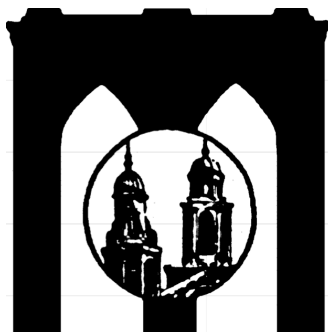


MIDWOOD HIGH SCHOOL RESEARCH PROGRAM SCIENCE FAIR 2024





2024 Midwood High School Science Fair

23 May 2024 — 2:00 to 6:00 PM

Robert Quinlan — Principal
Jenessa Kornaker — Assistant Principal
Tovia Rosenfeld — Assistant Principal
Glenn Elert — Research Coordinator
Stacy Goldstein — Research Teacher
Avel Cunningham — Research Teacher
Khrisna Alvarez — Research Teacher
Susan Katzoff — Research Teacher

Timeline

2:00–2:45 PM (Period 9)

Junior and senior judges meet in the library
Junior and senior judging packets distributed (time to read abstracts)
Junior and senior tasks explained

2:45–3:30 PM (Period 10)

Scheduled classes on 3rd floor annex moved to main building
Junior and senior judges set up rooms
Guest judges arrive and pick up judging packets in A214 (Research Room)

3:30–4:45 PM

Sophomores move to assigned rooms, boards already in position
Sophomores given time to complete setting up
Judging begins ~3:45 PM

4:45~5:00 PM

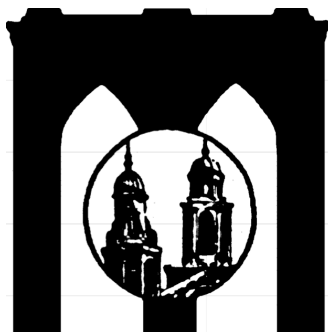
Judges return to A214 (Research Room) with completed packets (calculators available)
Judges given color-coded food tickets
Sophomore teachers provide students with color-coded food tickets
Sophomores return boards to A214 (Research Room)

5:00~6:00 PM

Food self-service in A313 (Physics Lab) in groups by ticket color
Use overflow room A319 (Chemistry Lab)
Juniors and Seniors assist with clean up

6:00 PM

The 2023 Midwood High School Science Fair has ended
See you in 2025!



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Alumni

Mie Abouelkheir, Fariha Ahmed, Simoni Basnet, Kezia Boateng, Meerab Cheema, Farhan Chowdhury, Samia Farid, Ramsha Farooq, Mohammad Hassan, Md Hoque, Adriena Jiang, Noor Khawaja, Sabina Kubayeva, Altin Kukic, Anastasiya Matveyenko, Allan Nosoff, Anthony Nosoff, Anna Obertos, Christina Obertos, Sara Qureshi, Hassan Rizwan, Benjamin Rudshteyn, PhD, Almas Shafiq, Zainab Tanvir, PhD, Victoria Tatarynova, Christine Truong, PhD, Prianka Zaman

Seniors

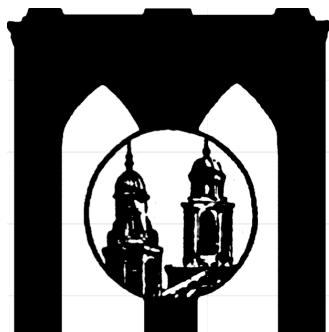
Brandy Antoine, Sanbina Babar, Justin Bailey, Masha (Mar) Bazilevich, Ashley Castillo Mendez, Ariane Charles, Elana Chen, Grace Chen, Huiying Chen, Vienna Chen, Xinwei Chen, Diana Chen Feng, Ayesha Chowdhury, Joshua Coleman, Kassidy Donald, Jennifer-Runling Fan, Rikza Fatima, Zehra Girgin, Lucy Guo, Sabrina Henry, Humayrah Hossain, Jessica Hu, Shirley Huang, Ling Xin Jiang, Batool Kamal, Hamood Khan, Max Kogan, Hailey Lau, Jaimie Ling, Shan Shan Luo, Lena Maad, Katelyn Martinez, Magaly Mendoza, Devin Morales, Areeba Mubarik, Emely Rivas, Victoria Ronan, Yanhe (Linda) Rong, Eman Shabbir, Meheri Syeda, Hai Li (Vivian) Sze, Nuzhat Tabassum, Elana Toyber, Julia Vargas, Alejandro Velasquez, Sonya Wang, Chloe Wu, Linda Xiao, Jinyu Xu, Rebecca Yakobovich, Oleg Zaika, Christina Zhang, Eric Zhang, Fiona Zhao, Vicky Zheng, Joanne Zhu, Joey Zhu

Juniors

Tomiriz Abdulkhamidova, Mohammad Ahmad Sabri, Afzal Akhtar, Sarah Bandilli, Anayeli Bermeo, Benjamin Brinzensky, Cholco Chan, Whisty Chan, Ashley Chen, Bradley Chen, Cathy Chen, Jenny Chen, Shahzeen Chowdhury, Anthony Dai, Alison Danilovich, Zoe Dean, Aaron Deng, Jiajun (John) Dong, Shaymaa Elrashidi, Isabel Eppel, Dana Flores Zeledon, Christian Gabelman, Sara Grezda, Jodi Guan, Rachel Huang, Yi Tong Huang, Yahya Hussain, Leah Josephson, Ahlam Judeh, Stephanie Kalam, Sukhdeep Kaur, Sierra Kelly, Denys Kolomiiets, Philip Kong, Eric Lau, Zachary Lee, Jaina Leung, Whitney Li, Becky Lin, Whaley Lin, Firdavs Marupov, Adreinne Mercado, Daisy Meza Veliz, Weiyee Mock, Kelly Ng, Emily Oliner, Ravital Reingold, Gavin Rice, Gautam Saji, Evelyn Giselle Serrano Flores, Michael Shohat, Faiza Soha, Denny Ting, Sienna Veseli, Wan Wu, Zongle Yang, Janetta Yanova, Nicolehe (Nina) You, Kaiyue Yuan, Feiyang Zhang, Sylvia Zheng

Teachers

Mie Abouelkheir, Gloria Aklipi, Madeline Crump, Liz Fenamore (retired), Joel Gumbiner (retired), Billy Hudacek, Jason Keating, Denise McDonnell (retired), Tiffany Peat, Jennifer Sullivan



2024 Midwood High School Science Fair

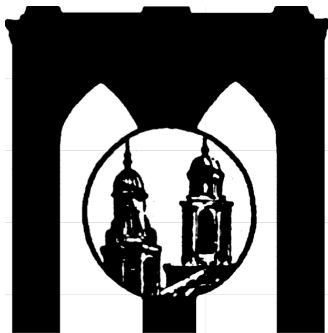
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Sophomores

