of the black and white pictures. From the evidence it can be concluded that color does affect memory.

320-04 Variations in reaction time caused by using a cell phone

Rolens Ambroise

(Roerich – Behavior)

A report states almost 1 out of 6 fatal car accidents are caused while being distracted using a cell-phone. US researchers reported that from 2001 to 2009 an estimate of 16,000 people died while using a cell-phone while driving. (Fox, 2010). In order to test the effects of using a cell-phone on driving, I decided to look at it in the aspects of reaction time. I hypothesized that using a cell phone will slow down a person's reaction time. In

order to test it, I needed 10 test subjects. I measured their reaction by dropping a ruler which they are supposed to catch. I will then measure their reaction time in inches. The first variable is the control. They will not be using any devices. Next I tested their reaction time using a cell phone. Then while using a Bluetooth earpiece. and finally while texting. I dictated them some words to spell. After all my testing the avg. reaction time for control was a 7.81 in. For talking on a cell phone it was a 9.95 in. For an ear piece it was a 9.157 in. For texting it was an 18.58 in. There is an obvious difference between texting and talking. But there wasn't such a difference between talking on the cell phone and the hands free device. These results led me to conclude that my hypothesis was correct. Using a cell phone will slow down a person a person's reaction time. and texting more than doubled reaction time. DON'T TEXT AND DRIVE.

320-13 Can electrolytes affect resistance

Rosa Basevich

(Ross – Products)

An electrolyte is defined as a compound that conducts electricity in an aqueous or molten solution. If there is a low concentration of electrolytes then the resistance will increase. The voltmeter is used to test resistance, the more electrolytes something has the less the resistance. Salt has a lot of electrolytes. By creating a saturated salt solution chart, it could be used to compare against products. A saturated solution of salt has 35 g in 100 mL of water. The chart starts with 1 g in 100 mL in water, and is increased by one until there are 15 g in 100 mL. Then the testing continues by 5 s until there is 35 g of salt. The purpose of this is to show the change in resistance. As the concentration of salt increases the resistance should go down. A salt solution chart was used as a comparison. Taking the resistance of a product and using the chart to figure out how many grams of salt it has. For every product there are two samples, example: two bottles of Gatorade were test each of them for resistance. The hypothesis was supported the lower the concentration electrolytes the more resistance there is. The results showed that most brands had the same amount of electrolytes, around 200 kilo-ohms. These results are important because it shows that most samples of a brand have the same amount of salt. Generally within a brand, the products have the same amount of electrolytes.

316-08 Dye-Sensitized Solar Cells: The Future of Renewable energy

Hussain Bokhari

(Roehrich – Chemistry)

Since 1990, the first climate report released by the United Nations, an international search for renewable energy has listed among the most important issues in science. But, at around \$300 per Sq. meter plus expensive installation, pricing for Solar Energy seems to be the biggest repellent of switching. My project was an investigation of the innovative Graetzel Cell co-created by Brian O'Regan in 1988. Dye sensitized solar cells are targeted for improvement because they are inordinately cheap and almost as efficient as Silicon solar panels. Using a slightly modified procedure, I created 12 dye sensitized solar cells to test 6 natural anthocyanin dyes found in raspberries, blackberries, cranberries, mangoes, pineapples and broccoli. I tested different colored dyes in fruits in hopes of discovering the best method to harvest the power of photosynthesis in solar cells. I was correct in hypothesizing that the anthocyanin dye closest to violet, the shortest wavelength of visible light, would be most efficient in converting light to energy and therefore, producing an electric current. Quantum physics tells us that a shorter wavelength of the electromagnetic spectrum has more energy. Raspberries have a natural red dye which, when dyed onto titanium dioxide, creates a purple film on the glass. Its contender, blackberries, also created a purple film but too dark for light to be absorbed effectively. In this experiment, I spent hours recreating the process of photosynthesis in homemade solar cells for under \$100 and concluded that the best, organic, anthocyanin dye for solar cells are Raspberries.

320-10 The Effects of High and Low pH on Radish Growth

Jacky Cham & Richard Wu

(Roehrich – Environment)

The purpose of the experiment is to see if pH has an effect on plant growth and which pH plants grow best in. The experiment included 4 groups, low pH, high pH, optimal range pH, and a control group. Each group contained 3 plants, having 12 plants in total. The pH for the low pH group contained pH as low as 3, the high pH group had a pH of about 9. The optimal range group had a pH of about 5-6. Since pH level of 7 is neutral, we used that pH as our control. After the plant germinated, we would track plant growth. We would slowly dig out the plants; doing it very carefully. After the plants were free, we would take them out and measure it from the top of the leaves to the end of the root. We measured the plants to the nearest tenth of a cm. We would then repeat the procedure for all the other plants. At the end of the experiment we concluded that the plant that we used does not grow well in high pH environments. The low pH groups had surprising results, the length of the plants grew a lot more than we expected. It grew a little more than the control and the optimal range group. We thought that the low pH group was going to die quick but it was the high pH group that died first.

316-21 Acne Medication Effectiveness on Propionibacterium Acne

Aarin Chase

(Sullivan – Microbiology)

My Research Project is on the effectiveness of common acne medications and active ingredients on Propionibacterium acnes. I used tetracycline, salicylic acid, and benzoyl peroxide. I had to use Staphylococcus epidermis because I had no access to propionibacterium acnes. I hypothesized that Tetracycline would do the best because it was an prescription drug, while the others were over the counter drugs. I performed my experiment and the overall results were tetracycline with an zone of inhibition of 4.194 cm. Following was salicylic acid with 1.46 cm and then benzoyl peroxide with 1.34 cm. My hypothesis was supported, tetracycline had the biggest zone of inhibition and it also, had an significant difference between itself and the other two active ingredients.

320-08 Nonorganic vs. Organic disinfectants on Serratia Marcacens

Colleen Chasteau

(Sullivan – Products)

Many people are making the switch to organic cleaners due to their Eco friendly reputation but do these more costly products really get the job done? The purpose of this experiment is to test whether there was a significant difference between the cleaning power of organic disinfectants and non organic disinfectant cleaners. In this experiment product testing was conducted on two organic cleaning products and two non organic cleaning products on Serratia Marcacens. They were incubated for 24 hours and the zones of inhibition were recorded. After conducting multiple t-tests there were no significant differences in the cleaning abilities. Clorox, a non organic cleaner, had the highest average of cleaning the bacteria. There is no need to pay more for organic products for cleaning purposes.

314-04 Should You Trust the Five Second Rule?

Cindy Chee

(Mosley – Microbiology)

The purpose of this experiment is to see if the “five second rule” is reliable and this experiment was done with marshmallows, agar nutrient plates, and cotton swabs. The marshmallows were placed onto the floor for five seconds and then they were picked up with gloves on. Then, a cotton swab was dipped in distilled water until it was completely wet so that it could be used to swab the part of the marshmallow that touched the floor. The cotton swabs were then used to make a zigzag pattern on half of

the nutrient agar plates after they got the bacteria from the marshmallows. These plates were then incubated overnight at 37 °C. This was also done with marshmallows for 15 minutes so that the amount of bacteria after five seconds on the floor could be compared to the amount of bacteria after 15 minutes on the floor. The average of the 15 minute trials was 1.2375 while the average of the five second trails was 0.8625. This was calculated by taking all the trials and getting the average of them. According to the data, the average of the 15 minute trials was higher than the average of the five second trials.

319-05 Canned vs. Frozen Vegetables

Amanda Chen & Christine He

(Ross – Plants)

Vegetables are an essential part of our daily diet. The purpose of this experiment was to find out if canned or frozen vegetables had more nutrients. It was hypothesized that canned vegetables contained more nutrients than frozen vegetables. For the experiment to be done, a ring stand with 2 rings attached to it had to be set on the table with an alcohol burner on the bottom. Two grams of a type of vegetable was placed on the bottom ring and a flask with 0.2 kg of water was placed on the top ring. The fire was kept under the vegetable until the vegetable became completely burnt and the temperature of the water was kept. The amount of nutrients from the vegetable was transferred into the water through the form of heat and energy. After recording the temperatures, the equation $Q=mc(T_{\text{final}}-T_{\text{initial}})$ was used to find Q , which represents the energy transferred from the vegetable into the water. This helped determine how much nutrients were stored in the vegetable. Based on the results, it showed that frozen vegetables stored more nutrients than canned vegetables. Frozen vegetables had a greater 'Q' value than canned which meant that it had more nutrients than its competing canned vegetables.

318-21 Effectiveness of Zinc Oxide on Ultraviolet Radiation

Amy Chen & Yukie Wong

(Mosley – Products)

The purpose of the experiment was to test if different concentrations of zinc oxide have an effect on the ultraviolet radiation. In the experiment, glass sheets were covered with different concentrations of zinc oxide. The ultraviolet meter was used to measure the ultraviolet index. The ultraviolet meter sensor was held directly under the sun to record the ultraviolet index without the glass sheets above it. After recording the ultraviolet index, the glass sheets with different concentrations were held on top of the UV meter. The difference of the ultraviolet index without the glass sheets and with the glass sheets were used to show the effectiveness the concentration of zinc oxide had. The ultraviolet index difference for the glass sheet labeled 0% was around zero to one and the ultraviolet index difference for the glass sheet labeled 8% was from two to four. The results show that the more zinc oxide added the more effect it had on the protection of the ultraviolet radiation.

316-15 Does Shape Affect Parachutes?

Jennifer Chen & Jason Zheng

(Ross – Physics)

The purpose of this project is to test whether shapes affect parachutes or not. The most popular shapes for parachutes are circular and rectangular. Since parachutes can be shaped in several different ways, we are experimenting which shape works best. Six different shapes circle, triangle, square, rectangle, pentagon, and hexagon were outlined and made into parachutes. Each of these parachutes was about the same size in comparison. The amount of strings attached to each parachute depended upon the number of vertices the shape had for example, the circle had 6 strings while the square had 4 strings. A weight of 1.5g was attached to these parachutes and dropped at a height of 200 cm. The triangle parachute landed the fastest while the hexagon parachute

descended the slowest. Based on these results, it's safe to say that the closer the shape is to a circle, the better because it gathers more air underneath it and slows its descent. The result shows that there is a significant difference between each shape. However, the square and pentagon do not have a significant difference in value. The hexagon worked the best out of all the other shapes and could be an option for the shape of parachutes that are made in the future.

316-04 Dirtier There or Over There?

Stanislav Chernykh

(Sullivan – Microbiology)

Many people wonder whether the location of something affects the amount of bacteria that will be on it. This experiment compares the amount of bacteria there is on library keyboard and office keyboards. Samples of bacteria were taken from Midwood High School's library and from a couple of office rooms in the annex. The gathered bacteria was grown for 24 hours in the Petri dishes. My hypothesis was that the library keyboards will have more bacteria than the office keyboards. The experimental results did not support my hypothesis. The results actually showed that it depends on how the day went. One day there might have been no one using the keyboards or the keyboards might have recently been cleaned.

320-05 The Effect of Liquid Hand Soap Against Staphylococcus Epidermidis

Brian Choi & Ashley Tan

(Sullivan – Products)

Liquid hand soap is a common household necessity for getting rid of germs on your hand. As most commercial adverts say, "This product kills 99.9% of germs." There are many different brands of soap that have this claim but do generic brands prove to be more effective than store brands? We tested the effect of the generic brands (CVS, Rite Aid, America's Choice) and the name brands (Softsoap, Lucky, Dial) against the bacteria, Staphylococcus Epidermidis. This is a gram positive, cocci bacteria that produces slime to form biofilm on plastic devices. It is found on human skin and most infections are found on plastic implants and catheters. Special ingredients in soap are trained to work against germs. Tetrasodium EDTA, a chelating agent, is used to remove metal ions from water to improve the effect of cleansing products. A well known active ingredient, triclosan, is a bacteriostatic agent. It works to weaken the cell membranes of bacteria to let the antibiotic in. After our experiment, we found that the brand, Dial, killed the most bacteria. In the data, we found that Dial had the largest average of 69.8mm; while Rite Aid had the lowest average with 23.3mm. Dial had a variance of 19.27 and Rite Aid had a variance of 2.84. Using the t-test, the t-value came out to be 30.01 which had a significance level of over 99%. Dial was most effective due to its active ingredient, triclosan.

314-20 Reaction Times of Different Pain Relievers in Acetic Acid

Anthony Dacres & Levtrim Kelmendi

(Ross – Chemistry)

The purpose of this project was to conduct an experiment to determine which pain reliever out of four over the counter pills (Advil, Bayer Aspirin, Ibuprofen & Tylenol) will dissolve the fastest. The experiment was conducted by testing 16 pills of each pain reliever within 50 mL of acetic acid solution as the solvent. Each pill was recorded for the amount of time required for the dissolving rate to occur. All of the pain relievers were able to dissolve and a large deviation was demonstrated between two groups of pain relievers. The first group was the stronger pain relievers of Tylenol and Bayer Aspirin and the second group were the weaker pain relievers of Advil and Ibuprofen. The dissolving rate averages of the first group were .25 seconds and 2.25 minutes while the second group dissolving rate averages were 10.39 minutes and 13.09 minutes. The large differential between the two groups were caused by the different strength levels of each pain reliever. The first group has a stronger effect upon the human body and the

second group has the weaker effect upon the human body. The overall fastest dissolving pain reliever was the Bayer Aspirin because it was the fastest acting pain reliever of all over the counter drugs.

