NORTHERN VIRGINIA

ABLE F C E

Williamsburg Middle School

Teacher: Bell

Memorization is an essential part of life, from doctors to middle school students, but it may not come easily. Many students listen to music while studying, but does it actually help? If so, what genre should they listen to? This experiment sought to answer these questions by testing the hypothesis that participants who listen to classical music will score higher on memory tests.

24 participants took 5 different memory tests, one for the control (no music), and one for pop, classical, rock, and jazz. These tests all had the same ten shapes, but in varied order for each genre. Participants were given 5 minutes to memorize the order of shapes while listening to a corresponding genre. Then, the tests were taken away and participants had 3 minutes to do any activity of their choice. Participants were given 15 minutes to take part two of the test which had them recall the order of the shapes. This was repe

203

Alexandria City High School

Teacher: Matthews

Many problems face the human race today, some definitely more prominent than others. But a constant issue that is progressively getting worse continues to be climate change. Information spreads, but it never seems quite quickly enough, and the question of who really knows what they are talking about arises often. The purpose of my project was to test wide age ranges of

10 204

Alexandria City High School

Teacher: Breistanksy

A multitude of different things can give athletes advantages in their sport — what methods they use to train, who they train with, what socio-economic status they grew up in, intrinsic (or extrinsic) motivation … just to name a few. Many, however, attribute athletic success or failure to natural body composition. All sports and positions

Alexandria City High School

Teacher: Lay

The data supports the idea that simply using more words in verbal instructions causes people to spend more time following the instructions. (The experiment was not very large, however, and more research should be conducted to back this up.) The hypothesis--that participants hearing long lines would take, on average, more time to complete the task given to them--was supported. Participants hearing long lines took an average of 13.8 seconds to complete the task, while participants hearing short lines took an average of only 6.5 seconds. Results may have been affected by the environment in which students participated. The classroom and hallway at any given moment were filled with different activities that could have impacted the thought-process of participants significantly. The lines could also have been recited inconsistently (ex. saying the long lines at a faster pace than the short lines). This experiment, if conducted again, would be improved with more planning and time taken to ensure larger participant turnouts and more constant variables.

12 206

Yorktown High School

Teacher: McKowen

Although prior research shows that the number of retweets of fake stories is much higher than true stories on social media, I seek to understand whether the diffusion of fake stories (by retweets) changes after a story has been fact-checked. This is useful

Alexandria City High School

Teacher: Matthews

In this experiment, I tested how the amount of glycerol (aka. glycerin, glycerine) affects the flexibility of a cornstarch bioplastic. I made the bioplastic, swapping out the amount of glycerol, and tested the flexibility by bending the cooled plastic, and measuring the angle at which it bent. Our data showed that the bioplastic with two teaspoons of glycerol was the most flexible and that the bioplastic with no glycerol was inflexible and barely functional. Understanding how the variables in bioplastic can affect its texture will help others understand how to perhaps make it for themselves, causing them to use less petroleum plastic, which in turn creates less air and earth pollution.

Alexandria City High School

Teacher: Matthews

Millions of people are infected with mosquito-borne illnesses each year. To try and combat these illnesses I decided to study transcription factors in vector mosquitoes that could be used as targets for mosquito killing pesticides. The mosquito species I studied were Anopheles gambiae, Aedes aegypti, and Culex quinquefasciatus. To better study these mosquito species I used Drosophila melanogaster as a reference species due to the copious amounts of research that has been done on it. I identified a protein referred to as tailles in Drosophila that regulates

Washington-Liberty High School

Teacher: Sotomayor

The overall purpose of the study was to find out which pH level best dissolved the beef liver. Three pH levels that were tested are vinegar with a pH of 2.5, bleach with a pH of 13 and water(control) with a pH level of 7. Studies have indicated that, vinegar has the potential to dissolve food. In addition, vinegar is shown to have a similar pH level as stomach acid (Whelan, 2019). The hypothesis was if the beef liver is placed in vinegar, then the beef liver will have the least amount of mass left. 10 trials were done for each pH level. The study comprised of 30 dixie cups with 5 grams of beef liver in each cup and a tablespoon of each liquid. The major findings or trends found are the 2 lower pH levels dissolved the most meat. However, the analysis is the vinegar and water had no statistical difference. The acidic and neutral solutions dissolved more meat than the basic solution.