- 318-18 Aiyerke Aibek
Reviving Blooms: The Best Additives for Longer-Lasting Cut Flowers
- 318-06 Tatyana Aikens
The effectiveness of various drugs on rate of reaction and target area
- 318-03 Amr Aljahmi
Arduino breathing sensor
- 320-20 Parizoda Bakaeva
The effect of various beverages on pH of urine
- 314-15 Michelle Botvinsky & Eve Zakroisky
Investigating Alternative Materials for Oil Spill Cleanup
- 316-06 Marliza Campbell-Dorsey & Emily Peng
Pac-Mania! Stress, Heart Rate, and Sound Exposure
- 320-03 Alisha Chen & Bella Wanle Ye
Comparative Analysis of Sunscreen Brands for UV Protection
- 314-11 Allan Chen & Juno Zhang
Comparison of Electrolyte Concentrations in Popular Drinks for Optimal Hydration and Recovery
- 318-05 Emily Cheung & Avril Chen
Will it Filter? Activated Carbon vs. Banana Peels
- 316-01 Jaylen Chin & Jackson Chen
A comparative performance analysis between fixed & tracking solar panels
- 318-10 Meerab Chishty & Mariam Gvasalia
Investigating the Effect of Sucrose and Glucose on Tooth Enamel Decay
- 316-16 Yiru Fang & Kelly Li
Effect of water pH on the number of chloroplasts in egeria densa
- 320-01 Hafsa Fnu & Sophia Ugazovas
Spray Away: The Effect of Different Disinfectant Spray Brands on Bacterial Growth on Doorknobs
- 320-11 Mahnoor Ghuman & Kyra Britton
The Influence of Text and Background Color on Retention Abilities
- 318-01 Daniel Hernandez & Haley Chen
H2-Oh Yeah! An investigation on Midwood Water Fountains
- 320-16 Zi Hai Hou & Xinying Lu
Battle of Antacids Against Acid Reflux
- 316-18 Kalok Huang
Which type of fruit is more acidic: lemon, orange, lime, watermelon, or pineapple
- 314-03 Queeny Huang & Sanna Ngo
Mindful for Math
- 320-13 Selena Jiang & Hui Yi Weng
Comparing Fluoride Concentration in Popular Toothpaste Brands
- 316-03 Nathanaelle Joseph & Charlotte Maloney
Temperature's influence on Bouncy Ball Heights
- 320-08 Sharika Khan
Bacterial Growth on Surfaces.
- 314-20 Erica Khankin & Rita Lin
The effect of classical and pop music on heart rate
- 316-13 Kevin Li
Glucose in Cooked and Uncooked Vegetables
- 320-18 Lena Li & Saba Khoja
Comparing the efficiency of various antacid brands on neutralizing pH levels of stomach acid

- 318-13 Manuel Li & Daoud Mirza
Comparative Analysis of Plyometric and Weighted Exercises on Vertical Jump
- 314-16 Michelle Li & Adisa Sokoli
Bacterial Battle
- 314-10 Vivian Li
Acid Rocks
- 316-10 Pamela Lin
Comparative Analysis of Lysol and Clorox Wipes on Bacteria Reduction on Computer Surfaces
- 320-06 Vincent Liu & Eugene Qian
Exploring the Impact of Online Gaming on Academic Performance
- 316-21 Eric Lu & Mohammad Hussein
Colors influence on memory
- 318-20 Helen Lu & Tiffany Zhen
Effects of pH Level in Water on the Growth of Mung Beans
- 320-15 Daoud Mirza
Comparative Analysis of Plyometric and Weighted Exercises on Vertical Jump Performance
- 316-20 Benny Armelle Ngouekem Kouleho
Greater-aid to electrolytes? Perhaps orange juice is more suitable
- 316-11 Kathryn Otkydach & Luis Olvera
Investigating the Relationship Between Body Mass and Impact Force in Falls on Different Materials
- 318-16 Han Xin Ou Yang & Abril Flores
The investigation of amylase enzyme digestion time on the production of reduced sugar in various fruits and vegetables
- 316-05 Mariella Pinsky & Emma Bitelman
Moisture Match
- 314-05 Sadnan Pranto & Antony Zheng
A Bright Idea: UV Light Exposure vs. Bacteria
- 318-11 Maham Sehail & Souhila Elsayyed
Bioplastics for a Sustainable Future
- 314-18 Linoy Shamuilov
Investigating the Effects of Essential Alkaline Water on Heartburn and Longevity Factors
- 318-15 Spencer Spallone & Ben Ference
Which storage containers prevents Mold Growth
- 314-08 Yuqi Su & Chloe Cho
Healthiest Water Based on pH
- 314-13 Grace Sudol & Taylor Morries
Investigating the Impact of Caffeine on Mung Bean Plant Growth
- 314-01 Akash van Koert & Alexandra Rakhovski
Berry Badness
- 320-10 Winnie Wang & Madison Wong
High Schools High on Lead
- 320-05 Timothy Wong
Investigating the Influence of Sunlight on Mitosis Rate in Amoeba Proteus
- 316-08 Athena Wu & Zuvi Quang
Digging Deep - Basic or Acidic?
- 316-15 Leo Ye & Ivan Chen
Investigating Soil Liquefaction and its Impact on Earthquake-Prone Areas
- 318-21 Nermin Zafar & Maribel Santacruz
The Impact of Acid Rain on Seed Germination Rates
- 314-06 Aseel Zeina-Alshehadeh & Wagd Elhag
Investigating the Effect of Temperature on Catalase-Mediated Decomposition of Hydrogen Peroxide
- 314-21 Karen Zevelev & Cherry Amancio
Oil Spill Savior: Testing Methods for Water Purification
- 318-08 Aziza Ziyadulloeva & Kathy Liang
Water Quality on Marine Life



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Abstracts

318-18 Reviving Blooms: The Best Additives for Longer-Lasting Cut Flowers

Aiyerke Aibek

(Ms. Goldstein – Plant Science)

This study investigates the effects of various ingredients on the longevity and freshness of cut flowers, focusing on common additives used in floral preservation. The experiment tested sprite, bleach, aspirin, and commercial floral preservatives on *Dianthus caryophyllus*. Flowers were placed in water solutions containing one of the additives and observed over two weeks. Measurements of vase life, petal wilting, and discoloration were taken daily. Results indicated that sprite significantly extended flower freshness, adding an average of 10 days to vase life. Water also improved longevity but to a lesser extent, while bleach and aspirin had minimal to no beneficial effects, sometimes accelerating wilting. These findings highlight the superiority of sprite in maintaining cut flower vitality, with bleach as a less effective alternative. Further research is recommended to explore the molecular mechanisms behind these effects and to test a broader range of flower species and preservatives.

318-06 The effectiveness of various drugs on rate of reaction and target area

Tatyana Aikens

(Ms. Goldstein – Medicine & Health Science)

The study examined the solubility of two over the counter (OTC) medications by dropping them into a 1M hydrochloric acid solution. The time it took for the medication to dissolve completely was recorded to understand its solubility behavior. This is crucial for drug effectiveness and absorption within the body. The average dissolution time for the OTC medication in hydrochloric acid was found. This study contributes to the understanding of OTC medication solubility and its implications for pharmaceutical development. By exploring dissolution characteristics, researchers and pharmaceutical companies can improve drug formulations to maximize effectiveness. The findings have significant implications for drug formulation and the development of more effective pharmaceutical products.

318-03 Arduino breathing sensor

Amr Aljahmi

(Ms. Goldstein – Engineering)

The Arduino breathing sensor has the ability to investigate people's breathing and whether they use their diaphragm which is beneficial to the body. The diaphragm is a dome shaped muscle at the base of the lungs. This muscle helps the lungs expand and contract while using 100% of your lungs. An Arduino is attached to alligator cables on a strap with a stretch sensor testing if a person is using their diaphragm and the difference after a minute of practice. The data is then collected as ADC values or analog to digital converter assumes 5 volts that comes from the Arduino through the sensor is 1023 and anything between is a ratio between 5 V and 1023. The stretch sensor is attached to a strap

and around the person below the upper lungs and as it is stretched the value changes. In addition, the lower the ADC values the more the person used their diaphragm. Based on the data almost all had lower values after practice proving that most people don't use their diaphragm while breathing.