319-10 The Stronger Foundation

Bailey Deng & Shawn Liew

(Sullivan – Engineering)

The purpose of this experiment is to see what type of base is most stable when an earthquake is taking place. The three bases used were circle, square and triangle. Our hypothesis was that the Square base would be the most stable and able to withstand the force of an earthquake. This is important because it helps engineers and architects with creating a building that would be stable in an earthquake country. We used a shake table and used a drill which acted as the earthquake and measured the amount of vibrations both vertical and horizontal to test which base was the most stable. 10 trials of all three bases were collected. The square base came out to be the most stable.

319-17 Aspirin For Plants

Dina Deng

(Roehrich – Plants)

Aspirin tablets are commonly used to reduce pain, inflammation, and fever, but what most people don't know is that another name for aspirin tablets is acetyl salicylic acid. Salicylic acid is a plant hormone that is commonly produced in plants when they are under stress. An experiment was conducted to see if regular water or aspirin water can speed up the growth rate of radish plants. The hypothesis stated that aspirin helps increase the growth rate of plants. This experiment was conducted using four groups: control, two-aspirin, three-aspirin, and four-aspirin. Everything was kept constant in the control and experimental group except for the number of aspirin. Everyday, the plants were all given 10 mL of water and the experimental groups were watered with the designated amount of aspirin tablets. The results of the average height for the groups: control group: 1.9 cm, 2-aspirin: 1.7 cm, 3-aspirin: 1.6 cm, and 4-aspirin: 1.2 cm. According to the results water is the best resource. This study can further lead to the question: how much aspirin should be given to plants and how daily, so that it does speed up growth rate.

318-09 Is Too Much Fertilizer Counter Effective?

Paul Dinov

(Roehrich – Plants)

Its common knowledge that plants need water and sun to grow. Many people also add in fertilizers to enhance growth rate and keep the plants looking healthy. Experiments done on mung beans growth in soil with various watering styles showed otherwise. Too much fertilizer and the plant will not grow. Morgen A conducted an experiment similar to mine and proved that a plant with no Nitrate Fertilizer grows better than a plant watered with Nitrate Fertilizer. My hypothesis stated that 0.5 grams of nitrate fertilizer per watering would help the plant grow best compared to any other trial. I was wrong. The phrase "Too much of anything is bad" fit in well with my experiment. The plants with the high ratios of fertilizers barely grew and looked unhealthy and pale. The ones with minimal fertilizer or without any at all looked mighty healthy. I watered my plants every 5-6 days depending on soil conditions. I watered each group of plants with 50ml per plant. I had 6 groups with 3 plants in each group. Every group used 0.1 more grams of fertilizer than the last. Every time I watered the plants the first group had just water(control) and then the second group, each plant had 0.2 grams of nitrate mixed with water and so on. I weighed out my portions carefully while performing my experiment. All the plants in the control group grew healthy, tall, and strong. This shows that varying amounts of fertilizer does have an effect on plants.

318-01 Do Frozen Foods or Canned Foods Have Better Nutritional Value?

Michael Divgun

(Roehrich – Products)

Frozen and canned foods are commonly consumed by the general population today, but which type of food has more calories and therefore more energy to offer when consumed? This can be determined by constructing a calorimeter and testing both types of food for the calories that they contain per gram. According to the results, it can be said with a 95% accuracy that frozen foods contain more calories per gram than canned foods. This result is based off of an unpaired two-sample t-test conducted with results from the ten trials performed with the calorimeter experiment.

318-07 Does Coffee, Cola, or Tea Stain Your Teeth?

Hasan Farraj

(Roehrich – Chemistry)

Teeth are cubical-shaped structures with grooves intended for use in consumption of food. Teeth are usually naturally white, or a close to white color, but build-up from foods and drinks such as coffee and tea over time can stain the white color and turn teeth yellowish and discolored. In this experiment, we'll use egg shells in order to explore how teeth are stained by drinking coffee, tea, and cola. First I filled three plastic cups with coffee, tea, and cola. Next put at least one hollowed-out eggshell into each container. Every day, fish them out and observe the progress of discoloration. Take some photos of gradual changes. On the day when you really start to notice discoloration, note that day. Record your results and compare the effects of the three liquids. As days pass and data is collected, I collected the data and stated which of the three liquid drinks stained the egg-shell the most on that particular day. At first I believed that the cola would stain the teeth more because of its known harmfulness to human teeth, but as it turned out, tea ended up being the most harmful of the three liquids. Cola causes your teeth to break down due to certain acids it contains. Also, coffee stains your teeth but only leaves a thin line at the bottom of your teeth. Lastly, tea stains your teeth the worst because it leaves big round stains.

316-09 Can you Multitask?

Amy Feng

(Mosley – Behavior)

The purpose of this experiment was to see if multitasking affected one's concentration. The experiment included making students play a regular game of Tetris Sprint. Next the subject had to do mental math problems while playing another game. Later they had to spell vocabulary words while playing another game. This was done 3 times per person. The predicted outcome was that multitasking would have an impact on the scores. The major findings from this laboratory were that most people had a slower time after adding a distraction, such as math and spelling. The average time of the games that involved spelling was 192 seconds, whereas without spelling the average was 182 seconds. The average time with math was 196 seconds, whereas without math the average was 178. After performing a t-test the data showed that multitasking does not significantly affect concentration. From the evidence, it can be concluded that doing simple multitasking did not affect the concentration of the subjects.

316-13 Which Lotion Is More Moist?

Sherry Fung

(Ross – Products)

Every single day, there are a bunch of people who apply lotion to their skin throughout the day, from the morning to the night. It is commonly used to prevent the skin from cracking and turning dry. The problem is, however, how moist the lotions are. To determine exactly how moist lotions are, an experiment was conducted using cups, filter papers, water, and of course, the lotions. The lotions that were used are common

products found in drugstores; Johnson's & Johnson's baby lotion, Cetaphil, and Moonlight Path (from Bath & Body Works). First, 10 mL was poured into each cup and filter papers were used to cover the top of the cup. The edges of the filter papers were then glued or taped to the sides of the cups and 1/2 teaspoon measure of lotion was spread onto the filter paper. The results of the experiment show that Johnson's & Johnson's baby lotion was the moistest lotion out of the three lotions. The amount of moisture in the lotion was similar to the control (evaporation). The least moist lotions include both Cetaphil and Moonlight Path. The t-values indicated that Johnson's & Johnson's and the control both had significant differences with Cetaphil and Moonlight Path, which didn't have significant differences. Therefore, Johnson's & Johnson's baby lotion was the moistest lotion.

319-18 Does Yoga Really Slow Down Your Heart Rate?

Miriam Gabay

(Mosley – Behavior)

The purpose of the experiment was to determine whether or not yoga slows your heart rate down. In order to test this, 20 girls were taken and were split up into groups of 4 for 5 different days of testing. Their pulse rates were taken 10 minutes before yoga (rest pulse), during yoga (in the middle of poses for a minute) and 10 minutes after they did yoga (they sat and relaxed). There were a total of 20 trials. For all the 5 days of yoga, the girls completed the same exercises for 25 minutes. The average heart rate of girls at rest (before yoga) was 74.65. During yoga, the girls had an average heart rate of 73.65. Then, 10 minutes after yoga, their average heart rate was 71.6. The data was t-tested. The results were shown to not be statistically significant. In conclusion, yoga does slow your heart rate down but not drastically.

314-19 The Effect of Exercise on Memory

Daniel Goldstein

(Roehrich – Behavior)

The purpose of this experiment is to find out what effect aerobic exercise has on a person's short-term memory. The experiment was conducted by testing the short-term memories of 10 people before they did aerobic exercise, and then test their memory again right after they exercised. Memory was measured based on how many items of information the test subjects were able to remember. The results showed the test subjects' short-term memories on average improved after they exercised. From these findings, people can learn and study for tests much more effectively by exercising before doing so, and this could also be a small factor in solving the obesity problem in the United States.

319-09 The Effect of energy drinks on concentration

Diana Grinberg

(Mosley – Behavior)

The purpose of this lab was to see whether or not energy drinks actually increase concentration. To do this experiment, volunteers had 15 completely random words read to them. They were asked to recite back as many words as they could. The data was recorded; then, the volunteers were given Monster Energy, an energy drink. After waiting fifteen minutes, they repeated the process of listening to and reciting words back again. Data was recorded and compared to the trials without the energy drink. The average words for people prior to the energy drink was 7.4 and an average of 8.1 after they drank the drink. This showed a significant increase in concentration and word memorization. In conclusion, Monster energy does improve concentration.

318-15 "C" These Fruits!

Michelle Guan & Jennifer Ferd

(Mosley – Chemistry)

The purpose of this experiment was to test the concentration of Vitamin C in 100% juices (fresh squeezed fruit) versus the concentration of Vitamin C in bottled fruit juices. The predicted outcome of this experiment was that the fresh fruit would have a higher concentration of Vitamin C than the bottled ones because health institutions generally persuade people to eat fresh fruits. This experiment was conducted by titration. Iodine was the indicator of this experiment. We used a drop by drop titration to find the number of drops needed to make the iodine change color to indicate neutralization. The major findings from this experiment were that the concentration of Vitamin C in fresh fruit was an average of 10 drops for one orange, 25 drops for grapes, 22 drops for one apple, and 19 drops for one tomato. The major findings from this experiment were that the concentration of Vitamin C was an average of 12 drops for half a cup of orange juice, 6 drops for grape juice, 7 drops for apple juice, and 6 drops for tomato juice. Based on this evidence, we concluded that the concentration of Vitamin C was actually more in bottled juices than in the fresh fruits.

316-19 Which Vitamin C Has the Most Vitamin C?

Olena Hadelia

(Roehrich – Chemistry)

Vitamin C is a water-soluble vitamin that is needed daily for humans. It is needed for the growth and repair of tissues in all parts of our body. The citrus fruits and juices are one of the best sources of Vitamin C. The purpose of my experiment was to determine Vitamin C concentration in different types of orange juices. In order to do this, I titrated Vitamin C, and then I titrated orange juices. I tested concentrated, premium not-from-concentrate, and homemade fresh-squeezed orange juice. I used Lugol's iodine solution as an acid, and a starch solution as an acid-base indicator. In order to get accurate results, I performed 6 trials for each juice, and then used 20 mL of each juice for each titration. Then I found out how much iodine solution it took to titrate each sample of juice. Afterwards I set up a special proportion in order to find out how much Vitamin C was present in each juice. My results showed that fresh-squeezed orange juice had the highest concentration of Vitamin C. A premium orange juice had about 1.47 mg less, and the concentrated juice had 11.13 mg less Vitamin C than a fresh-squeezed orange juice. My results supported my expectations. If one wants to get more Vitamin C out of what he/she puts in his/her body, it's better to drink a fresh-squeezed orange juice.

318-18 The Physics of Cheating in Wiffleball

Mohammed Hasan

(Sullivan – Physics)

The project The Physics of cheating in Wiffleball is to determine whether cork, sawdust, or marble used as fillers in hollowed-out wiffleball bats will cause a wiffleball to travel farther, and give it a greater edge while playing the sport compared to a plain normal bat. Upon experimentation with different filler-bats and a plain normal bat, using a self-constructed batting device, the following results were derived by taking the sum of the means. The ball traveled when struck by the four types of bats: the normal wiffleball bats traveled an average of 1034.9 cm, the cork-filled wiffleball bats traveled an average of 1210.82 cm, the sawdust-filled wiffleball bats traveled an average of 1130.64 cm and the marble-filled wiffleball bats traveled an average of 980.76 cm. The results indicate that the cork-filled wiffleball bat enables the wiffleball to travel the farthest, but reflecting on the close proximity of the statistics of all four-wiffleball bats, filler-bats do not provide a significant level to allow cheating in wiffleball.

320-16 Hydrogen Peroxide's Effect on Ethanol's Heat Production

Tamneya Hauter

(Sullivan – Chemistry)

Hydrogen Peroxide is a commonly used compound that spontaneously breaks down into water and oxygen gas. Its main usage is bleaching, but in small concentrations, it is used as a cleaning product and for minor cuts. Due to its oxidizing properties, it acts as a catalyst to the burning of flammable substances. Ethanol is an alcohol that is used as fuel or a fuel additive. However when used as a fuel, it produces 30% less energy than gasoline. The purpose of this experiment is to determine whether a hydrogen peroxide and ethanol solution will produce a higher amount of energy when burned than ethanol alone. I hypothesize that hydrogen peroxide and ethanol will produce more heat than ethanol alone due to hydrogen peroxide's extra oxygen atom. The experiment was conducted by using a ring stand, clamp, wire gauze, beaker filled with room temperature water, thermometer, and crucible. Depending on the trial and concentration, specific amounts of 35% hydrogen peroxide, ethanol, or water were poured into the crucible and lighted with a flaming long wooden stick. Temperature of water was recorded every thirty seconds until flame died out. Change of temperature for each trial was then converted into joules. In conclusion, hydrogen peroxide and ethanol produced more heat than the ethanol alone. In every trial, hydrogen peroxide produced more heat than ethanol and should be used as a fuel additive. However, as concentration of hydrogen peroxide increased, combustion time decreased. Because of this, should be used in small concentrations.