Kenmore Middle School

Teacher: Brown

Studies have shown that the addition of salts and sand to ice decreases its melting time, but which one is the fastest? This project looks into the impacts of iodized salt (IS), rock salt (RS),

Kenmore Middle School

Teacher: Brown

The purpose of this experiment is to investigate which of the following drinks (Market Pantry® lemonade, Tang® orange juice, Mott's® apple juice, and Pepsi®) is the most acidic. The hypothesis was that if the drinks are tested for pH, lemonade would have the lowest pH. The independent variable was the type of drink used. The dependent variable was the pH level of

Thomas Jefferson Middle School

Williamsburg Middle School

Teacher: Warden

The rationale for this experiment is to model how fruits and vegetables can be preserved. This is of great importance to industries such as the horticulture and produce industries. Enzymatic browning occurs in many victuals, such as bananas, lettuce, and apples. Enzymatic browning downgrades the tactile and visual properties of a fruit or vegetable ; it can even devalue the fruit or vegetable, making it cheaper. Browning can also decrease the nutritional content of fruits and vegetables; although this doesn't make the fruit or vegetable inedible, contrary to popular belief. This causes the common consumer to throw away these fruits and vegetables leading to financial loss. Enzymatic browning also causes economic harm for farmers that grow victuals that undergo the process of enzymatic browning.

This study examined how long it took for a banana slice to oxidize based on the level of acidity of liquid which was placed on it. It was hypothesized that lime juice would preserve the bananas the best. In the end□vnc□□□bgc□g□x:b:g7he bananas

Dorothy Hamm Middle School

Teacher: Kennedy

CH CHEM I

412

Washington-Liberty High School

Teacher: Sotomayor

The purpose of this experimh

Alexandria City High School

Teacher: Holmes

The purpose of my research project was to determine if bi-chromatic powder is the best powder to use to lift fingerprints. My hypothesis was if bi-chromatic powder is used, then the fingerprints will come off the best. In my experiment, I found that if bi-chromatic powder made better, clearer fingerprints. Bi-chromatic powder lifted fingerprints with an average of 88% accuracy whereas magnetic powder had 28% accuracy and both baking powder and talcum powder had an average of 0% accuracy. Since both talcum and baking powder absorb moisture, the low accuracy could have caused both powders to absorb the moisture in the fingerprints. The low accuracy of magnetic powder is likely because the powder is much more coarse than other powder used in this experiment. If these powders were exchanged for more neutral and finer powders, the results most likely would have been more even. If bi-chromatic powder is used, then the fingerprints will be lifted the most accurately. This hypothesis was true with all of the data supporting it. The independent variable was each type of powder used and the dependent variable was how well the fingerprints were lifted, there was no change created. My results may have been different than I hypothesized if my powders weren't moisture-absorbing agents or if they were less coarse. A few improvements for the experiment are to let the fingerprint sit with the powder on it for over 90 seconds before dusting it and to use a clearer tape when lifting them.

Washington-Liberty High School

Teacher: Fretts

The purpose of this experiment was to test if various solvents would influence the separation of several pigments found in spinach leaves through the measurement of the retention factor. Retention factor is measured through the distance travelled by a pigment over the distance the solvent travelled, showing how much of the pigment has dissolved. Chromatography is used to aid in the separation of substances. Solvents would aid in the separation of plant pigments, where capillary action would allow the pigments to be carried along the paper. It was hypothesized that if the isopropyl alcohol is tested, that level will be the most effective in the separation of pigments, due to chlorophyll and carotenoids being insoluble in water, with the isopropyl alcohol having the lowest water content. The null hypothesis for this experiment is that if different solvents were tested, then there is no effect of the separation of the pigments spinach leaves' pigments. From the data collected, it was concluded that the isopropyl alcohol was most effective in the separation of various pigments extracted from spinach leaves, with mean retention factor values of 0.132 for chlorophyll A, 0.452 for chlorophyll B, and 0.725 for carotene. The data supports the hypothesis that was tested. Statistical tests were done to determine the statistical significance of the data, with both an analysis of variance (ANOVA) test and three T-tests on all experiment groups, yielding p-values of less than the critical value of 0.05.

Washington-Liberty High School

Teacher: Fretts

The purpose of this experiment was to determine the effect of certain types of oil on the strength of hair exposed to ultraviolet radiation. The hypothesis states that if chicken oil is applied to the hair, then the average force required to break the hair after exposure to UV radiation will be the greatest because it has the highest level of unsaturated fats and therefore, the highest UV absorption rate. The independent variable was the type of oil and the dependent variable was the force required to break the hair (in Newtons). The levels of IV included chicken oil, groundnut oil, and coconut oil, in addition to the control. Each oil was applied to groups of ten hairs. These hairs were then exposed to ultraviolet light for sixty minutes. The force required to break the hair was measured using a spring scale and the data was analyzed. The hypothesis was rejected. An ANOVA test was conducted and the null hypothesis was accepted, as the resulting p value (0.125) was greater than the critical value of 0.05, indicating that the data was not statistically significant. The inconclusive data could be attributed to the time spent exposed to UV, which was a notable limitation. Hair health plays a vital role in people's self image and hygiene, so it is important to continue to research and test methods of protection.