320-20 The effect of various beverages on pH of urine

Parizoda Bakaeva

(Ms. Goldstein – Medicine & Health Science)

The purpose of this project is to understand and evaluate the effect that beverages have on urine pH. Previous research results done on the consumption of caffeine on the kidneys indicated that rapid elimination of urine occurred because of the effects that caffeine has on kidneys. Knowing this type of information is essential for one's health and can allow a person to identify if they have kidney disease through their urine. The methods used to execute this project was using a pH meter to determine the pH level of urine after the addition of water, orange juice, and ginger ale. The data that was collected indicated that more acidic beverages like orange juice and ginger ale made pH of urine more acidic compared to water which resulted in a neutral pH. An ANOVA test was used to identify that these beverages did not have a significant difference on urine pH. These findings are significant because it allows people to understand that these certain beverages have no effect on urine pH.

314-15 Investigating Alternative Materials for Oil Spill Cleanup

Michelle Botvinsky & Eve Zakroisky (Ms. Alvare – Earth & Environmental Science)

Oil spills have significant negative impacts on the global economy and environment. While booms are effective, residual oil remains. This study aims to discover alternative materials for oil spill cleanup. Using a simulated oil spill with vegetable oil over water, various absorbent materials were tested. Results indicated vermiculite as the most effective adsorbent, while rice performed poorly. Challenges encountered underscored the importance of consistent temperature and timing. Minimizing errors ensures accurate assessment of absorbent performance, contributing to the development of efficient oil spill cleanup methods.

316-06 Pac-Mania! Stress, Heart Rate, and Sound Exposure

Marliza Campbell-Dorsey & Emily Peng (Ms. Cunningham – Medicine & Health Science)

This study aimed to assess the validity of noise environment therapy claims to provide teens with the best coping methods. It was hypothesized that if students were put under stressful conditions, then the sound environment would have a significant impact on their overall stress level, because certain sounds induce adrenaline responses. To perform this experiment, a stressful situation was simulated by watching participants play Pac-Man. Participant heart rate was then measured. The average heart rate for the "Silent Environment" control heart rate measurement was 88.8 bpm, the "game noise" sound environment heart rate was 89.8 bpm, and the "Green Noise" sound environment averaged 87.6 bpm across all trials. Through an ANOVA statistical analysis (F-stat was 0.0821; F-crit was 3.8853; P-value was 0.9217), it was found that there was no significant difference between sound environment and heart rate. However, if given more time and resources, the experimental quality could have improved.

320-03 Comparative Analysis of Sunscreen Brands for UV Protection

Alisha Chen & Bella Wanle Ye

(Ms. Alvarez & Ms. Cunningham – Chemistry)

Sunburns are a prevalent concern during summer due to inadequate protection against harmful UV rays from the sun. This experiment aimed to determine which sunscreen brand offers the most effective protection against UV rays, ensuring optimal skin

protection during prolonged sun exposure. The hypothesis posited that if the Neutrogena sunscreen exhibited a lighter color on the UV tester, it would indicate superior skin protection. The experiment involved applying various sunscreen brands to a UV tester to assess their protective efficacy. Results revealed that both CVS and Neutrogena provided equivalent UV protection, a level 1 on the exposure scale compared to Coppertone, which registered a level 0. The findings validated the hypothesis, demonstrating the efficacy of Neutrogena sunscreen. Although the experiment underwent several adjustments, further refinement could involve sourcing appropriate materials and conducting additional trials over an extended period for extensive evaluation.

314-11 Comparison of Electrolyte Concentrations in Popular Drinks for Optimal Hydration and Recovery

Allan Chen & Juno Zhang

(Ms. Alvarez – Product Testing)

This study aimed to compare electrolyte concentrations in various drinks to inform consumer choices for hydration and recovery, addressing concerns like hyponatremia, especially for athletes and those engaging in strenuous physical activity. Five popular drinks were tested using a digital multimeter to measure electrical conductance, indicating electrolyte concentration. Statistical analysis using ANOVA Single Factor revealed that with a 95% level of confidence ($\alpha = 0.05$) the F-value (0.022) < F-critical (3.89) meaning there are no significant differences in the conductance among the Gatorade (Mean: 0.00010), BodyArmor (Mean: 0.00025), Vita Coco Water (Mean: 0.00049), Orange Juice (Mean: 0.00011), and Vitamin Water (Mean: 0.00026) drinks. However, graphs highlighted subtle variations that could be practically significant. This research underscores the importance of thorough assessment in beverage selection for hydration needs, particularly in mitigating risks associated with hyponatremia.

318-05 Will it Filter? Activated Carbon vs. Banana Peels

Emily Cheung & Avril Chen

(Ms. Goldstein – Product Testing)

Water can be contaminated with harmful contaminants that are lethal to humans. Therefore, scientists recommend filtering water before consumption. However, some countries in the world lack the resources to use complex water filters, limiting their access to clean drinking water. To address this problem, scientists came up with accessible ways to purify water such as homemade water filters. In this experiment, activated carbon and banana peels in homemade water filters were used to filter different types of contaminated water, determining the filter's capability. Data was collected based on the purity rating of the filtered liquids and compared using a T-test. Overall, both methods were able to filter the liquids but unable to purify them completely. These results show that activated carbon and banana peels can filter water to a certain degree. However, with more research and changes, activated carbon and banana peels can become the next solution for the global water crisis.

316-01 A comparative performance analysis between fixed & tracking solar panels

Jaylen Chin & Jackson Chen

(Ms. Goldstein – Engineering)

As the demand for energy increases and the cost of non-renewable resources continues to rise, many nations are working to find alternative sources of electricity before a crisis arises. Energy from the sun is clean and available in natural quantities, which can reduce our dependence on fossil fuels on a large scale along with providing low-carbon solutions. By tracking the sun's radiations, the photovoltaic (PV) panels could be directed in such a way that they collect higher levels of sunlight than their fixed counterparts. This article presents the design and performance assessment of a solar tracking system based in Arduino and Pvsyst. This experiment presents the design and performance assessment of a solar tracking system. The main objective of this study is to show that the proposed

solar-tracking system performs better than a non-tracking system. In terms of power output, the results reveal that the tracking system outperforms the fixed solar panel.

318-10 Investigating the Effect of Sucrose and Glucose on Tooth Enamel Decay

Meerab Chishty & Mariam Gvasalia (Ms. Alvarez – Medicine & Health Science)

Sucrose, a vital carbohydrate comprising glucose, is commonly found in various foods and contributes significantly to gum diseases through tooth enamel decay. In this study, two experimental groups, one containing sucrose and the other glucose, were examined. The sucrose group consisted of peaches, bananas, and apricots, while the glucose group included mango, pomegranate, and pear. Hollow eggshells, simulating tooth enamel, were immersed in blended fruit juices to assess the rate of decay caused by sucrose and glucose. The findings indicate that sucrose poses a higher risk of tooth enamel decay compared to glucose. This research provides valuable insights for individuals susceptible to gum diseases, enabling them to make informed dietary choices and contributing to advancements in dental care.