319-03 Natural Antibiotics

Tobias He

(Mosley – Microbiology)

There are many urban myths out there that say ginger and garlic are "natural antibiotics". The purpose of this experiment is to test which "natural antibiotic" is the most effective against bacteria growth, in this case E Coli. Garlic should have a greater effect on the bacteria than ginger because garlic contains high amount of sulfur which is responsible for its infecting fighting ability. To do this, agar plates were used. The plates were labeled with Ginger, Garlic, and Control, and inside each section was a filter disk soaked in the corresponding spice. The plates were incubated overnight at 37 °C and data was taken the very next day. The average zone of inhibition for garlic was 22.91 mm and for ginger it was 4.36mm. The results show that garlic indeed surpassed ginger's ability of being a "natural antibiotic".

314-18 Are You Safe In School?

Syeda Hillary

(Ross – Products)

Bacteria is a naturally occurring organism that sustains itself off the healthy cells in the human body, using people as hosts. Bacteria is found on commonly touched surfaces. But, in a school of 4,000 or more kids how do you prevent the spread of contagious viruses and diseases caused by bacteria? In this experiment, the purpose is to try to find out which antibacterial spray (Lysol, Windex, or 409) will work best for killing the most amount of bacteria on commonly touched surfaces in school. The hypothesis stated that Lysol antibacterial spray will most effectively kill the greatest amount of bacteria because it is the #1 brand recommended by pediatricians. It is also advertised to have the highest amount of customer ratings. In order to carry out this experiment, the two metal bars on the second floor annex bridge were divided into four sections (Distilled water, Lysol, Windex, and 409) and then sprayed every morning. Then later on in the day, the metal bars were swabbed with sterile cotton swabs and was spread out onto an agar plate and then the Petri dishes were incubated. Then, data was collected on which one grew the least amount of bacteria. As it turns out the hypothesis was refuted. 409 antibacterial spray worked the best at killing the most bacteria. The average for 409 antibacterial spray was 1.36 whereas the average for Windex and distilled water was

1.45 and for Lysol was 2.09. Lysol grew the most amount of bacteria. 409 proved to be the best spray to use to kill bacteria. Janitors should spray commonly touched surfaces in school with 409 antibacterial spray.

316-07 Photons, Action!

Jing Wei Hu

(Sullivan – Engineering)

Development of more effective, environmental friendly and economically affordable ways to generate electrical energy has always been the challenge of the electrical engineers; this applies specifically to the solar industry due to the increasing popular use of sunlight. This experiment is an attempt to develop such way to generate electrical power using solar energy. I am determining whether or not the use of reflector can help a photovoltaic solar cell to generate more electrical power due to the reflector's ability to concentrate light rays. Knowing that comparing the voltage generated does not serve well as a measurement of electrical power; Therefore, I use rechargeable batteries to compare the effectiveness. The method to test this is by allowing the Photovoltaic solar cell to charge two AA Ni-MH batteries for 10 minutes with and without the use of a reflector; when charging without a reflector, solar panel will just be lying flat. After the charging period, I connect each of the battery to a LED light separately and record the duration of the time a light lid up. Ten trials for each group were conducted. The results show that the LED light lid up on average 18.28 minutes without the use of a reflector and 37.23 minutes with the use of a reflector. A t-test was performed and indicates the results were significant. This supports the idea that the use of a reflector can enhance the electrical power and therefore is more effective.

318-02 Colgate or Crest?

Xiao Yan Hu

(Mosley – Products)

This experiment evaluated the effectiveness of Colgate and Crest toothpastes against Staphylococci bacteria. The effectiveness of toothpastes was determined by measuring their zones of inhibition in mm on an agar plate with bacteria sample spread evenly on after incubation overnight. It was hypothesized that Colgate toothpaste would show larger zones of inhibition and it is more effective against Staphylococci bacteria due to the higher percentage of active ingredient contained to fight against cavities. One major finding from this experiment was that Colgate showed larger zones of inhibition than Crest by an average of 5.59 mm. The average zone of inhibition for Colgate is 18.92 mm, and the average zone of inhibition for Crest is 13.33 mm. Statistical values proved that there is significant difference between the effectiveness of these two toothpastes. From evidence, the hypothesis is supported by the data, and it can be concluded that Colgate toothpaste is more effective against Staphylococci bacteria than Crest toothpaste is.

319-15 Bacteria vs. Citrus

Nancy Huang & Vivian Cheng

(Ross – Microbiology)

The purpose of this experiment was to find the effect of different pH levels of citrus fruits on two types of bacteria. The citrus fruits used in this experiment were lemon, lime, orange, and grapefruit. Distilled water was used as the control. Citrus fruits contain citric acid. They are sometimes used for medical treatments, such as relieving bee stings. The bacteria used in this experiment were Escherichia coli and Staphylococcus epidermidis. Escherichia coli are rod shaped and is gram negative. They can be found in the intestines. Staphylococcus epidermidis are round-shaped and is gram positive. They can be found on human skin. In this experiment, two agar plates were used for each trial. Both plates were divided into three sections. The first plate was labeled with a control, lemon, and lime. The second plate was labeled with a control, orange, and grapefruit. Escherichia coli was spread onto the plate. Disks that were soaked in the products used for this experiment were then place in their sections. The

plate was then incubated at 37 °C overnight. The zone of inhibition was then measured. The same steps were used for Staphylococcus epidermidis, but instead, the plate was incubated at 25 °C. Fifteen trials were used for each bacteria. Lime gave the largest average zone of inhibition for Staphylococcus epidermidis. Lemon gave the largest average zone of inhibition for Escherichia coli. Orange and grapefruit had little to no effect on either of the bacteria.

314-21 How do liquids that go down the drain affect soil?

Shanna Huang

(Sullivan – Microbiology)

Have you ever thought of how harmful it is to the environment every time you pour something down the drain? Liquids that are poured down the drain everyday are purified through soil by removing germs and chemicals before it reaches any rivers or groundwater. But these liquids are also harming plants and killing necessary bacteria that are needed for plants in the soil. Without these bacteria, nutrients needed for plants to grow can't be transferred. In my experiment, the liquids I used were Neutrogena Acne Cleanser, Bath & Body Works perfume and nail polish remover. The bacteria I tested on was Bacillus marcescens. With these liquids, I did nine trials and tested to see which liquid killed the most bacteria. The liquid that killed the most bacteria would be the one that is most harmful to plants and the soil.

319-23 Which Solvent Has the Best Ability to Remove Permanent Marker

Oscar Huey

(Sullivan – Products)

People these days are clumsy. They can get any stains on their clothes as they wish. This project was designed to test which solvent can be used to remove permanent marker the best from cloth. The solvents used were hand sanitizer, hairspray, water, and vinegar. I hypothesized that hairspray would work the best because of people's past experiences. The experiment conducted was based on the procedure of cutting 4 pieces of cloth and making a shaded box of 5 cm by 5 cm in the middle of the cloth. Then apply the solvents into their designated cloths. As a result, hand sanitizer came out to be the best solvent to remove permanent marker from cloth. Therefore my hypothesis was incorrect.

314-10 Brain Dominance

Zainab Iqbal & Marisol Morales

(Mosley – Behavior)

The purpose of this experiment is to determine which side of the brain is more active by conducting physical activities. The predicted outcome was that more than 50 percent of the test subjects would perform the activities using the right side of their bodies, which mean they used the left side of the brain. In order to conduct the experiment, test subjects were used to perform a series of activities. The test subjects wrote their names, used scissors, and threw balls to test their hand dominance. When testing foot dominance, test subjects were asked to kick balls, step up stairs, and step onto coins. To test eye dominance, test subjects were required to look in a hole, look through a tube, and cover one eye to look at a finger. Cupping ears, listening through the phone, and listening through the wall tested ear dominance. The major findings from this experiment was that test subjects performed the given activities using the right side of their body more than 70% in each area. From the evidence, it can be concluded that on average the left side of the brain dominates the body.

314-15 Is the amount of carbs in milk different from what it is labeled as

Sabrina Karasik & Yana Grebenyuk

(Roehrich – Products)

Milk is a large supplement of a human's daily life. A very controversial topic is the truth of the nutrition labels on the back of milk cartons. Many milk distributors falsely advertise the amount of carbohydrates that are present in milk. My partner and I decided to conduct an experiment to test the truth of the labels printed on the milk cartons. We tested 8 different types of milk including but not limited to: soy milk, vanilla milk, and powdered milk. For each we extracted the carbohydrates by adding calcium carbonate, ethyl, and acetic acid. This project is very useful for future generations because we can find out which companies are not truthful in their advertising and are not healthy, discouraging people go buy from these companies. Our procedure was to label each beaker of the milks and pour acetic acid while it is boiling to extract casein. Then, to that casein, we will, add calcium carbonate and ethyl, to fully extract the carbohydrates. Finally, we will boil each flask until what is left crystallizes. Our results were that regular milk had the most different amount of carbohydrates than what was advertised. We concluded that this was because the amount of carbohydrates was too high for advertisement so the company lowered it on the label so more people would purchase it.

318-13 The effectiveness of Nettles as an antibiotic as compared to garlic

Taulant Kastrati

(Roehrich – Microbiology)

Serratia Marcescens is a rod-shaped, gram-negative bacteria that naturally occurs in water and soil. People exposed to great amounts of *S. marcescens* exhibited a greater risk of developing pneumonia and urinary tract infections than someone who isn't exposed. Antibiotics are commonly prescribed to kill *S. Marcescens*, however, not everybody can get to it. In Eastern Europe garlic and nettles are used in folk medicine. Garlic is used as a disinfectant because of its ability to both kill bacteria and inhibit its reproduction. Nettles are used to treat urinary tract infections and bacterial infections. It's important for people to have healthy alternatives to killing bacteria without always using antibiotics. For my experiment, I compared a nettle solution, a nettle capsule solution, a garlic solution, and distilled water to see which would be most effective. I transferred the bacteria onto my agar plates, then I placed the disks into it, and finally I incubated it. My results are: a t-value of 4.28 for nettles, nettle capsules with a t-value of 4.14, distilled water with a t-value of 3.6, and a confidence level of over 99% for all. This shows that garlic is more powerful than the herbal remedies that people use as an antibiotic.

314-11 Does Cooking Fruits and Vegetables Deplete Vitamin C Content?

Isheta Khanom

(Roehrich – Medicine)

This experiment was conducted to see if cooking fruits and vegetables would deplete Vitamin C content. It has been proven that raw fruits and vegetables have more Vitamin C than cooked ones. The experiment involved cooking fruits and vegetables and preparing a corn starch-iodine solution. The fruits and vegetables were simmered for fifteen minutes on a hot plate to prepare the cooked extract. The corn starch was used in the solution to stain the iodine dark-blue, allowing to visibly see any color changes. Ten drops of a raw or cooked fruit/vegetable extract were added to the solution. Once the extract was added, the solution turned a lighter color if it had more Vitamin C because of a reaction between the iodine and the Vitamin C. The cooked extract didn't cause any color changes. The raw extract turned the solution lighter and had more Vitamin C.

320-19 The effect of Garnier Fructis Length and Strength shampoo on hair

Jennifer Komlyk

(Ross – Products)

The purpose of the experiment was testing the claim of Garnier Fructis Length & Strength shampoo. The claim was that it would strengthen hair and repair damage. To test this, four females used the shampoo for eleven days. Before they used the shampoo about ten strands of their hair were taken. A Scanning Electron Microscope was used to take two pictures of a strand of every girl's hair. One picture was at 300 magnification and the other was at 1,700 magnification. The zoomed in pictures clearly showed all of the rips and ridges in the hair. There was a total of 8 pictures. Then a Force Sensor was used to see how many newtons it took to rip the hair. There was a total of eight trials for every girl. After eleven days of changing to Length & Strength, SEM pictures were taken and eight trials were performed again to see the change in before and after. The data from the Force Sensor was recorded and t-tested. The results were shown to be very significant in the force taken to rip the hair after using the shampoo. The SEM pictures showed a slight decrease in ridges and damage to the hair follicle. In conclusion, Garnier's Length & Strength shampoo lived up to the claim.

319-06 Surface Tension of Liquids

Marina Korovyanskaya

(Ross – Physics)

The purpose of this experiment was to measure and compare the surface tension of water, canola oil, rubbing alcohol, and tea. High surface tension of a liquid allows insects such as water striders to walk on it. This lab was conducted to find whether different liquids have different surface tensions and which liquid would have the highest surface tension. It was expected for water to have the highest surface tension since many insects are able to walk on water. To measure the surface tension of each liquid, a single beam was made to measure the force exerted by surface tension on a needle. The needle was attached to the beam and was floating on the surface of the liquid. The surface tension was providing the resistance and the amount of weight that the surface tension could pull back was recorded. The surface tension of water was found to be 4.70×10^{-2} N/m, rubbing alcohol was 2.42×10^{-2} N/m, oil was 2.84×10^{-2} N/m, and tea was found to be 5.05×10^{-2} N/m experimentally. Based on the t-test, water and tea had 90% similarity while the rest of the liquids rejected the Null Hypothesis when they were compared to each other. In conclusion, the four liquids had different surface tensions and tea had the greatest surface tension. The result did not support the hypothesis.