E E GI EE I G

7 500

Kenmore Middle School

Teacher: Gantenbein

In this experiment the purpose was to determine which of the three common building materials - wood, clay and concrete - is better at withstanding earthquakes. The hypothesis was that concrete would be the best material of the three, since it is sturdier than wood and clay. To test the hypothesis, three miniature houses were built out of these materials and then subjected to vibration which would simulate an earthquake. After being subjected to vibration, the wood house had no structural damage; the clay house had some cracks mainly around the joints; and the concrete house collapsed entirely early into the experiment. The hypothesis was not supported, the cement house was the least able to withstand vibration, and the wood house

7 501

Thomas Jefferson Middle School

H-B Woodlawn Secondary Program

Teacher: Boyle

This project is a model of an electrical conductor that can produce an arc of electricity. It shows the process used to make the conductor and explains the science behind how it works. The conductor demonstrates an electrochemical reaction. An electrochemical reaction is the passage of an electric current, involving the transfer of electrons between two substances—one a solid and the other a liquid. The reaction happens inside a battery and the electric current is transferred to an electric circuit that creates a small bridge of electricity between two wires.

Swanson Middle School

Teacher: Seliskar

Lack of access to clean water is a global issue that is leading cause of various diseases and mortality. Regular water filters rely on the principles of adsorption where dirt particles adhere to solid surfaces, improving quality of water. The goal of this project was to further improve on our previously designed low-cost herbal filter by utilizing clay-based balls mixed with herbs instead of powdered form of herbs and check for removal of common water contaminants while trying to achieve greater clarit

8 509

11 516

Washington-Liberty High School

Teacher: Cook

The purpose of this study was to test how much building sway on super-slender towers from vortex shedding is reduced when a pendulum Tuned Mass Damper (TMD) was being used. The independent variable was the amount of damping. The experimental group was the building with the pendulum TMD. The control group was the building without the pendulum TMD. The dependent variable was the building sway, as measured by an acNP□bnnwxP7m□vows

C"#$

Yorktown High School

Teacher: Hessler

The goal of this project was to design and build a shoe using piezoelectric transducers that would generate sustained power while walking and jogging. Piezoelectric transducers are ceramics or crystals that produce electricity when force or stress is applied. To achieve sustained power, Voltage Multipliers were used.

This project had four phases: Capacitor Selection, Insole Design, Metronome Testing, and Treadmill Testing. Voltage, current, and power were recorded in each. Of the six capacitors tested, the 2.2 uF had the longest duration of charge, so it was chosen as the capacitor size for the Voltage Multipliers in the next phases. Of the four inserts tested, Insert 1 had the largest peak power and Insert 4 had the longest duration of charge, so both were used in the next phase. In the Metronome Testing phase, the transducers were tapped at walking (50 BPM) and jogging (88 BPM) paces in 30 second intervals. Insert 1 had a higher sustained power than Insert 4 at both walking and jogging paces, so it was chosen for the next phase. In the Treadmill Testing phase, the current was smaller than the previous phase, resulting in a decrease in power, which is similar to the final results in the previous experiment. Through further studies, the power output could be increased using stacks of transducers. With this technology implemented, individuals would be able to produce their own energy through walking and exercise and help the world toward the goal of zero carbon emissions.

E E I NE AL A D EA H CIE CE

8 603

Swanson Middle School

Teacher: Swanson

I tested the effect of the

Washington-Liberty High School

Teacher: Brodowski

Alexandria City High School

Teacher: Matthews

With mold having such a dramatic effect on how and when bread can be eaten, “Most common source of microbial spoilage is due to mold growth”, (Ravimannan et al. 2016) and with the possibility of having longer shelf life of bread with small changes in where bread is located, and more specifically the temperature of the environments it is in, the idea for the experiment came about. To be clear, the hypothesis investigated was “If bread is kept in the freezer, then it will show the least mold growth.” In order to test this hypothesis, I put white bread slices into plastic bags, and stored them in different temperature environments for 14 to see how temperature affects it.. My IV was the temperature of the environment, my DV was mold (amount), and my control group was the room temperature setting. [3 Levels: Room Temperature, Refrigerator (40F) and Freezer (0F)] After conducting the experiment 3 times, the data collected supported

Washington-Liberty High School

Teacher: Fretts

Yorktown High School

Teacher: Lovrencic

Access to clean water is limited in many developing areas. Therefore, filtration technologies that are accessible and can be locally produced should be investigated. A recently-developed filter is the xylem water filter, which is relatively inexpensive and utilizes the xylem tissue within gymnosperm trees to filter out contaminants in water. Optimization of the filter to ensure efficient use of resources could help increase accessibility and performance. Literature has suggested that xylem filters may be as thin as 0.6 cm without compromising the filtration ability.