316-16 Effect of water pH on the number of chloroplasts in egeria densa

Yiru Fang & Kelly Li (Ms. Cunningham – Plant Science)

The purpose of this experiment was to determine the effect of water pollution on the chloroplasts of aquatic plants. This project is demonstrated by putting *Egeria densa* in three different pH solutions (acidic, neutral, and basic) to represent the different polluted water. The change in number of chloroplasts was inspected by a microscope over time and collected as data. One way ANOVA test was then used to see if there was a significant difference between the number of chloroplasts as pH changes. It was shown from the test and samples of data that pH of "polluted" that are not 7 significantly decrease number of chloroplasts, especially solutions that are polluted to a pH greater than 7. Thus, this finding indicates that when water is polluted to a high pH, it cause the most decrease in number of chloroplasts, which leads to less oxygen created and plant death, resulting in significant disruption to the ecosystem of the Earth.

320-01 Spray Away: The Effect of Different Disinfectant Spray Brands on Bacterial Growth on Doorknobs

Hafsa Fnu & Sophia Ugazovas (Ms. Goldstein – Product Testing)

This project aimed to find the effectiveness of different disinfectant sprays such as Clorox, Lysol, and hydrogen peroxide on bacterial growth on doorknobs. The motivation behind this project is the need to find an optimal brand for the prevention of the spread of disease through high-touch areas such as doorknobs. The procedure involves collecting bacteria samples on the doorknobs before and after treating the doorknob with disinfectant which is based on trials where the number of sprays for each brand is varied and allowed to develop in a bacteria incubator. Our data showed that Clorox and hydrogen peroxide have consistent disinfectant rates while Lysol also has an effective disinfecting rate. An ANOVA test was used on the data collected and it determined a p value of 0.49 which is greater than 0.05 which indicated no significant difference in disinfecting rates among the three brands. The findings of this experiment are important in maintaining a hygienic environment.

320-11 The Influence of Text and Background Color on Retention Abilities

Mahnoor Ghuman & Kyra Britton (Ms. Alvarez – Behavior & Social Science)

Research suggests that a variety of text and background colors can enhance memory retention by capturing one's attention. Understanding these mechanisms could facilitate the enhancement of study habits and ultimately academic performance. The objective of

this experiment was to discern the specific effects of text and background color on one's memory. This experiment involved administering memory tests to participants using various text and background color combinations. However, it became apparent that numerous variables beyond text and background color could influence memory performance. To address this, future iterations of the study could include a survey component to gather information on participants' environmental factors, such as sleep patterns, distractions during testing, and dietary habits. Such insights could provide a more comprehensive understanding of the interplay between environmental variables and memory performance.

318-01 H2-Oh Yeah! An investigation on Midwood Water Fountains

Daniel Hernandez & Haley Chen (Ms. Cunningham – Earth & Environmental Science)

The motivation for our experiment was to identify Midwood High School's top water fountains for drinking in order to maximize health benefits. The techniques included comparing the pH and other levels of particulate matter, from several water fountains. The data that was collected had several outcomes, with some samples having levels of a specific particulate matter that were within recommended limits while some samples had levels that were over or under the recommended levels. An ANOVA test was used for the data analysis to confirm the average and difference between various samples. The main conclusions were that certain Midwood High School water fountains do have more or less of a particular type of particle matter than is advised. All things considered, knowing this information is essential for day-to-day living since it will let you know which Midwood High School water fountains are the healthiest to drink from and guarantee that the water you are getting is of the highest quality.

320-16 Battle of Antacids Against Acid Reflux

Zi Hai Hou & Xinying Lu (Ms. Cunningham – Chemistry)

Acid reflux occurs when the acid in your stomach travels the wrong way and goes up your esophagus, resulting in symptoms of heartburn and bloating. We decided to conduct research on the effectiveness of different antacid brands to oversee which brand of antacid can effectively resolve symptoms of acid reflux. For our experiment, we did a titration test to see which brand of antacid utilizes the least amount of acid (1 M of HCl) to neutralize the base in the antacid. We did 4 trials for each brand, then conducting ANOVA test to see if the different brands of antacid made a difference in the effectiveness. We found that the brand of antacid does make a difference in its effectiveness in relieving symptoms of acid reflux. Also, the smallest average of the 3 brands was Pepto Bismol, meaning that Pepto Bismol needed the least amount of acid (HCl) to neutralize the base inside the antacid while Antacid Flavor Chews needed the most amount of acid (HCl) to neutralize.

316-18 Which type of fruit is more acidic: lemon, orange, lime, watermelon, or pineapple

Kalok Huang (Ms. Cunningham – Chemistry)

Most of the everyday fruits we see, if not all of it, are acidic. This is because they produce citric acids and other acid naturally. In order to do this experiment on pH levels in different fruits, the fruits that were selected were juiced. The fruits used were: lemon, lime, orange, watermelon, and pineapple. pH paper was used to determine the pH range. Data suggested that lemon was the most acidic and watermelon was the least acidic. Reason why this is relative and important to us is because fruits serve as a major supplier of vitamin C. Vitamin C, also known as ascorbic acid, occurs in fruits in an abundance amount but sometimes these fruits can be too acidic. This results in number of unpleasant things such as increased sensitivity in teeth, upset stomach, and disrupted pH balance in blood. This experiment was to see which fruit would be too sour to the point that it can result in these negative effects.

314-03 Mindful for Math

Queeny Huang & Sanna Ngo

(Ms. Alvarez – Behavior & Social Science)

In this experiment, we sought to explore whether mindfulness exercises were beneficial to an individual's cognitive performance. In experimenting, we can determine whether we can use these practices in the real world allowing for people reach their highest brain capacity levels. Our hypothesis was if students participate in mindfulness exercises, then their cognitive performance will improve, as these practices allow better stimulation of the brain. In this experiment, students carried out 6 math assessments, all of them consisting of 35 multiplication problems. They will have completed these questions without square breathing and with square breathing. The number of questions answered and time will be recorded. The mean of questions answered correctly when students did not perform the exercise was 31, while the mean of doing so was 32, showing that there was a slight difference when students carried out square breathing before the test and when they did not.

320-13 Comparing Fluoride Concentration in Popular Toothpaste Brands

Selena Jiang & Hui Yi Weng

(Ms. Cunningham – Chemistry)

Toothpaste contains fluoride, an important mineral that helps to prevent tooth decay, which is essential for oral health. Using two widely used toothpaste brands, Colgate and Crest, this study compared fluoride concentration in them to aid consumers in making better decisions for their oral health. To determine the fluoride content in the selected toothpaste samples, Colgate and Crest, a titration method was used. Results revealed that Crest exhibited a mean of 52 drops, while Colgate showed a mean of 64 drops. Statistical analysis of fluoride concentrations using a T-test showed no significant difference between brands, with an estimated T-value of approximately 1.04, which is below 2.3, the T-critical value. These findings provide valuable insights for individuals seeking to prevent tooth decay using toothpaste.

316-03 Temperature's influence on Bouncy Ball Heights

Nathanaelle Joseph & Charlotte Maloney (Ms. Goldstein – Physics & Space Science)

This experiment addressed if temperature can change the bounce height of a bouncy ball. This was done by changing the temperature of the bouncy balls and then measuring the height after a bounce at 2 feet tall. In order to analyze the data found in the experiment, an ANOVA test was used to figure out whether there's a significant difference between the temperature of a bouncy ball and the height that it bounces at. The ANOVA test determined that there is a significant difference between the temperature of a bouncy ball and the bounce height. This means that the temperature of the bouncy ball does affect the bounce height of the bouncy ball. This experiment determined that the higher the temperature of the bouncy ball, the higher the bounce height the ball will reach.