316-11 Breakfast at Calorie's

Anastasia Koshik

(Ross – Products)

The goal of this experiment is to determine which cereal releases the most energy, in other words, which cereal has the most calories. The three cereal brands being compared are Cinnamon Toast Crunch, Cocoa Puffs and Honey Nut Cheerios. The energy release is measured using a calorimeter. The main data is collected by the temperature raise of the water when a cereal is burned underneath it. Each cereal was tested with 10 trials. After 10 trials, each trial was plugged into the specific heat formula, $q=mc(t_{\text{initial}}-t_{\text{final}})$. Then the average calorie of each brand was calculated and compared. Cinnamon Toast Crunch had the highest calorie average of 2.595. Honey Nut Cheerios had the smallest calorie average of 0.641. This means that It is the best for less calorie intake out of the three.

316-06 Feel the Burn

Angelika Kowalska

(Roehrich – Medicine)

Everyone loves to eat. Not only is it essential for human life, but it something everyone enjoys. Sometimes eating your meal too quickly or having too many greasy burgers can lead to heart burn and indigestion. That is where antacids come in. When we eat too quickly sometimes the acid in our stomach reflexes out and results in the uncomfortable feeling we know as indigestion or sometimes even heartburn. This acid from our stomach which usually has a pH of about 2, needs to be neutralized. Therefore this acid must be neutralized by a substance we call antacids. Antacids come in both tablet and liquid form and there are many different types of antacids such as Tums, Pepto Bismol and your regular store brand antacids. In this experiment I tested which antacid, regular strength or extra strength, worked better. To test this I poured 50 mL of hydrochloric acid into a beaker. Then I mixed one dose of antacid with 100 mL of water. I measured the pH of the hydrochloric acid and I poured 10 mL of the antacid. Each time I stirred the new mixture and measured its pH. Testing against a control of water there was no significant difference in the antacids tested. Neither of the antacids completely neutralized the hydrochloric acid. Other studies show that liquid antacids work better than tablets and is something that could be tested in a further experiment.

320-22

Aleksey Ladina

(Ross — Products)

This experiment was a product test of re-sealable plastic bags. The brands that were used for this experiment were Hefty, Ziploc, and Nice!. The purpose of this experiment was to see which bag resisted spills the best, and if consumers should waste their money on the more expensive brands. Another goal of the experiment was to see if the seal was the reason for the failure of the bag. The first hypothesis was that Hefty bags would work the best and the second hypothesis is that the seal is responsible for the bags spilling the water. To conduct the experiment, re-sealable Hefty, Ziploc, and Nice quart-bags were used. The bags were filled up with a quart of water and dropped off of a 93cm desk. The re-sealable bags landed into a garbage bag that was flat on the floor. The bags were dropped repetitively until they failed to contain the water that was in the bag. The number of drops needed for the bag to fail was recorded. The method by which the bags failed were also recorded (rip, burst, leak) to see if the seal was responsible for the failure of the bags. The average amount of drops needed was Hefty: 3.3, Ziploc: 6.0, and Nice: 6.6. The t-tests showed that there were no significant differences between any of the sets of data. Therefore the first hypothesis was refuted. The second hypothesis was correct because the seal was responsible for 26 out of the 30 spills. The results suggest that you should not waste your money on the more expensive brands of re-sealable bags.

320-17 The Effect of Group Work on Critical Thinking

Fanny Lee

(Mosley – Behavior)

The purpose of this experiment is to see if there is a significant difference in group work versus an individuals' critical thinking. In this case, the goal is to complete and finish a jigsaw puzzle as quickly as possible, as individuals and in groups of two. The expected results were that group work would be more successful than individual work. To conduct this experiment, 10 females were chosen to complete a 25-piece jigsaw puzzle. Then the same 10 individuals had to find a partner, a female, to complete a 50-piece puzzle. Each trial was timed in minutes and seconds. The results showed that individuals, having an average of 3 minutes and 19 seconds, were faster and more successful than individuals working in groups which had an average of 4 minutes and 47 seconds.

318-17 Garlic vs. Ginger: Which Herb is More Effective?

Joanne Lee

(Roehrich – Cellular)

Garlic and ginger are common, natural, anti-bacterial herbs. Both are used frequently as home remedies against the common cold, diarrhea, and used to treat infected wounds. They are effective due to their antimicrobial and antifungal properties. The purpose of this experiment is to observe the effectiveness of garlic versus ginger in inhibiting the growth of the ubiquitous, gram negative bacteria, *Serratia Marcescens*. Five trials using agar plates were applied for testing each fresh, cooked, and dried garlic and ginger. Each plate was incubated under 37 °C and then evaluated for the zone of inhibition in mm. In the result of the experiment, the average zone of inhibition for fresh garlic is 19.4 mm, for fresh ginger is 6.4 mm, for cooked garlic is 29 mm, for cooked ginger is 3.6 mm, for dried garlic is 16.6 mm, and for dried ginger is 3.6 mm. According to the t-value table, all three calculated t-values indicate a confidence level exceeding 98%. The data collected for fresh, cooked, and dried garlic versus ginger suggests that garlic is more effective than ginger in inhibiting the growth of *Serratia Marcescens*. In future experiments, to show which herb is a more effective remedy, more variety of bacteria should be tested as well.

314-03 Would You Touch a Door Knob Again?

Melissa Lee

(Ross – Microbiology)

When many people clean their houses they usually leave out cleaning door handles thinking it's not important. However door handles are one of the most common places where germs are spread. Many common illnesses can be spread from touching door handles like the common cold, and strep throat. The experiment was to see whether the inside (room) or outside (hallway) of door handles had more bacteria on them. The hypothesis was that since more people go in and out of A219 and that since people who don't actually go into the room might touch the door handle than the outside of A219 would have the most bacteria on it. Two sets of doors were tested; A214 and A219. Each day a swab of the inside and outside of both doors were taken and put in clean Petri dishes with agar. The previous day's Petri dishes were then observed, their results were recorded and then they were cleaned out. The t-test was done it was found that the t-value of the I A219 and I A214 was 2.21 only the inside of A219 was significantly dirtier than the inside of A214. All the other combinations did not have a high enough t-value so their results being higher or lower than each other were out of chance.

319-11 The Effect of Inclination on Solar Panels

Betty Leung

(Roehrich – Environment)

The purpose of this experiment is to make the most efficient use of solar panels by changing the angle of inclination towards the sun. Solar energy is a renewable energy source that utilizes the sun's rays. Greenhouse gas emissions are a growing problem and using a renewable energy source would reduce this. Compared to fossil fuels, solar energy is a more effective way to produce electricity. Fossil fuels are the heaviest contributors in greenhouse gas emissions. The burning of fossil fuels pollutes our air and water. Solar energy is clean, green, abundant, and cost effective. Although the cost of solar energy is a slightly higher than grid power, the preservation of our earth is beneficial to the future generations that are to come. Solar panels were tested by measuring the amount of volts produced at different angles. The multimeter was set at a 2000m resistance range under voltage and the solar panels were propped at 30°, 60°, 90°, and 180°. I predicted that when the solar panel was placed perpendicular to the sun, it would produce the greatest amount of voltage. The major findings from this experiment were that the angle of inclination towards the sun did have significant effect on the amount of voltage it produces. From the evidence, it can be concluded that

placing the solar panel at 180° would yield the greatest amount of voltage opposed to the other angles of inclination.

318-14 The Effects of Coffee Grounds on Plant Growth

Vincent Leung

(Roehrich – Plants)

The experiment's purpose is to determine the effects of coffee grounds on plant growth. To create an appropriate experimental environment, spent coffee grounds were used in conjunction with Lima bean plants. Two Lima beans were placed into each sandwich bag with a piece of wet paper towel, and were sorted based on group letter and number. In group letters A-C, "1" was designated the control, "2" had 10 g of coffee grounds, and "3" had 20 g. In a later second trial, letters D-E were used with "1" being control, "2" having 2 g of grounds, and "3" having 5 g. The grounds were added and spread out once the plants germinated. Every Monday, Wednesday, and Friday, the plants were watered with 5 mL of tap water with the excess unabsorbed liquid drained out. The lengths of the roots and notes of interests were taken daily using a metric ruler and observation. It was hypothesized the groups with added coffee would have shorter roots due to common knowledge of coffee being acidic pH influencing plant growth. Prior research showed caffeine could increase calcium activity in plants. As calcium serves as a "messenger" in plant cells, this is similar to caffeine's stimulation to the central nervous system of humans. While the coffee groups did indeed grow shorter, it was also observed that the roots of the controls were "greener and healthier" while the roots of the coffee groups were more "brown, sickly, and had multiple smaller branching." In sum, coffee grounds negatively impact plant growth.

320-20 Speed Up !

Nancy Li & Vivian Tan

(Sullivan – Microbiology)

The objective of this experiment was to determine how the concentration of potato enzymes affect the rate of the breakdown of hydrogen peroxide. Hydrogen peroxide is produced in a cells called granulocytes. This cell produces hydrogen peroxide as a defense to fight off infections such as parasites and viruses in our body. In this experiment, we timed the time it took for a filter paper disk to sink and float back up in our enzyme - hydrogen peroxide solution. It indirectly relates to the reaction rate of the enzyme. The major findings from this experiment was that the reaction rate stop increasing, when the enzyme solution increased, after a certain point. It is concluded that as the concentration of enzymes increases, then the reaction rate also increases until the enzyme became saturated in the solution.

320-03 Aspirin on Plant Growth?!

Zhuan Liang

(Mosley – Plants)

The purpose of this project is to see whether or not aspirin water will help plants grow. Green bean seeds were planted, one seed per pot. Water one seed with plain water to serve as control and water the other seed with aspirin water to serve as experimental. The pots must be labeled with "plain water" or "aspirin water", so that the seeds could be correctly watered with the designated types of water. Once the seeds were cultivated, observed the plants daily and start collecting data when seeds start to grow. The result of this project specifies that aspirin water does help plants grow. The anticipated outcome also provides evidences that although aspirin water slows the seed from germinating. However, once the seed is germinated then aspirin water does assist in increasing the height of green bean plants.

320-01 Catch This Tempo

Sophia Liao & Barbara Zamilatskaya

(Mosley – Behavior)

The purpose of this experiment was to determine if the tempo of a song affected memorization. The hypothesis of this experiment was that faster songs will result in more words memorized, since faster songs are often catchy. To support our experiment, we included different genres of songs to see if genre would affect memorization as well. The test was performed with three different song genres, pop, R&B, and hip-hop. For each genre, two songs were picked out, fast and slow songs. The slow songs ranged from 50-70 words and the fast songs ranged from 90-100+ words. The songs were carefully chosen so that none of the songs would be known by the test subjects. The chorus of each song was printed out. For each test subject, the six songs were played to them three times each. The first time with the lyrics, the second time without, and then on the third time, the test subject would have to sing any words they remembered along with the song. The number of words the person sang correctly on the third time was then counted and recorded. The data was then analyzed and t-tested. The results of the t-tests showed that there was no significant difference between the memorization of both fast and slow songs for all three genres. The t-value for pop was 0.45, for R&B it was 0.81, and for hip-hop it was 0.23. Using the degrees of freedom, which was 28, it was then concluded that hip-hop songs were easier to memorize.

320-02 Which Affects Your Heart More? Is it Hard Rock or Soft Piano Music?

Lucy Lin

(Mosley – Behavior)

In doing this experiment, the purpose is to test whether soft piano music or hard rock will affect a human's heart rate. It is hypothesized that hard rock music will have more of an effect on the human heart than soft music. When testing this theory, each participant is to rest for two minutes, listen to soft piano music for two minutes and then rest for another two minutes. After, they have to listen to two minutes of hard rock and the results are compared. The results show that when listening to soft piano music the average amount of change in heart rate was 0.5bpm and for hard rock it was 2.2bpm. Therefore, hard rock has a greater impact on pulse rate, compared to soft music, on humans.

316-22 Which Brand of Aluminum Foil Works Best?

Sandra Lin

(Roehrich – Products)

As consumers we want to know that we're spending our money on products that function well. Buying aluminum foil is no exception. Aluminum foil is mainly used to maintain the temperature of food and liquids. There are different brands of aluminum foil the ones used in this experiment include the following- Reynolds Wrap, Pride, and American Wrap. For this experiment, the different brands of aluminum foil were tested out to see which worked the best in retaining temperature. Four water bottles were used for this experiment. Three bottles were wrapped in different brands of aluminum foil and one was left alone as the control group. Cold water was poured into each of the bottles and the bottles were placed into a foil tray filled with warm water. After three minutes the bottles were taken out and the temperatures of the water inside the bottles were measured. When testing out how well the brands of aluminum foil were able to keep water warm, warm water was poured into the bottles and put into cold water. The results showed that Reynolds Wrap was significantly better at retaining the temperature of the water compared to other brands. So next time you're deciding which brand of aluminum foil to buy don't choose the flimsy store brand foil pick Reynolds Wrap it's worth the price.