320-08 Bacterial Growth on Surfaces.

Sharika Khan

(Ms. Alvarez – Microbiology)

The motivational factor for this project was the fact that most of an adolescents day is spent using these desks at schools requiring them to have contact with these surfaces like tables multiple times a day, this made me curious to know much bacteria does an adolescent encounter by just touching these surfaces every day and how clean are these surfaces and which cleaning product would most directly reduce the bacterial growth to keep these surfaces cleaner and safer for adolescents. The app one petri was a major help in identifying and counting the bacterial colonies. According to my data analysis the Clorox spray had a greater effect on the bacterial growth then the Lysol spray, indicating

that it's more efficient to use Clorox spray to get rid of these bacteria on the surface than the Lysol spray.

314-20 The effect of classical and pop music on heart rate

Erica Khankin & Rita Lin (Ms. Goldstein – Medicine & Health Science)

We did this to discover the effects of music on a person's body, especially how music affects a person's heart rate and if it has an effect on anxiety levels. We used a Google form, a Google spreadsheet, and a pulse oximeter. The data we collected was resting heart rate and heart rate after music sessions. We used a T-test, analyzing the changes in heart rate for the music sessions. Pop music had a higher effect on increased heart rate than classical music. Additionally, there's a significant difference in a person's heartbeat rate whether they listen to classical or pop music. In our conclusion, on average, we found classical music was able to decrease heart rate, implicating listening to it can improve people's mental health by decreasing heart rate. This data can also be used by health in general because low heart rates can help with decreased blood pressure.

316-13 Glucose in Cooked and Uncooked Vegetables

Kevin Li (Ms. Cunningham – Medicine & Health Science)

Hypoglycemia is when the glucose levels in your blood drop below the average amount of glucose. The method is vegetables are purée and put into the test with 5 ml of Benedict's reagent it was then boiled for 5 minutes for all 3 trials to see the results. The techniques used to find and analyze data were the ANOVA test and Google Sheets. The findings are important as they can help people find if cooking vegetables is better to eat to help boost glucose levels rather than raw. The key finding is that cooked vegetables had a significantly higher glucose than raw vegetables. This finding is important as people can be informed that eating cooked vegetables can help boost glucose levels and prevent them from dropping.

320-18 Comparing the efficiency of various antacid brands on neutralizing pH levels of stomach acid

Lena Li & Saba Khoja (Ms. Goldstein – Medicine & Health Science)

Antacids are one of the most popular and effective methods to treat gastroesophageal reflux disease (GERD). Acid neutralizing capacity (ANC) determines the effectiveness of the antacids. In order to select the best antacid, the ANC value must be considered, which can differ greatly in each brand of antacid, and is not often stated on product labels. Therefore, consumers may have a hard time determining which antacid brand on the market is the most effective and worth their money. The purpose of this study was to compare the effectiveness of three antacid brands—Tums, Alka-Seltzer, and Walgreens Brand Antacid Tablets—in neutralizing stomach acid through the method of titration. The volume of hydrochloric acid (HCl) solution required to neutralize the base was measured in milliliters for each brand. It was determined that Alka-Seltzer pills showed a higher significant difference in its ANC out of the three brands tested.

318-13 Comparative Analysis of Plyometric and Weighted Exercises on Vertical Jump

Manuel Li & Daoud Mirza (Ms. Alvarez – Medicine & Health Science)

This study aimed to compare the effects of plyometric and weighted exercises on vertical jump. The purpose was to determine which exercises would lead to greater improvements in vertical jump height. Participants were split in two groups and underwent either plyometric or weighted exercises over a month. Plyometric exercises resulted in an average increase of 3 inches in vertical jump height, while the weighted exercise group showed a smaller average increase of 1.5 inches. This challenges the hypothesis that weighted exercises would lead to greater improvements. The study

underscores the effectiveness of plyometric exercises for enhancing vertical jump height and suggests the need for further exploration of exercise protocols and long-term effects to optimize training regimens. Overall, the project was successful in demonstrating the superiority of plyometric exercises for improving vertical jump.

314-16 Bacterial Battle

Michelle Li & Adisa Sokoli

(Ms. Goldstein – Biochemistry)

This experiment will test which mouthwash brand is most effective in killing E. coli bacteria. A cotton swab will be dipped in the bacteria then transferred to a cup of the designated mouthwash and will be swirled for 30 seconds. The cotton swab will then be swabbed on the petri dish and incubated for a day. The resulting appearance of the petri dishes will determine which mouthwash is the more effective antiseptic. Mouthwashes maintain oral health and cleanliness. Using the finest mouthwash may be helpful in many different scenarios. It helps combat bacteria and freshen breath, especially in situations where brushing isn't always possible, such while traveling or after eating or drinking. It reduces oral bacteria overnight, improving dental health and reducing problems like bad morning breath. Proper mouthwashes address certain oral health issues such as dry mouth or sensitive gums, providing focused relief for people with particular problems.

314-10 Acid Rocks

Vivian Li

(Ms. Cunningham – Earth & Environmental Science)

Walking home from school, I noticed a rough, pitted surface on the side of my house that was directly exposed to weather conditions, unlike the sides shielded by trees. Suspecting acid rain as a cause, I conducted an experiment to determine which building material (granite, marble, sandstone, or limestone) deteriorates most in acid rain. I recorded the initial masses of the rocks using a pocket- scale and submerged each rock in beakers full of sulfuric acid (simulating acid rain). For four days, I weighed the rocks daily to observe mass loss. The data was recorded in Google Sheets and analyzed using a statistical ANOVA test to determine the significant differences in mass degradation among the rocks. The experiment revealed that limestone experienced the most deterioration as it lost the most mass, supporting my hypothesis. These findings can inform future construction practices by highlighting the susceptibility of certain materials to acid rain, guiding better material choices.

316-10 Comparative Analysis of Lysol and Clorox Wipes on Bacteria Reduction on Computer Surfaces

Pamela Lin

(Ms. Alvarez – Microbiology)

This study evaluates the efficacy of Lysol and Clorox wipes in reducing bacteria on computer surfaces, crucial for maintaining a clean classroom environment. The hypothesis posits that greater variety in Alkyl groups, present in Clorox wipes, leads to a more substantial reduction in bacteria colonies. Bacteria levels were measured before and after wipe application, and the percentage reduction was calculated. A t-test statistical analysis indicate there is no significant difference in bacteria reduction between Lysol (61.27% average reduction) and Clorox wipes (74.63% average reduction), with a test statistic (1.0707) is less than critical t-value (4.3027) for a significance level of $\alpha=0.05$ and 2 degrees of freedom, failing to reject the null hypothesis. While the project achieved partial success, improvements include collecting bacteria samples from the same computer for each trial and increasing the number of trials for enhanced accuracy.

320-06 Exploring the Impact of Online Gaming on Academic Performance

Vincent Liu & Eugene Qian (Ms. Goldstein – Behavior & Social Science)

In today's society, where digital technologies are increasingly integrated into daily life, understanding the impact of online gaming on academic performance holds significant relevance. This experiment involved collecting the daily gaming hours of 20 students, who were subsequently tasked with completing a math assignment (scores converted to percentages) shortly after. A t-test was conducted to analyze any significant differences. By scrutinizing this data, we aim to ascertain whether online gaming indeed exerts a measurable impact on academic achievement, thereby informing strategies for educational interventions and technology usage guidelines.