318-12 Effectiveness of germ-killing sprays on keyboards

Ron Livchits

(Ross – Microbiology)

The experiment is testing how effective germ killing sprays work on keyboards. This project can be connected in helping many parents and adults choose wisely on what products to buy and is it even worth buying them. I hypothesized that Lysol germ killing spray would be the most effective bacterial killing spray out of the 3 I used : Lysol, Fantasik, rubbing alcohol and not cleaning at all. Effectiveness of each product was tested by using the products the morning before on 10 different keyboards and then about 6 hours later check the keyboards for bacteria. Bacteria was collected off the keyboards with the swabs and then rubbed on the Petri dish. The next day observe the bacteria colonies. The bacteria were measured from 0-4+ and 4+ being the least effective, or the dish with the most amount of bacteria growth. The results show that rubbing alcohol kills bacteria the best. After the t-test was calculated I concluded that with 95% of confidence rubbing alcohol is a better and more useful product to buy rather than Lysol and Fantasik.

318-19 Isolation of Caffeine from Tea

Raymond Lopez

(Roehrich – Biochemistry)

Isolation of caffeine from gunpowder green tea is extremely important in everyday life, most people wonder what the ingredients are in tea, and if they are beneficial. This was a reason why this project was appealing. Caffeine is a member of class of organic substance that is found in the plants. This substance is found in many everyday items such as coffee, cocoa and coca cola. This amount differs in each item, in tea the amount can be reasons why people drink it in the morning. This experiment will show if the labels and peoples idea of how much caffeine is actually in tea and if it can change your mental state in the morning. Tea leaves consist of cellulose, which is insoluble in water, which makes it a simple sugar. This is an essential part of an animals' diet, scientifically proven. This beverage has been around for at least 2000 years an originated in China. Caffeine can be proven to be highly effective in certain situations and knowing how much you consume can help the consumer see the difference in each beverage. The scientific definition for this experiment is the extraction of water soluble material in the tea leave into hot water. The hot solution is allowed to cool and the caffeine will be extracted with dichloromethane, which is a certain chemical found in paint thinner.

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314-02 What are the effects of Monster and Gatorade on pulse rate?

Daniel Lozovoy

(Mosley – Behavior)

The purpose of this experiment was to determine the effect of an energy drink (in this case Monster) versus a sports drink (Gatorade) on pulse rate. My hypothesis was that monster would increase the subjects pulse rate more than Gatorade. The subjects measured their pulse rate before they drank Gatorade. After 15 minutes the subjects measured their pulse rate. The same was done for the Gatorade trial. The data was recorded and t-tested. Everyone but two people who drank monster had an increase in their pulse while all of the subjects who drank Gatorade had a decrease in pulse rate.

320-12 The Effect of Energy Drinks on the Heart Rate of Goldfish

Robert Malone

(Ross – Animals)

The goal of this experiment was to see the effect that different energy drinks have on the heart rate of goldfish. In this experiment, 5 goldfish were used to test 5 different brands of energy drinks: Red Bull, Nos, Amp, Rockstar and Monster. To test what effect these energy drinks had on the fish, 1 ounce of each were added to their appropriate fish bowl, and then the heart rate of the fish was counted and compared with the heart rate of the fish before the energy drink was added. The results were the exact opposite as one may think, as the heart rate of the fish after the energy drink was added was much lower than the heart rate of the fish before the energy drink was added, with Red Bull having the largest effect on the heart rate of the fish. This is significant because although it may have the opposite effect, the results of this experiment could be used to predict what energy drink would have the largest effect on the heart rate of humans.

319-12 Effect of temperature on the rate at which a candle burns

Parmeet Manchandani

(Sullivan – Chemistry)

My goal was to find out if the rate at which a candle burns is affected when candles are kept at different places that have different temperatures. The two places that I decided to test my candles was my room and my fridge. A total of 40 candles were tested, 20 in the room and 20 in the fridge. Each candle was tested for 10 minutes. I recorded the amount of candle burned in each trial. I created variance tables for both the places, in room and in the fridge. Using the variance tables I calculated the variances and then using the variances I calculated the t- value. My level of confidence came out to be less than 90% which that the difference in averages was due to chance.

318-16 Effectiveness of dish washing detergents against S. Marcescens

Katherine Mei

(Roehrich – Products)

Consumers spend a lot of money trying to presume the cleanliness of home hygiene. Using the best antibacterial is promoted. In this experiment, the effectiveness of different dishwashing detergents (Ajax, Dawn, and Palmolive) was investigated. I would expect Palmolive (antibacterial) to be more effective because it cost more than the other two brands. It is also stated that it eliminates 99.9% bacteria. The effects of the dishwashing detergents were tested against Serratia Marcescens, which is a gram-negative bacterium. The bacteria were spread thoroughly on agar plates. Three sterilized disks dipped in the detergents and a clean disk as control were placed in each quadrant. It is inverted and incubated at 37 °C overnight. The average zone of inhibition for Ajax is 15.4 mm; Dawn is 18 mm; and Palmolive is 12.5 mm. Palmolive is the least effective against Serratia Marcescens. In conclusion, Dawn had a larger zone of inhibition than the other brands against the Serratia Marcescens. To further conduct this experiment to see how effective the brands are, I can test it against other bacteria.

316-12 Mpemba Effect: The Freezing of Hot Liquid vs. Cold Liquid

Salma Momtaz

(Mosley – Physics)

The purpose of this experiment is to test the Mpemba Effect which states that hot liquid can freeze faster than cold liquid. It was hypothesized that the hot liquid would freeze faster. The experiment was done using two liquids, water and milk. Four different temperatures were tested for each of the liquids. They were checked at a twenty minute interval for one hour and forty minutes. At the end of the experiment, the data was translated to graphs. From these results, it could be concluded that the hot liquid cooled down faster because both liquid that were initially at 100°C, dropped about 100°C in 100 minutes. The initially 23° dropped about 23°C in 100 minutes. The results prove the Mpemba effect valid.

314-08 Shaping your thoughts

Alexandrina Moruz

(Mosley – Behavior)

This experiment explores the aspect of the brain that concentrates to different things, in this case its shapes. The word/ shape combination sends two different messages at the same time to the brain which creates a potential of conflicting the brain in naming the words. This test in experimental psychology is known as the Stroop effect. This experiment required 15 volunteers between ages of 15-17 which had to name 100 shapes printed on a paper with matching and non-matching names printed on top of the shapes. The volunteers were asked to say the names of the shapes without any mistakes as quick as possible, and they were timed. The major outcome of this experiment was that having the matched words printed on top of the shape had a lower time average by approximately 25 seconds then the mis-matched words which had a higher average of time.

316-18 How Does Hand Size Affect How Far You Can Hit a Handball

Floren Moskviitn

(Mosley – Physics)

The purpose of this experiment was to determine if hand sizes in both boys and girls has significant affect on how far a handball can travel. The hypothesis was that the bigger the hand was of a certain individual, the more chance the ball would be able to travel farther. Twelve subjects were used for the experiment. The subjects would all receive the same handball to use in each trail, along with the same exact court for each trail. The subjects would then proceed to standing in three different positions, while hitting the ball from those three positions. Each trial would be completed five times, to get a more accurate average of the twelve subjects. The people who had a bigger hand size indeed was able to hit the ball a lot farther than the people with smaller hands, as the data showed. The hypothesis was supported due to the ball traveling farther by being hit by a larger hand.

319-08 How do different acids affect the growth of bacteria?

Scarlett Neuberger

(Ross – Microbiology)

The purpose of this experiment was to test how the strength of different acids affects the growth of E. coli. Tomato juice, vinegar and grape juice were the variables and distilled water acted as the control. E. coli is a gram negative, rod shaped bacterium most commonly found in one's intestines. Tomato juice, grape juice and vinegar have pHs of 4.1, 3.4 and 2.4 respectively. The hypothesis was that the vinegar would have the greatest affect on the bacteria because of its low pH level. To perform this experiment, start by dipping a pipette in a Petri dish of alcohol and running it through a flame in order to clean it of any bacteria that could contaminate the E. coli. This should be done between every step. Extract 0.4 mL of bacteria to put onto the agar plate and spread

evenly. Then dip four discs into each liquid and place them on the plate. Then measure the zone of inhibition, the place where bacteria did not grow. t-tests showed that when comparing vinegar to water, vinegar works best. However, all other results proved insignificant. The hypothesis was supported in the comparison of vinegar to water, but refuted in comparison to everything else.

318-04 Musicality

Ada Ng

(Mosley – Behavior)

The purpose of the experiment was to test how different genres of music affect a student's concentration, or focus. A predicted outcome suggests that a person's brain is affected when music is played, therefore, causing distractions, and loss of concentration. Twenty sophomore students were asked to complete a maze while being timed under certain circumstances. The same twenty students were then asked to read an excerpt under the same conditions. In each trial, students performed the given task without any music. They were then given four selected types of music and asked to complete the tasks again. The major findings from this experiment were that music generally had little effect, or no statistical significance on concentration when compared to each other, however, when compared to the control group (no music), most had a statistical difference. The more upbeat songs seem to be more of a distraction, or stressor. From the evidence, it can be concluded that music does not affect one's mind notably, but may or may not help someone to focus.

314-06 Effect Environment and Mediums have on Germinating Radish Seeds

Meghan Ng

(Roehrich – Plants)

Many people nowadays are beginning to take notice in the significance of producing their own vegetation. This experiment seeks to find out which soil content and environment fits best when germinating fruits and vegetables, such as radish seeds. It can help gardeners, farmers, and people who want to go DIY! If more people cultivate fruits and vegetables at home, it's healthier for the consumer, you get to control what is in your food, it's pesticides free, and your product comes out fresher. If the Organic Compost is supposedly a good medium for early vegetation starters, than the outdoor plants with this soil content should grow more rapidly, time and growth wise. I tested 9 indoor and 9 outdoor plants, with 3 different types of soil. The plants will need sunlight so the indoor plants were by the window, and the outdoor plants absorbed the sun's rays on my deck. In a span of 15 days the indoor Organic Compost Plant #1 grew the quickest with the height of 165 mm. The outdoors tallest plants were the Organic Compost Plant #3 and the Scott's Potting Soil Plant #2 which both grew 30mm. The indoor plants started growing on day 3 and the outdoor started germinating on day 7 due to environmental differences. Indoors ranged from 70 °F–79 °F, meanwhile the outdoors vary from 50 °F–70 °F. The end result of my project proved my hypothesis wrong. The indoor Organic Compost #1 had the best results due to an increase in temperature indoors versus the environment outdoors.

316-16 Electrolytes: Sports Drinks vs. Juices

Richard Oletsky

(Sullivan – Chemistry)

Many big sports drinks companies such as Gatorade advertise about how great their products are because they contain electrolytes. An electrolyte is basically a substance that will break up into individual ions in a solution. This project is determining whether or not there is a significant difference in the concentration of electrolytes in both sports drinks and juices, and to determine which drink is better after exercising. I measured the conductivity (which is directly proportional to electrolyte concentration) of 10 sports drinks and 10 juices, and found out that juices have (on average) higher electrolyte concentration than sports drink. Lemon juice turns out to be the best drink to drink after

exercising because of its high electrolyte concentration (3720 ppm) and low carbohydrate amount (0 g).

318-05 Rate of Dissolution for Pain Relievers: Generic vs. Brand name

Christine Ou & Mavis Zhou (Sullivan – Medicine)

Our experiment was performed sufficiently to compare the rate of dissolution for pain relievers and to see if it is worth paying for brand name. We were given time in class to conduct two separate trials for each of the ten drugs we had. We hypothesized that ibuprofen will dissolve the fastest and it is not worth paying more for brand name drugs. We compared five store brand drugs to five brand name drugs. We used a 0.3 molar solution of hydrochloric acid represent the stomach acid for our experiment. Based on the data, Bayer actually dissolves the fastest in comparison to ibuprofen. Additionally, it is not a necessity to pay more for brand name drugs because store brand pain relievers are cheaper and just as efficient.

316-01 Which Dish Detergent Is Most Affective?

Bernice Pham & Johnny Warn (Ross – Microbiology)

E. coli is a gram-negative bacterium that is commonly found in households. A common household product used to kill this bacterium is dish detergent. Using dish detergent to clean plates and hands can reduce the amount of bacteria spread around the household. The purpose of this experiment was to determine which common brands of dish detergent are most effective against *E. coli*. In this experiment, five different brands of dish detergent were tested: Ajax, Dawn, Gain, Palmolive and Sunlight. If Dawn is the most expensive brand then it should also be the most effective dish detergent out of the other four brands. Label the bottom of the agar plates and extract 0.4 mL of the *E. coli* and put it in each plate. Afterwards spread the bacteria evenly on the plate. Dip blank discs into each watch glass and place them in their respective zones for each plate. The plates were then incubated overnight at 37 °C. Based on the t-test, there was no significant difference between the five different brands of dish detergent. Therefore, the hypothesis was refuted. This can affect society because buying any brand is the same. They are all as effective for killing bacteria.

319-02 The Effect of Salt Concentration on Growth Speed of Flower Seeds

Carol Pignato (Sullivan – Plants)

The purpose of my experiment is to find out how salt concentration affects the growth speed of flower seeds, which in my experiment are marigold seeds. I gathered 3 pots, used a control group with 0 tsp of salt, and 2 other pots with 1/2 tsp and 1 tsp of salt. I watered each pot with the necessary amount of salt. Eventually, it took more than a week for the 2 pots WITH salt to grow, so I decided to stop the salt water and just use water with 0 tsp. of salt for ALL pots. After almost a month of daily watering, I learned that, based on my experiment, less salt made the marigold seeds grow fastest in approximately 30 days, as I expected. On the last day, pot 1 (0 tsp salt) grew 3.4 cm, pot 2 (1/2 tsp salt) grew 0.8 cm, and pot 3 (1 tsp salt) did not grow at all! I concluded that the higher the salt concentration is, the slower it takes for the seeds to grow.

314-12 How Can We Calorie Count?

Monique Powell (Roehrich – Chemistry)

A calorie, equivalent to 1.484 Joules, presents the amount of energy in food. The nutritional information, including the calorie, is shown on the packaging of food. While the Food and Drug Administration (FDA) requires that most foods must have a nutrition label, the calories shown are not necessarily accurate. That brings into

question how many calories are in one's food. Two common snack brands, Keebler and Nabisco, were examined. For each brand, five snacks, ranging from crackers to cookies were tested using a calorimeter. In addition, a t-test was performed. In order to test the calories, a calorimeter was constructed. Two containers, one used for an insulated system, a thermometer, water, and a fire source were some materials used to both create the calorimeter and test the energy in the snacks. When a small flame was set to the food item, the insulated can would be placed on top of the food item attached to the cork. Then, the thermometer inside the other can that is positioned on top would measure the temperature of the water before and after the flamed food releases energy. This temperature change was then used in an equation that converted it to energy. As a result, the calories of the food items were significantly greater than the label claimed. In addition, there wasn't a significant difference between the calories in the two brands. This information serves significance because it shows that one is not fully notified of what he or she consumes.

319-14 Does Light Bulb Color Affect Plant Growth?

Vinitha Punnoose

(Ross – Plants)

This experiment mainly tests the effect of light bulb color on plant growth. The hypothesis was that light bulb color affects plant growth by helping plants grow to become taller and healthier. Forty red cherry tomato plants were used for the trials as well as 4 CFL bulbs of the colors red, white, green, and blue. The plants were divided into four groups, with ten plants in each. Each group had a different colored light bulb assigned to it and received energy from that light source. Measurements of the plants were taken each day using cm as the measuring unit. Every two days, the plants received 30 mL of fresh water. The experiment took place for a total of 11 days. After the data of the height measurements were recorded, a t-test was conducted. Six t-values were compared to the table of critical values. The degree of freedom was 18. The major two t-values were between white and blue and white and green. These two t-values were 2.25 and 1.79, and they were higher than the critical values, which mean that there is 95% confidence supporting the hypothesis. Different colors can reach a plant depending on the length of the wavelength emitted by the sun. The shorter the wavelength, the more energy involved. Chlorophyll within cells usually captures the light directly from the shorter wavelengths. Blue light can help promote seed germination, leaf growth, and stem growth. Red light can help ripen growing fruits.

314-13 How different spices affect E. coli growth?

Stanley Purygin

(Ross – Microbiology)

The purpose of this experiment is to test which one of 3 common spices would kill the most E. coli. E. coli has been around for over 100 million years and it is commonly found in the lower intestines of warm blooded organisms. E. coli usually gets contaminated through meat processing. E. coli can be very harmful to the human body when coming into contact with it. It can cause severe illness when you ingest it or when touching animal feces. First, the work was sterilized then all the supplies were gathered such as: agar plates, E. coli, spreader, pipette, black pepper, and red pepper. The pipette extracted 0.4 mL of the bacteria, which was then spread over the surface agar plate. 0.25 mg of black pepper, red pepper and cinnamon were placed were placed in separate sections of the agar plate. There was a significant difference between the amount of bacteria that was killed by cinnamon compared to red and black pepper. The project took a longer time than expected because either the bacteria or the agar plate kept getting contaminated. Ten trials were completed for each spice and the control group which was water. The experiment was a success and the hypothesis was proven correct, cinnamon was the spice that killed the most E. coli bacteria. In the food industry this was also researched and they commonly use cinnamon to destroy different types of bacteria.

318-06 Purplish Bulb Onion Vs Red Hot Chile Pepper

Jiang Jie Qu

(Roehrich – Microbiology)

Bacteria are a group of unicellular microorganisms lacking organelles and an organized nucleus, and some of them can cause diseases. Many People throughout the world used many different things to kill bacteria instead of using antibiotics, like ginger, nettles, garlic, and many other things. So I wonder if these unique things really can kill off some bacteria. Onions can be used to treat asthma, dehydration, sore throat, upset stomach, high blood pressure and many other uses. Chile pepper can be used to treat fever, colds, hangovers, reducing heart attacks, regulates blood flow and many other uses. The purpose of my experiment is to test if onion and Chile pepper are really effective against bacteria, and to found out which is more effective against gram-positive bacteria and which is more effective against gram-negative bacteria. The bacteria I am using are Escherichia coli (gram-negative) and Staphylococcus epidermidis (gram-positive). The procedures are very simple, you need to get your materials, sanitize work space, label agar plates, transfer bacteria into plates and spread, transfer disk into plates, and incubate upside down overnight. For my t-tests and I found out my t-value is very high for Escherichia coli which is 10.934. My t-value for Staphylococcus epidermidis is also very high which is 8.937. The t-values I have exceeds the t-value on the t-chart greatly, which is 3.792. This means that there is a significant difference between the effectiveness of onion and Chile pepper on gram-positive and gram-negative bacteria.

319-07 Comparison Between Male and Female Memorization

Sunita Rakkhal

(Mosley – Behavior)

The purpose of this experiment was to compare male and female memory efficiency. It was hypothesized that the efficiency of the memory of females would result to be slightly higher than that of males. Twenty participants, ten male and ten female of ages 14 to 17 were asked to memorize a passage, and report the number of times they fully reread the passage. Then, they were asked to recite the passage for verbatim. If the subject made a mistake while reciting, they were asked to continue memorizing and recording the number of times they reread the passage. The passage consisted of 50 words and was the same one used for both genders. Five different trials, involving different test subjects, under the same circumstances were conducted. After performing t-test calculations of the number of times the passage was reread for all five trials, it was concluded that females possessed slightly better memory than males because they reread the passage a fewer number of times on average.

314-01 Grow Plants Grow!

Dajana Reci & Anna Stafeyeva

(Ross – Plants)

The purpose of this experiment was to test the affect of different fertilizers on plant growth. This was done to see which fertilizer helped the plant grow the greatest. To perform this experiment the plants were watered with different amounts of All-Purpose Fertilizer and Orchid Fertilizer. The results compared to the control group which had no fertilizer. According to the t-test values there was only a difference between the All-Purpose 0.15 and the Orchid Fertilizer 0.1. The hypothesis was supported with a 95% level of confidence. According to the results the Orchid Fertilizer had the greatest affect on plant growth because it produced the longest plants.

319-20 Which Brand of Toothpaste is Most Effective Against Staphylococcus?

Dianna Roman & Valeriya Falkovich

(Sullivan – Products)

The purpose of this experiment is to determine which toothpaste kills more Staphylococcus bacteria out of the six toothpastes tested, to guide people in deciding

which toothpaste would be better to use. The six toothpastes used for this experiment were Colgate, Crest, Aim, Pepsodent, Ultra-Brite, and Aquafresh. Considering the theory that popular store brands are expected to give better results, Colgate and Aquafresh were hypothesized of being most effective in comparison with Crest, Aim, Pepsodent, and Ultra-Brite. The methods that were taken place were placing six separate, clear disks in six different toothpastes and placing them on a relative space in a labeled agar plate. The six toothpastes were also compared to a control group, which was distilled water. The agar plates were then incubated overnight in thirty-seven °C temperature and the zones of inhibition were measured. Eleven trials of such procedures were done. The major findings in the laboratory were that in terms of average zones of inhibitions, Aim had the higher average compared to the other five toothpastes tested. From this evidence and after performing fifteen t-tests, the data did not support the hypothesis and it can be concluded that Aim was most effective against Staphylococcus bacteria in comparison to Colgate, Crest, Pepsodent, Ultra-Brite and Aquafresh.

316-05 Does Listening to Classical Music Affect Memory?

Benjamin Ross

(Mosley – Behavior)

This experiment was to test if listening to classical music while studying improves memory capabilities. To test this question, four sets of vocabulary words were organized and a set of 30 test subjects ranging from 14-16 years of age was gathered. Sets of 20 vocabulary words were read to each of the test subjects, the subjects were later asked to repeat as many of the 20 words as they can remember (not necessarily in order). Spacing the trials at least one day apart between people, a second, third, and fourth trial was conducted with each subject. In the latter three trials, there would be one more without-music trials and two with-music trials. The averages of each subjects score in both variable groups were calculated, and then an overall average of results for the without-music trials and the with-music trials were calculated. The results of the experiment show that on average, people who listen to music while reviewing vocabulary end up remembering more words than people who do not listen to music while reviewing. These results support the hypothesis stating that, "On average, music will improve one's memory". Listening to music while reviewing vocabulary words will on average make one remember 0.5 more words than someone who doesn't listen to music while reviewing.

320-11 Reflection Perception

Iman Saad

(Mosley – Behavior)

The purpose of doing this experiment was to compare the ability of a right handed person to a left handed person in mirror writing. The predicted outcome was people who are left handed will write faster and have less letters wrong than right handed people. The time each subject wrote "This is written in mirror language" and the letters wrong was recorded. The subjects had to write each letter in the opposite direction it should normally be written. To see if the subjects wrote it correctly, the text was reflected when looking at a mirror. The average time and letters wrong was compared. There was a significance of 0.30 for the time for right and left handed people wrote the text. The letters wrong between the right and left handed people had a significance of 0.4. The results showed left handed people wrote faster and had less letters wrong than right handed people. From the evidence, it can be concluded that left handed people write quicker than right handed people.

316-20 The Effect of Cocoa Powder on the Growth of Bacteria

Tiffany Sanabia & Dominique Semple

(Sullivan – Products)

The purpose of this experiment was to test the effect of antioxidants in cocoa powder on the growth of probiotic bacteria found in Activia yogurt. Antioxidants, which are found in cocoa powder, are beneficial to the body, therefore we wanted to determine which type of powder would have the greatest effect on the growth of the bacteria. Antioxidants protect your cells from the effects of molecules produced when your body breaks down foods, or is exposed to radiation or tobacco. These molecules are also known as free radicals. We made chocolate agar with the various cocoa powders and streaked them with bacteria extracted from the yogurt. We also made regular agar plates as our control. As a result, we were unable to measure the growth of the colonies.

According to a visual interpretation of the data there was no significant difference between the growth of bacteria in any of the products tested and the regular agar plate.

318-20 Air Pollution Differences in Underground and Outside Stations

Patrice Sanderson

(Ross – Environment)

New York City transit is an alternate way of getting around without harming the ozone layer. But that does not mean the stations do not produce pollution that will harm human beings. In this experiment, the purpose was to test the differences in the outside train station and the underground station. To test the air a bucket was filled with water, and a bubble blower to collect air samples. For ten days air samples were collected for twenty minutes. The filled bucket was placed in a secluded area in the station. Each day, some water was set aside as the control. After each test a volt meter was used to test for electrolytes. Electrolytes are found in many substances. It is used in many different ways. There are electrolytes that are good for the human body that is needed in every day function. Then there are electrolytes in batteries that can be harmful to the human body. It is believed that that kind of electrolytes are found in pollution. There is no difference with how it is measured so the amount found in the control may be good while the amount in the sample may be polluted. The more electrolytes found in the sample, the more polluted the air in that specific place. The control was also tested to see how much electrolytes were there before it was tested. The results show that the above train station is more polluted. This may be true based on the fact that the outside train is open to all the city air pollution.

314-05 Bone Decay in Soda

Carmine See & Madeeha Sheikh

(Mosley – Products)

The purpose of the experiment was to determine whether or not soda can cause bone decay. It was predicted that each soda brand would lead to bone decay in all sets of animal bones. To test the effects of soda on multiple bones, the bones were soaked in soda and weighed on a daily basis. After five days the bones were dried over the weekend and then weighed. The weight of the bones before being soaked in soda was compared to the weight after being soaked in soda and then dried over the weekend. In each set of bones for each brand of soda there was a decrease in weight from the original weight of the bones. Bones in Sprite lost an average of approximately 53.3% of their weight, bones in crush lost an average of approximately 61.9% of their weight, bones in Pepsi lost an average of approximately 62.9% of their weight, and bones in Coca Cola lost an average of approximately 70.4% of their weight. These results support that soda does break down bones and can cause tooth decay.

316-14 The Strength of Glue

Ester Shamailova

(Ross – Products)

The goal of this project is to test the strength of glue. In order to do that bridges are made out of popsicle sticks in the shape of a sideways capital H with all three types of glues. To make the bridges stronger another popsicle stick is glued to both ends of the sideways capital H. Then with a rubber band and a string the bucket is attached to the center of the vertical line in the sideways H. Once that is done, weights (in grams) are carefully placed into the bucket. When the bridge breaks, the weight that caused it to break is taken out and then the mass of the bucket is recorded. Those steps are repeated to all thirty bridges (ten for each

320-09 Does Vitamin D or Vitamin C help pansies grow taller?