316-21 Colors influence on memory

Eric Lu & Mohammad Hussein (Ms. Goldstein – Behavior & Social Science)

This experiment tests the significance of colors influence on memory. The result of this experiment can be used to see if color in advertisement is more attractive to consumers. The procedure used to complete this project was a memory test. To complete the memory test participants sat in front of a screen with two slides that show a total of twelve letters, one slide includes colors, and the other does not include color. The participants then record how many letters they remember, and a t-test is performed to see whether there is a significant difference between memory and color. The collected results from the experiment indicate that there was in fact no significant difference between colors and no colors on memory.

318-20 Effects of pH Level in Water on the Growth of Mung Beans

Helen Lu & Tiffany Zhen (Ms. Cunningham – Plant Science)

An experiment was conducted to find what pH value of water speeds up mung bean growth for more efficient commercial production. This is important because of the bean's popularity and health benefits. In our experiment, we used pH indicator strips to make 3 solutions: acidic, neutral, and basic, based on the addition of lemon juice (acidic) or baking soda (basic). We observed 12 mung bean samples with 4 samples grown for each solution. To measure sprouting rate, we checked the beans once two days after planting to determine how many beans sprouted. To measure the plant growth, we then checked the height immediately after and again five days later. ANOVA results suggested that mung beans sprout the fastest in neutral water, with a significant difference in the data. Results from t-Tests and ANOVAs implied that mung beans in acidic water grew the most in height with significant differences in two ANOVAs and one t-Test, though no significant difference was shown in two other t-Tests.

320-15 Comparative Analysis of Plyometric and Weighted Exercises on Vertical Jump Performance

Daoud Mirza (Ms. Alvarez – Medicine & Health Science)

This study aimed to compare the effects of plyometric and weighted exercises on vertical jump. The purpose was to determine which exercises would lead to greater improvements in vertical jump height. Participants were split in two groups and underwent either plyometric or weighted exercises over a month. Plyometric exercises resulted in an average increase of 3 inches in vertical jump height, while the weighted exercise group showed a smaller average increase of 1.5 inches. This challenges the hypothesis that weighted exercises would lead to greater improvements. The study underscores the effectiveness of plyometric exercises for enhancing vertical jump height and suggests the need for further exploration of exercise protocols and long-term effects to optimize training regimens. Overall, the project was successful in demonstrating the superiority of plyometric exercises for improving vertical jump.

316-20 Greater-aid to electrolytes? Perhaps orange juice is more suitable

Benny Armelle Ngouekem Kouleho

(Ms. Goldstein – Chemistry)

The drawback of sports drinks over consumption is that it increases blood sugar levels and dysregulates insulin production enough to put many individuals at risk of diabetes. Is there a better and more natural alternative to sports drinks for hydration? The key reason for most sports drinks consumption is due to their electrolytes, an essential mineral for the nervous and cardiovascular system. Since this mineral can be found in many natural products as well, for the sake of this experiment, freshly squeezed orange juice has served as comparison to Gatorade in terms of electrolyte quantities they could provide by using a multimeter. The conductive components of the solutions with electrolytes were detected by the multimeter's ammeter to measure currents of electrolyte densities (siemens). As a result, the orange juice still managed to have approximately 3 times more siemens of electrolytes than Gatorade, likely sourced from its potassium ions rather than sodium.

316-11 Investigating the Relationship Between Body Mass and Impact Force in Falls on Different Materials

Kathryn Otkydach & Luis Olvera

(Ms. Alvarez – Physics & Space Science)

Falls are a common cause of injuries across the United States, often resulting in severe consequences. This experiment tested the influence of body mass on the injuries sustained during a fall, specifically examining the impact force exerted on surfaces. The hypothesis proposed in this experiment is that individuals with greater body mass would experience more severe injuries due to the increased force exerted upon impact. It was found that when a cushion was added, the force exerted did not decrease. Thus, adding a cushion may not actually decrease the injury that one can have upon a fall. For future experimentation, it will be crucial to test a variety of materials to see if a different cushion(s) will decrease the force exerted on a surface. Understanding these dynamics can be crucial for developing strategies to mitigate the risks associated with falls and potentially reduce mortality rates.

318-16 The investigation of amylase enzyme digestion time on the production of reduced sugar in various fruits and vegetables

Han Xin Ou Yang & Abril Flores

(Ms. Goldstein – Medicine & Health Science)

The human body's ability to properly digest food depends on amylase enzymes. Over the world, millions of people struggle with eating and losing weight. This experiment was conducted to investigate which food gives the feeling of being fuller by looking at the digestion time of vegetables and fruits by amylase and its production of simple sugars. Various fruits and vegetables were mixed with amylase enzyme solution. Iodine was used to calculate the breakdown of complicated starches into simple carbs. 10 mL of each group was added to Benedict's solution and heated to see the color change. The obtained data includes the time of digestion and the amount of simple sugars generated. Significant discoveries include bananas taking the longest to digest and produce the most simple sugar. The experiment's goal is to assist individuals who are unsure of foods to consume that will feel the most satisfied, may inadvertently consume excessive food.

316-05 Moisture Match

Mariella Pinsky & Emma Bitelman

(Ms. Cunningham – Chemistry)

Knowing which moisturizer to use is important to keep our skin plump and hydrated. Every cream on the market has a different texture and skin type, but they all supposedly retain water and prevent transdermal loss. This experiment aimed to determine which moisturizer holds water longest to see how effectively moisturizing they are. We chose

six moisturizers to test: Matter of Fact (MOF), Origins (O) Peter Thomas Roth (PTR), Byoma (B), Cerave Dry (CD), and Cerave All (CA). We spread each cream onto individual sheets of paper, dropped water onto them, and timed how long until it seeps through. Averages for 3 trials are as follows (minutes): MOF 11:37; O 13:37; PTR 1:40:23; B 17; CD 7:42; CA 26:33. We hypothesized that CD would have longer retention time, since it is intended for drier and thirstier skin. However, PTR has the longest retention by far, with the others much slower. We concluded that there was no statistical significance between the brands and their water hold time.

314-05 A Bright Idea: UV Light Exposure vs. Bacteria

Sadnan Pranto & Antony Zheng

(Ms. Alvarez – Microbiology)

The COVID 19 pandemic led to a greater focus on the issue of contamination, and while primitive methods like staying 6 feet apart worked decently, there was still another perspective to be seen. Ultraviolet light was utilized in miniature lamps to disinfect phones during the pandemic. UV light can be used to damage bacteria causing mutation, making the bacteria unable to replicate its DNA and eventually killing them. This experiment samples bacteria using cotton swabs and gives the sample a controlled exposure of UV light using a lamp and leaving it in an incubator. After 3 days, the amount of colonies were counted by hand. Quantitative data such as time samples were exposed to UV light and the amount of colonies grown was measured to conclude UV lights effectiveness against bacteria. Based on the results collected, an increased exposure to UV light has shown to have a decrease in the amount of bacteria colonies.

318-11 Bioplastics for a Sustainable Future

Maham Sehail & Souhila Elsasyed

(Ms. Cunningham – Product Testing)

This study investigates the impact of varying cornstarch-to-glycerin ratios on the properties of homemade bioplastic, addressing environmental concerns such as reducing reliance on petroleum-derived plastics. The research focused on how these ratios affect bioplastic flexibility and thickness. Bioplastic films were produced in three trials with increasing cornstarch-to-glycerin ratios. Cornstarch forms a polymer matrix when heated and mixed with glycerin, which acts as a plasticizer to enhance flexibility. Data analysis, including ANOVA tests, revealed that higher glycerin proportions significantly increase flexibility, while thickness remains unaffected. These findings underscore the critical role of glycerin in bioplastic formulations, influencing mechanical properties. This study advances the understanding of homemade bioplastic production and its potential as a sustainable alternative to conventional plastics.

314-18 Investigating the Effects of Essentia Alkaline Water on Heartburn and Longevity Factors

Linoy Shamuilov

(Ms. Alvarez – Medicine & Health Science)

Heartburn, a common affliction worldwide, can escalate into gastroesophageal reflux disease (GERD), impairing various aspects of well-being. Essentia alkaline water, purported to balance stomach acidity with its pH of 9.5, has been suggested as a remedy for heartburn. This study aimed to assess the impact of Essentia water consumption on participants' mobility, sleep quality, energy levels, and heartburn symptoms. Participants were surveyed over a 10-day period, with 5 days consuming Alkaline water and 5 days consuming regular water. The hypothesis predicted that Essentia water consumption would lead to improved mobility, sleep quality, and reduced heartburn symptoms due to its low acid levels and acid-buffering properties. Analysis via a single-factor ANOVA test revealed a statistically significant relationship, where 19 out of 21 participants reported enhanced sleep quality, increased energy levels, and decreased heartburn symptoms after consuming Essentia water.

318-15 Which storage containers prevents Mold Growth

Spencer Spallone & Ben Ference (Ms. Alvarez – Medicine & Health Science)

The purpose of this research project is to try and prevent food waste as humans are a large contributor to food waste and this can be attributed to mold. The freshness of food can be prolonged with the proper storage container. If there is a significant difference between the containers being tested and their effectiveness at keeping food mold free, then food waste numbers can be lowered or even prevented. This can save money on groceries and prevent food waste. The method used was an observational experiment where bread was placed in the different types of containers then were checked as they developed mold. BactLab is the app being used to count the mold colonies on each piece of bread.

314-08 Healthiest Water Based on pH

Yuqi Su & Chloe Cho (Ms. Cunningham – Chemistry)

Our motivation of our project was to experiment and determine which brand of water is the most neutral with a pH level of 7 which is the healthiest. For our methods of executing the project was that we played out the 5 cups and poured each brand of water into each cup. We then measured each brand of water with a pH meter and cleaned it after testing each brand of water. Poland Spring is the healthiest water with an average pH of 6.55 being the closest to neutral pH. Evian is the least healthy water with an average pH of 11.57 being furthest from neutral pH. The ANOVA test showed that there is a significant difference between the pH of different brands of water. Our key findings were the Poland Spring water was the healthiest out of the 5 brands we tested which meant that it was the closest pH of 7. The significance was that when we go buy water, we are aware which brand of water is best for our health and that the water we drink on a daily basis is not too acidic or too basic.

314-13 Investigating the Impact of Caffeine on Mung Bean Plant Growth

Grace Sudol & Taylor Morries (Ms. Alvarez – Earth & Environmental Science)

This study investigates whether caffeine, a common stimulant, affects plant growth similarly to fertilizers. Various caffeine sources, including instant coffee, energy drinks, and matcha, were tested on mung bean plants. The hypothesis proposes that diluted caffeine solutions may stimulate growth due to their fertilizer-like properties. Mung bean plants were subjected to different caffeine treatments under controlled conditions, with a control group of water for comparison. Results showed that higher caffeine concentrations inhibited growth, as seen in plants treated with energy drinks containing 200 mg of caffeine per serving. In contrast, matcha, with 44 mg of caffeine, promoted more substantial growth and demonstrated less variability across four trials. Despite successful outcomes, future experiments could improve by extending the study duration and ensuring consistent watering practices for more reliable data.

314-01 Berry Badness

Akash van Koert & Alexandra Rakhovski (Ms. Cunningham – Microbiology)

The motivation behind our project stems from a love for fruits and a hate of mold. It often occurred that I would forget to eat some fruit only to find that it had molded in only a few days. This led us to be intrigued as to what environment is best for combatting this. In order to accurately test this question, we used sterile latex gloves when touching strawberries to avoid contamination. We used an app called BactLab to count the bacteria on the strawberries after 7 days in their respective environments. We collected our data by using the values in the BactLab app and grouped the data together by type of bacteria, general bacteria, coliforms, yeast/fungus, and Escherichia coli. We did 3 trials per

environment and then an ANOVA test was conducted. We found that there is a significant difference between the amount of bacteria grown in the differing environments. The data showed that the freezer is the best environment to stop mold from growing and that a cardboard box is the worst.

320-10 High Schools High on Lead

Winnie Wang & Madison Wong

(Ms. Cunningham – Chemistry)

Concerns for lead contents in school drinking water has remained to be an issue; with many schools' lead concentration surpassing the EPA limit of 0.015 ppm. Previously collected data showed a broadened conclusion but can be further narrowed for more accuracy. We used water samples from 4 schools in NYC: Brooklyn Technical, Stuyvesant, Tottenville, and Midwood. Lead indicator strips for water were used to indicate the concentration of lead in the samples and an ANOVA analyzed the differences in concentration. In contrast to our hypothesis that Brooklyn Tech has the highest lead concentration, the results pointed at Tottenville instead. Also analyzed, was that there was no significant difference between each school's average lead concentration in their water. Our findings can help students and staff in schools understand the current lead levels in their schools and this is significant as if there was data showing concentrations over 0.015 ppm it brings a notice of concern and vigilance.

320-05 Investigating the Influence of Sunlight on Mitosis Rate in Amoeba Proteus

Timothy Wong

(Ms. Alvarez – Cellular & Molecular Biology)

Mitosis, a fundamental biological process, plays a crucial role in cell proliferation across various organisms. Despite its significance, the impact of environmental factors such as sunlight on mitosis remains understudied. This experiment aimed to assess whether sunlight affects the rate of mitosis in *Amoeba proteus*, a microorganism known to undergo mitosis. *Amoeba proteus* was cultured in environments with and without sunlight for a duration of 5 days. Colony counts were conducted, and a t-test was employed to analyze any significant differences. Results indicated a significantly quicker mitosis rate in *Amoeba proteus* cultured without sunlight compared to those cultured with sunlight. These findings suggest that sunlight may hinder the rate of mitosis, possibly due to the interference from UV rays in the replication processes. This study sheds light on the environmental factors influencing mitosis and underscores the importance of further investigation into its mechanisms.

316-08 Digging Deep - Basic or Acidic?

Athena Wu & Zuvi Quang

(Ms. Cunningham – Plant Science)

Soil pH is a critical factor that influences soil health and environmental sustainability. This experiment assesses the role of soil pH in soil health and environmental sustainability. Soil pH affects nutrient availability, microbial activity, and soil structure. The pH range for nutrient availability, microbial activity, and soil structure is between 6.0-7.0. When the soil pH is too low or high, these factors may be compromised, leading to poor soil health and reduced environmental sustainability. Further research is needed to investigate the impact of soil pH on soil health and environmental sustainability in different soil types and regions. A soil pH tester was used to determine the approximate value of the pH level. After this was done for three trials, an ANOVA test was done on the data. The F-value, 7.738, and the F-critical value, 5.143, show that the null hypothesis is correct, which means that there is a significant difference between the pH level of each sample.