Rina Shuster

(Roehrich – Plants)

Pansies are flowers that bloom in spring, when fully grown they should reach heights of 6 to 8 inches. Pansies are naturally rich in Vitamin C, and they absorb Vitamin D from the sun. This experiment was done to see if the addition of Vitamin C or Vitamin D would most aid the growth of the flowers. Vitamin C and Vitamin D were both dissolved into water, in order to hydrate the plants. The plants were watered when the soil in the containers were dry, which happened approximately every other day. The plants were watered until the soil in the containers was fully saturated and could not hold any more water. There were drainage holes on the bottom of the containers so that the plants would not drown. When the plants started to sprout, (vitamin D being the first), the plants were measured in mm using a ruler. In the end the pansies watered with vitamin D with an average height of 5.6 mm at the end of the experiment. The control had an average height of 3.6 mm and vitamin C had an average height of 5.2 mm.

320-06 Effect of Temperature of Juice on pH Change

Shruti Singh

(Sullivan – Chemistry)

The experiment explored how the pH of different types of juices change in different temperatures. Eight different types of juices (cranberry, lemon, grapefruit, aloe, mango, pear, lemonade and apple juice) were separated into two categories: "warm," in which the samples were kept in an incubator around 34 °C and "cold," in which they were kept in a refrigerator. The pH of every juice sample was taken every day using a pH meter. Overall, the pH of most of the juices decreased, but they decreased slightly more rapidly in the warm samples. t-test results showed that there was no significant difference between the pH levels of each of the juices.

314-09 Understanding Lactose Intolerance

Feyisola Soetan

(Roehrich – Medicine)

Lactose intolerance is the inability to digest the milk sugar lactose. This is because of deficiency in lactase enzymes, which break down lactose into glucose and galactose. There have been milk substitutes for people who are lactose intolerant such as Lactaid. Lactaid works as milk for the lactose intolerant because it contains lactase enzymes. This project was completed to explore the activity of the lactase enzyme. This was done by adding lactase to products containing lactose and testing for glucose. Testing for glucose was done using glucose urinalysis strips. First, regular milk and Lactaid were tested without lactase to observe their qualities and how they differ in glucose concentration. Then, lactase was added to both milks and tested once again for glucose. This was done for six trials. The regular milk had a negative glucose concentration until the addition of lactase, upon where it turned positive. Lactaid had a positive

concentration throughout the collection of data. After the data was completed, the t-test was 11.06 with 10 degrees of freedom. Therefore, it can be stated with 99% accuracy that there is a difference in glucose concentration between regular milk and lactose free milk with the addition of lactase. Based on data results, it is the Lactaid that has more of a glucose concentration. It is made evident by the results, the activity of lactase, breaking down lactose into glucose and galactose in milk. Glucose cannot be found in regular milk, where there is lactose in its full form.

319-16 Amount of mold growth due to preservatives

Emily Sokolson

(Ross – Microbiology)

Fast food franchises like McDonalds and Wendy's are known to add large amounts of preservatives in their French fries. Preservatives like citric acids and the high content in these fries affect the way the French fry breaks down in your body. McDonalds is proven to contain the most preservatives therefore it will grow the least mold. This experiment tests the difference in the amount of preservatives added in fast food French fries and homemade French fries. Forty glass tubes were lined up with 2 fries in each tube. There were 10 tubes with homemade fries, 10 tubes with Wendy's fries, 10 tubes with McDonald's fries, and 10 tubes with nothing inside (control). Pictures were taken of each tube everyday to record the amount of mold that grew on the potatoes. Another way bacteria was grown was by swabbing the fries on the agar plates. At the end of the thirteen days it was found that all of the fries grew the same amount of mold and bacteria. The bacteria for the McDonalds was growing at a 4+, the Wendy's was growing at a 4+, homemade as well, the control was growing at a 1+ (no growth). The data does not support my hypothesis. The amount of mold growth on the fries indicates a low concentration of preservatives in all the fries.

319-04 The Relationship Between Music and Being Able to Focus

Michael Taormina

(Sullivan – Behavior)

This experiment was done to see if listening to music could help people focus and finish their tasks faster and if it did then what kind of music. The hypothesis was that the slower music will help the student focus more than the faster music and they'll be able to finish the task the fastest. For the experiment a stopwatch, a pencil, 3 sets of 3 different mazes, headphones, and a device to listen to music were needed. Nine students were timed on how long it took them to complete the maze. There were three procedures tested. The first was with no music, the second trial was with fast paced music and the third was slow paced music. The testing groups completed a maze for each trial. According to the "No Music" there were significantly better results in terms of how fast the group was able finish the mazes. The times it took to finish ranged from 42 seconds to 1 minute and 58 seconds. The "Fast Music" trial ranged from 48 seconds to 2 minutes 58 seconds. The "Slow Music" trial ranged from 56 seconds to 2 minutes 15 seconds. This was actually slightly faster than the results of the "Fast Music" trial. However there was no significant difference between the two trials with music. Slow music was more effective than fast music when doing a task but no music improves was the most effective.

319-19 Does Music Affect Memory?

Beyhan Taylan

(Roehrich – Behavior)

The purpose of this experiment was to test whether or not music affects memory. Previous experiments were conducted and classical music was proven to improve memory. Music was proved to relieve stress, and alleviate depression. For this experiment ten students studying in Midwood High School were tested, and their ages ranged from 14-16. For this experiment the students were given twenty vocabulary words and their definitions to memorize within two minutes. The students were given a

sheet contain the definitions of the words they read before, and required to write the word corresponding to the definition. Students were tested in different settings. The student was given trials in a quiet area to review the vocabulary definitions then tested. They were required to listen to music of different genres, and review at the same time, and tested still listening to the music. Finally, the students that were tested were graded if they correctly paired the vocabulary (from the sheet they previously reviewed) to the definition. From the data I collected classical music slightly improved memory compared to a quiet environment, but rock music and pop music resulted into lower results compared to a quiet environment. In conclusion, certain music such as classical music does improve memory while others like rock and pop do not. However, why rock and pop music did not improve memory, but resulted into lower percentages is unknown.

314-22 Bop It EXTREME!

Gianni-Niamani Theobbles & Shanice Morgan (Mosley – Chemistry)

The purpose of doing this experiment was to test the effect of stimulants on response time. The stimulant used was Monster energy drink. First, 20 volunteers played Bop It Extreme three separate times. Then the average score was taken. Next, each person was given 80 mL of the Monster to drink. Each subject waited 10-15 minutes and then they did another three trials with the Bop It Extreme. The average score with Monster increased by about 10 compared to the average score without the Monster. As our hypothesis stated the Monster energy drink does have an effect on how fast your response time is. Monster stimulates your brain and effects how it functions. In this case, it caused an increase in the response time of the subjects drinking the Monster causing the scores to increase when playing Bop It Extreme.

316-02 What is better for organisms material radiated in plastic or glass

Glenmore Thomas Jr (Ross – Plants)

Microwave radiation is harmful to living organisms. Studies have been performed which shows that microwave radiation affects people negatively and can cause cancer in people. The experiment tested was if microwaving things in plastic are better for organisms than microwaving things in glass, weather the plants will have more successful growth with being watered with water radiated in glass over the plants that were watered with water that was radiated in plastic. The experiment had three different groups consisting of an even number of plants. The control group was watered with pure water, one of the two experimental groups was watered with water radiated in plastic, and the other experimental group was watered with water radiated in glass. The plants were kept in a place where they had equal sunlight and they were given an equal amount of water according to their group. On the final day the height of the plants were recorded. The data showed that the control group was the most successful group, the experimental group of plants watered with water radiated in plastic was the least successful, the experimental group of plants watered with water radiated in glass was more successful than the experimental group watered in plastic but not as successful as the control group.

319-01 Pearly Whites

Kelly Tom & Eunice Lee (Sullivan – Products)

Many people want white teeth, but how would they achieve it using whitening products? So our experiment is on measuring the effectiveness of whitening strips and whitening toothpastes. We hypothesized that whitening strips would work better than the whitening toothpastes because it was more expensive. To conduct this experiment, we used stained eggs to test the products. After we conducted our experiment, our hypothesis was refuted. The data we received made us realize that whitening

toothpaste works better than whitening strips. Therefore, whitening strips is not worth buying.

320-07 Males vs. Females: Amount of Taste Buds

Patryk Trzonkowski

(Sullivan – Medicine)

In this experiment I wanted to see if there was a significant difference between the amount of taste buds in males and females. There were many conflicting studies of previous experiments done to see if there was a significant difference in the amount of taste buds between males and females and some studies stated that there was no difference and others said that females had more taste buds than males. I wanted to see who was right. There are many factors that affect taste and other factors that actually kill your taste buds. I predicted that females would have more taste buds. I took 10 males and 10 females and put blue food coloring on their tongue and counted their papillae with a magnifying glass. My results indicated that there was no significant difference in the amount the taste buds between males and females; my hypothesis was refuted. The taste bud killing factors could've affected my results such as burning of the tongue, life cycle of taste buds and chemicals. My sample size may have been too small. The studies I have researched tested thousands of people rather than testing only twenty people. Size of people's tongues could've also affected my results. Scientists today still haven't figured out why some women may have more taste buds than men.

319-22 Refractive Indices of Different Substances

Emily Tung

(Ross – Physics)

Refraction is the bend in light that passes from one medium to another medium. This happens because light travels at a different speed once it hits the other medium. Therefore it travels in a different direction, creating a bend, thus an angle. For this experiment, salt water, sugar water and vinegar water are all tested for their refraction angles and compared to the general refraction angles in plain water, which is the control. The hypothesis is that all three substances will have smaller refraction angles. Therefore they will have greater refractive indices than water. The refractive index indicates how severe the refraction is. The reason that these substances are predicted to have a smaller angles/bigger refractive indices than that of water is because different substances will have different properties. These properties will disturb the normal path of light that usually goes through water. The methodology of this project is to measure the refraction angles first of each substance. Using a laser pointer and protractor. They each go through nine trials. Every three trials start with a new incident angle, which is the angle in the air. After all the refraction angles are found, the refractive index of each trial is determined. After those are determined, the average refractive index for each substance is found. The average refractive indices of water, salt water, sugar water, and vinegar water are 1.33, 1.40, 1.48, and 1.5 respectively. After performing t-testing, there is an acceptable difference between the refractive index of water and each of the three variables. Therefore it can be confirmed that refractive index will be greater when another substance is added to water. Also, vinegar had the greatest refractive index.

320-21 Soaps and Their Affects on E. Coli

Roman Vinokur

(Sullivan – Microbiology)

My experiment is about the effect of different hand soaps on the bacteria E. coli. Bacteria is defined as a member of a large group of unicellular microorganisms lacking organelles and an organized nucleus. E. coli is a gram-negative bacteria which is mostly found in the small intestines of a living organism. E. coli can affect a humans health severely, especially if their immune system is compromised. I used agar plates with E. coli inside of them. I used hand soaps such as Soft Soap, Caldrea, and Aquarium to see

which works best against the bacteria by measuring zones of inhibition after adding the soaps to the plate.

318-10 Reproduction of Planaria

Sarah Walsh

(Ross – Animals)

The purpose of this experiment was to test the rate of reproduction between planaria under two separate light conditions. Planaria can reproduce sexually and asexually, and they normally reproduce successfully in room temperature. Two environments were set up; one in room temperature and one under fluorescent lights that would raise the temperature of the environment the planaria were placed in. The planaria were placed for eleven days under the fluorescent lights that ran on a 12-hour cycle and in daylight streaming from a window. Each day the Petri dishes in which they were kept were cleaned and the number of planaria was recorded to mark the rise and fall in the number of planaria. The hypothesis stated that the planaria in the daylight dish would reproduce at a faster rate, as planaria usually reproduce normally in room temperature. The temperature in the fluorescent light dish would be too high for a faster rate of reproduction. After the experiment was conducted, the results from the data showed that the average number of planaria in the fluorescent light dish was significantly higher than the average number of planaria in the daylight dish, however the data collected did not support the original hypothesis. An error could have occurred during the experiment if the fluorescent lights malfunctioned or the temperature in the daylight environment was drastically altered in any way.

319-24 How Acids Affect the Oxidation for Apples and Pears.

Emily Wang

(Roehrich – Biochemistry)

The purpose of conducting this experiment is to see which acid works best in slowing the oxidation rates for pears and apples. Fruits that was peeled and left out begins to brown, which leads to food being wasted. When fruits such as apples and pears oxidize it is due to an enzyme that is reacting with oxygen. A way to slow down the rate of oxidation is to lower the pH of the surface of the fruit. Since lemon juice, lime juice and vinegar are all acids with low pH, it will lower the pH of the surface of the fruits. For this experiment, sliced apples and pears were covered in three different acids with low pH (lime juice, lemon juice and vinegar). One slice of each fruit from each trial was set aside as the control, while the other slices were the experiments that are being compared to the control. The percentage of oxidation on each slice is measured by the grids on the slices. Each slice has grids carved into them in order to calculate the percentage of browning, the squares of each grid on the slices are approximately the same sizes. The slices are checked every 8 minutes and observed. In conclusion, lime juice is the most effective acid at slowing oxidation with its low percentage of browning on both slices of apples and pears.