316-15 Investigating Soil Liquefaction and its Impact on Earthquake-Prone Areas

Leo Ye & Ivan Chen (Ms. Alvarez – Earth & Environmental Science)

With 55 earthquakes occurring daily worldwide, soil liquefaction presents a notable challenge for individuals living in seismic zones, occurring when saturated or partially saturated sediments experience sudden changes in stress conditions such as earthquakes. Given its role played in the loss of homes during seismic events, this experiment seeks to identify materials with the slowest liquefaction process. The aim is to lessen the impact of earthquakes on residential structures by identifying suitable materials for the ground base. The hypothesis is that altering the material to be liquefied will influence the liquefaction process duration due to varying material properties. This was tested in the experiment by determining when each material has shown signs of liquefaction such as bubbles and water surfacing. Results indicate 13.84s for sand, 5.16s for sandy soil, and 8.8s for soil. Although the project was mostly successful, more trials can be run to validate the results.

318-21 The Impact of Acid Rain on Seed Germination Rates

Nermin Zafar & Maribel Santacruz (Ms. Cunningham – Plant Science)

Human activities, including burning fossil fuels and overreliance on vehicles, have increased nitrogen oxide and sulfur dioxide emissions, posing a risk of acid rain. This can negatively affect soil germination by lowering the recommended pH for plants. Our experiment was conducted to simulate acid rain using vinegar, lemon juice, and hydrogen chloride to see its impact on the germination of Mung beans. The data collected from 3 trials per acid and control showed decreased measured seed growth as acidity lowered. Using a statistical ANOVA test we saw that with 95% levels of confidence, the mean germination of each seed is not equal as the F-value of 31.4 is greater than the F-critical value of 4.1. The results show that acid rain does affect the germination of plants. Thus, there is a significant difference between the effect of the various acids and the control on the growth of Mung beans. The findings indicate the importance of monitoring human activity for environmental protection.

314-06 Investigating the Effect of Temperature on Catalase-Mediated Decomposition of Hydrogen Peroxide

Aseel Zeina-Alshehadeh & Wagd Elhag (Ms. Alvarez – Biochemistry)

Exploring the biochemistry of catalytic reactions. This experiment researches the decomposition of hydrogen peroxide using catalase derived from potatoes. The objective was to assess the influence of temperature on the rate of catalytic reactions, with implications for understanding temperature's role in chemical processes, particularly in health applications. The hypothesis posited that increasing the temperature of hydrogen peroxide would accelerate the reaction with catalase enzymes due to enhanced enzyme activity at higher temperatures. Setups involved altering the temperature of hydrogen peroxide to room temperature (22°C) and 83°C. Data analysis revealed that heated hydrogen peroxide led to faster catalase-mediated decomposition, shown by shorter reaction times compared to room temperature. Despite procedural setbacks, the project underscored the need for further exploration, suggesting adjustments to experimental design and test group considerations for future studies.

314-21 Oil Spill Savior: Testing Methods for Water Purification

Karen Zevelev & Cherry Amancio (Ms. Cunningham – Earth & Environmental Science)

Crude oil spills pose a significant threat to our aquatic ecosystems, endangering our rich biodiversity. Efforts to clean up these spills are crucial to minimize environmental damage and restore affected ocean areas. Oil spills have devastating effects on marine

life, coating their feathers, fur, or scales, hindering movement and contaminating food sources. However, current methods of oil removal often create a negative feedback loop, as non-eco-friendly materials are used. This study focuses on removing oil from water using three methods: oil skimming, filtration, and absorption systems. The key findings are that absorption method was the most effective which was surprising since we had assumed that filtration would be the most effective. Knowing that absorption is the best method in removing crude oil from oceans, this could help future marine biologist explore better methods of absorption in removing oil from large bodies of water.

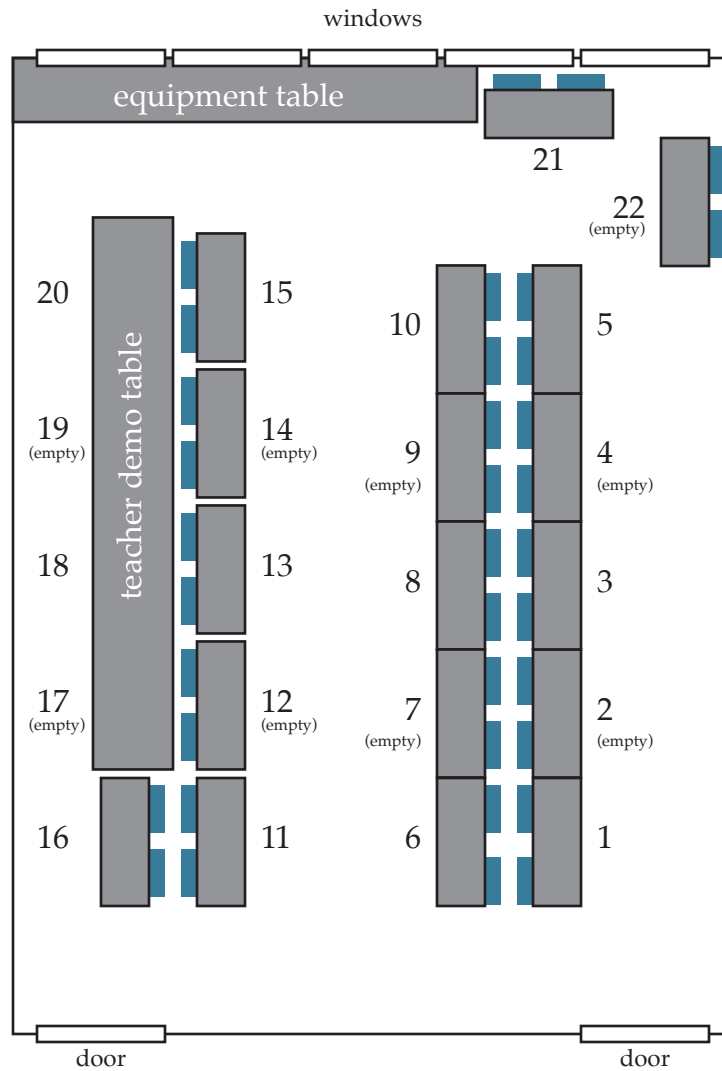
318-08 Water Quality on Marine Life

Aziza Ziyadulloeva & Kathy Liang (Ms. Alvarez – Earth & Environmental Science)

Residing in New York, surrounded by various bodies of water, sparked curiosity about the impact of these environments on marine life. To investigate, water quality assessments were conducted at Marine Park, Coney Island Beach, and Gravesend Bay. Parameters including pH, dissolved oxygen (DO), and temperature (°C) were measured using pH strips, a water quality meter, and dissolved oxygen test kits. It was hypothesized that marine life would thrive in saltwater with neutral pH, high dissolved oxygen, and cooler temperatures. It was found that the average pH of the waters is 6.5, the average DO level is 6.4 ppm, and the average temperature is 19.4 C°. As for the implications of such data, due to the fact that these measurements are within the acceptable range for marine organisms to live well under, it can be concluded that there the marine life in Brooklyn bodies of water are in safe and sustainable conditions. Further research was done on how this affects humans and the environment.

Room Arrangements

Project boards in rooms
A314, A316, A318, A320



Room A313: Food service (get in, get out)
Rooms A319: Overflow seating area