314-16 How Does Laundry Detergent with Phosphate Affect Plant Growth?

Grace Win

(Ross – Plants)

Laundry detergent is used to wash clothes, and people aren't aware of what specific kinds of ingredients it has, and what it can do to the environment. Before the ban of phosphates in laundry detergents in 1993, they contained phosphates, which were used as "builders" that helped wash away the grease and dirt from clothing. However the remaining water waste from the wash was carried into all sorts of bodies of water. Phosphates can be used to help plants grow, so when this water waste went into bodies of water, it caused an increase in the growth of algae and other plants. This then caused an increase of oxygen that led to many fish and other sea creatures to die. This experiment was to find out how laundry detergent with sodium phosphate would affect plant growth. The hypothesis was that the plants watered with the laundry

detergent with sodium phosphate will not grow at all. There were three groups, one watered with water, another watered with a laundry detergent solution and the last group watered with a laundry detergent with sodium phosphate solution. By the end of three weeks, plants in all three groups had grown. The group with the highest average height in cm was the group that was watered with water. The group with the lowest average height in cm was the group that was watered with the laundry detergent solution. Since plants grew in the group watered with laundry detergent with sodium phosphate, the hypothesis was not supported.

318-11 Chips on Fire!

Sandy Wu & Candice Zhong

(Mosley – Chemistry)

The purpose of our experiment is to determine which types of chips contain the most potential energy by finding the average calorie per chip. A calorimeter was used. It consisted of a ring-stand, a can, a needle in a cork, different kinds of chips, and a lighter. The can contained 25 mL of water at 25 °C. The chip was weighed and was placed on the needle. Then, the cork was placed under the can and the chip was lit on fire. A thermometer was placed in the can to measure the increased temperature of the water. This was repeated nine more times using the same brand of chips. Five different types of chips were tested and a total of 50 trials were recorded. In conclusion, Cheez Doodles puffed had the most potential energy and Microwave popcorn had the least potential energy. The Cheez Doodle Puffed had an average of 7.24 calories per chip and the Microwave Popcorn had an average of 6.91 calories per chip.

314-14 Music Effect on Concentration

Javlon Xaydavov

(Ross – Physics)

Many people listen to music when carrying out various tasks throughout the day. It is hypothesized that there is a relationship between music, mood, work efficiency and concentration. This experiment was conducted to find correlation between specific genres of music as well as to find music effect on concentration and work efficiency. Ten boys played a math game (Raindrops) without music as a control group for two minutes. Afterwards the same ten boys played Raindrops while listening to a certain genre of music (pop, rock, classical, and country) for two minutes each day. The outcome was that the control group averaged 2624.5 points, pop averaged 2888 points, rock averaged 2945.0 points, classical averaged 3209.0 points, and country averaged 3051.7. Classical music averaged a higher score than other music genres. In conclusion, all groups had higher scores than the control group which supports the hypothesis that music does have an effect on concentration and work efficiency. Classical music had better correlation with concentration and work efficiency than any other genre.

320-15 Comparison of Vitamin C Concentration of Orange Juice and Apple Juice

Jordan Yan & Kenny Isufi

(Sullivan – Products)

Vitamin C is an essential nutrient for humans. Vitamin C, also known as ascorbic acid, is found in fruits and vegetables. Vitamin C is found in most brands of orange juices and apple juices. In our experiment, we test and compare the concentration of Vitamin C found in different brands of juices. We compare the different concentration between brands and between the two types of juices. In order to test the Vitamin C concentration, we mixed together a Vitamin C indicator solution. Then, we would test the volume of juice required to neutralize a certain amount of indicator solution. As a result, we find out that homemade orange juice had the highest concentration of Vitamin C because it required the least amount of liquid to neutralize the indicator solution.

318-08 The Effect of Toothpaste on Bacteria

Sabrina Yang

(Roehrich – Products)

Inside our mouth there are many unhealthy bacteria. These unhealthy bacteria could lead to problem such as toothache, cavity, gum disease and the cause of tooth loss. To prevent these problems it is important to keep our mouth clean. One way is to brush our teeth with toothpaste everyday. Many manufactures developed their own brand of toothpaste and claim theirs works the best. In this experiment it involves comparing four brands of toothpaste; Colgate, Crest, Aquafresh, and Aim. The purpose of this experiment is to compare and find which toothpaste works the best against bacteria called Escherichia coli (E. coli). First the bacteria, E. coli, is spread on the surface of a agar Petri dish. Then an anti-bacteria disk is placed on the same agar Petri dish for the control and along with three more anti-bacteria disk covered with toothpaste as the three trials. These steps are repeated for all brands of toothpaste. The toothpaste that works the best is the one with the most zone of inhibition. The result of the experiment shows that Colgate works the best out of the rest of the toothpaste with an average of 25.3 mm for zone of inhibition. Out of all the toothpaste Colgate cost more, but not a significant amount and it is worth its price for its results.

318-03 Does sugar help preserve carnations?

Jocelyn Yeung

(Roehrich – Plants)

My project involves the use of sugar to preserve fresh-cut carnations' lives. The purpose of this project is to determine how different amounts of sugar affect the life span of a cut carnation. My hypothesis was that if there is more sugar in the water in which the carnation is in, then the carnation will live longer. I began the project by gathering 12 carnations, 12 labeled cups, measuring spoons, vinegar, and sugar. Then, I placed water into the 12 cups until each cup was $\frac{3}{4}$ full. I added $\frac{1}{4}$ teaspoon of vinegar into each cup. Next, I added $\frac{1}{4}$ teaspoon of sugar to three cups, $\frac{1}{2}$ teaspoon of sugar to three cups, and 1 teaspoon of sugar to three cups. I stirred the mixtures until the sugar completely dissolved to give me a sugar water solution in the nine cups. Lastly, I placed a carnation into each cup. After collecting data over a period of about two weeks, my experimental results show that sugar does and does not help preserve carnations, depending on the amount of sugar added. The carnations put into solutions with $\frac{1}{4}$ teaspoon of sugar stayed fresh for the longest time and the carnations put into solutions with 1 teaspoon of sugar, $\frac{1}{2}$ teaspoon of sugar, and no sugar were the first to start wilting. Based on my results, I can conclude that fresh-cut carnations are able to last longer when placed in solutions of sugar of higher concentration but only up to a certain level.

316-10 The Effect of the Amount of Fertilizer on Plant Growth

Hillary Yip & Karry Ho

(Sullivan – Plants)

The purpose of the experiment was to find the relationship between plant growth and fertilizer. The test is to see if there is any significant difference in using different concentrations of fertilizer. The reason for this experiment is to see if when using fertilizer, is it necessary to use the amount that we are told to give or if other amounts can work just as well. The hypothesis is that the original amount will work the best and plant growth in terms of height will be the highest in this group. Our procedure was simply to spray solutions that are made up of water and fertilizer on the paper towels in the plastic bags. Nine seeds are put into each bag and we see the growth of the plants as time passes. After 3 weeks have passed, the control group, the group with no fertilizer, had the highest average in terms of height of the stem in both seeds. The t-test value of the marigold seeds, one of the two seeds that we had used, is 2.7488 and it showed a significant difference because the number had passed the 95% confidence level. For the zinnia seeds, another seed we had used, there was no significant difference because the

number 2.0754 did not pass the 95% confidence level. In conclusion our hypothesis was not supported; the control group was the one that worked the best and only in the marigold seeds showed there was difference in using a different concentration.

320-18 The effectiveness of different types of wipes

Jessica Yip

(Roehrich – Products)

Germ is everywhere! Find out how effective different types of wipes are against the bacteria that grows on your hands on this hands-on experiment. The skin is our first line of defense that protects the rest of the body from the pathogenic bacteria living in our environment. Within a few minutes, a person's hands may encounter numerous microorganisms and bacteria that can be transferred simply through touching public objects such as door handles, railings, and holding onto poles on public transportation. Moist wipes and antibacterial wipes were developed to clean hands when soap and water are not available. To conduct this experiment you would need three students and three different types of wipes. The three participants placed their hands in one Petri dish, then used a wipe that was assigned to them to clean their hands. The wipes that were tested were the Wet Ones antibacterial wipes, Wet Ones gentle and Huggies. Next, they placed their cleaned hands in another Petri dish. You would compare the effectiveness of the wipes by estimating the number of bacterial colonies grown on the Petri dish that students touched with their dirty hands with their cleaned hands. From the data collected from the eight trials, the participant who used the wet ones antibacterial wipes had the greatest decrease in the bacterial growth compared to the other two participants who used the wet ones gentle and Huggies wipe. In conclusion, the most effective wipe against bacteria growth was the wet ones antibacterial.

320-14 How Can Sight Affect Taste?

Corinna Yong

(Mosley – Behavior)

The purpose of this research is to ascertain how sight can affect taste. This study involves using sight and its effect on taste using different flavors of jellybeans. The hypothesis is that if taste is tested with and without sight, then taste will be better with sight because of the brain's ability to acquire more information using the senses and taste buds. Thirty students were taken from a high-school setting and were given a total of ten jellybeans. Subjects were given five different flavored jellybeans with their eyes closed, and then the same five jellybeans with their eyes open. This was to be repeated for a total of thirty subjects. Data was then recorded and analyzed. The data has shown that the average (based on a point-system out of 25) without sight is 19.4, whereas the average with sight is 23.27. The study concludes that sight significantly affects taste. This case can prove useful in learning the development of human taste buds.

314-17 What liquid has the highest surface tension?

Manashir Zarbailov

(Sullivan – Chemistry)

My project is about the surface tension of a liquid. Surface tension is the intermolecular forces that are at the surface of a liquid. Two things effect surface tension and they are density and how strong the intermolecular forces are. I tested ten liquids, such as water, milk, coffee, tea, grape juice, apple juice, orange juice, oil, rubbing alcohol, and Pepsi. I poured each liquid in a cup fully and dropped pennies in the cup; when the liquid overflowed I stopped putting pennies and counted how much were in the cup. Rubbing alcohol overflowed first, therefore it has the lowest surface tension. Water overflowed last, therefore it has the highest surface tension. In conclusion, water has the highest surface tension.

316-17 To Go or Not To Go?

Julia Zelenko

(Mosley – Microbiology)

This experiment was conducted in order to find if there is a significant difference between the amount of bacteria that grows on the door handle of a bathroom and the amount of bacteria that grew on the button that flushes the toilet. In order to conduct this experiment, swabs were taken off of two areas in a bathroom: the door handle and the button that flushes the toilet. These swabs were then swiped on designated areas of the Petri dishes and incubated at 37 °C. After 24 hours of incubation, the Petri dishes were looked at and rated from 1+ to 4+ (1+ symbolizing little to no growth of bacteria, 4+ symbolized the swabbed area was covered with bacteria). The data collected through this experiment showed that the average amount of bacteria that grew on the door handle of the bathroom was 1.45+, which was less than the average amount that grew on the button (3.55+). After performing a t-test, a valid conclusion can be drawn that there is a significant difference between the amounts of bacteria that grew in each area. The amount of bacteria that grew on the button that flushes the toilet is significantly larger than the amount of bacteria that grew on the door handle.

319-13 Which product stains teeth the most? Coffee, Tea, Water, or Coke?

Bella Zilber

(Ross – Medicine)

The staining of teeth affects people in their everyday lives. Teeth are made of Calcium and they are defenseless against acids. The things we drink daily contain acids. Such as tea, coffee and coca-cola. Throughout the experiment, eggshells were used as a substitute for teeth because they're very similar. They both erode and stain when they come in contact with a lot of acids. The hypothesis that was made is that coffee will stain teeth the most. The first step was to empty out the eggs and put 10 hollowed out eggs into each container. Each container contained a different liquid. It was coffee, tea, coke or water. For 15 days pictures were taken of the eggs. The data did not support the hypothesis because tea stained the eggs the most. Therefore tea stains teeth more than coffee and coke. Water had no effect on the eggs. Tea stained teeth the most because it contains the most Tannic acid.

319-21 Kill the Bacteria with Mouthwash!

Bing Zou

(Roehrich – Cellular)

Antiseptic mouthwash is a health-care product used to improve oral hygiene and to kill dental plaque which causes cavities and bad breath. Most mouthwashes contain ingredients including water, ethyl alcohol which kills oral flora, flavorings, dyes, and the element fluoride which helps to prevent tooth decay. In this experiment, the effectiveness of various mouthwashes against the bacteria *Staphylococcus epidermidis* is being tested. *S. epidermidis* is a Gram-positive bacterium commonly found on the human skin, as well as the human mouth. The three mouthwashes used in this experiment were Listerine Cool Mint antiseptic mouthwash, Listerine Total Care mouthwash, and Scope Cool Mint mouthwash. By performing an antibiotic sensitivity test, the effectiveness is able to be determined. It appears that the Scope mouthwash is most effective against *S. epidermidis* by having a zone of inhibition of 39.6 mm compared to the other two mouthwashes' 21.6 mm and 16.0 mm. The results explain the significant effectiveness of mouthwash against the bacteria in the human mouth and that mouthwash treatment can be used to enhance oral hygiene.

Room Arrangements

A314, A316, A318, A320

A319 (Chemistry Lab)