In my project, I study the impact of xylem filter thickness on the effectiveness of water filtration, as measured by turbidity. Three different filter thicknesses of 0.5 cm, 1 cm, and 1.5 cm were tested. I fond that there was a direct relationship between filter thickness and turbidity: as filter thickness increased, turbidity increased. On average, the turbidity of the water filtered in the 0.5 cm group was 0.355 NTU while the turbidity in the 1.5 cm group was 8.289 NTU. I also observed that increased filter thickness caused the filtered water to be tinted yellow. I believe this may be caused by natural particles within the wood itself that ended up contaminating the filtered water. The thicker the filter, the more contaminants from the wood that were introduced into the water.

Because the thinnest filter level of 0.5 cm was effective at both lowering turbidity and producing clear, non-tinted water, I conclude that using a thin xylem filter would be most effective at water filtration.

Alexandria City High School

Teacher: Lay

If air quality is tested in differently sized classrooms just before the start of an active school day, and then immediately after the school day, then the CO2 concentration in smaller classrooms will be higher.

Yorktown High School

Teacher: Mower

Washington-Liberty High School

Teacher: Hedderly

Si a p silla

The purpose of this study was to see if S. pusilla are reacting to higher temperatures caused by climate change by shifting their range north. The independent variable was the occurrence of S. pusilla in Virginia (number per count). There was no control group. The constants were the databases used for the independent and dependent variables, and the month for which the data was collected. The dependent variable was the temperature anomaly in Virginia (oC). The hypothesis was: If S. pusilla occurrence in Virginia over time is compared to Virginia temperature anomalies over time, then as the temperature anomalies increase, the S. pusilla occurence will increase, demonstrating a northward range shift. The null hypothesis was: S. pusilla occurrence will remain constant in Virginia, even as temperature anomalies increase. The study was important because it provided insight into how organisms are reacting to climate change, which could help protect other organisms in the future. The study was completed by compiling the S. pusilla occurrence data and the temperature anomaly data into an excel sheet. The independent variable was calculated using the equation: number per count = number of S. pusilla reported ÷ number of counts reporting S. pusilla. A line graph and scatter plot were made to represent the relationship between S. pusilla occurrence and temperature anomaly; a Spearman's Rank Correlation Test was run. The data showed little correlation between the variables. Further study is needed to accept or reject the hypothesis.

Bishop O'Connell High School

Teacher: O'Connor

Concerns have

Dorothy Hamm Middle School

Teacher: Kennedy

Here I study the correlation between a person's EEG and their score on a series of pattern recognition tests. I took a close look at prominent correlations and why they might be. During this stage, I found that Beta, Alpha, Delta, and Theta quantities behaved in ways that made sense given their properties. Gamma Waves also functioned along expected lines but variability was high enough that I discarded its prominence. In the second stage, I write code to predict these scores. The code did not turn out to be reliable against the average but did prove substantially better than guessing.

Williamsburg Middle School

Teacher: Thomas

This project explores the effect of photograph (photo) size on the accuracy of a facial detection

Alexandria City High School

Teacher: Matthews

This experiment was conducted for a number of reasons. One of them was to identify a clear difference between Hall of Famers and regular players. This was because this difference would provide grounds for current players who seemed like they were on the brink of making the Hall of Fame, but at the same time looked like they didn't have enough. That leads to the second objective which was to identify a unit of measurement that tells us if a player is a Hall of Fame-caliber player. I identified the points system as a measurement as it reflected how much one has accomplished over the course of their career. I approached this experiment by using averages at first. I then discovered the chi-square test, which is better at comparing entities. Some key results I had were when I found the percentages of outperformance. This led me into believing that it was harder to underperform than overpreform because of the mediocre stats some players put up.

Alexandria City High School

Teacher: Gamby

9 710

Alexandria City High School

Teacher: Paul

Wakefield High School

Teacher: El-Gamal

The Purpose of this project was to observe general trends in what makes a password secure and potentially debunk any password security myths. The password that is inserted is the independent variable. The dependent variable is the time it takes for the computer to guess the passwords. The Hypothesis was that the computer will take 2-3 minutes on average to guess my passwords, while the overall mission statement was to observe trends in password security.

The project was done by constructing a Python program that would guess each password in a certain amount of time. Each password would then be plugged into the code (template provided by ScienceBuddies.org) in order to generate the amount of time needed to “crack” the password. Once all of the times to “crack” each passcode were collected, scatter plots and other graphs would be used to analyze the data.

It was found tha

Alexandria City High School

Teacher: Daigle

In the experiment, three hard drives were tested 10 times each using CrystalDiskMark. It was found that the hard drives got approximately 20 mb/s faster every two years.

H-B Woodlawn Secondary Program

Teacher: Taggart

What is one of the most important things to do when taking care of your skin? Moisturizing. In this project we investigated the effects of different types of moisturizers on gelatin, which we

H-B Woodlawn Secondary Program

Teacher: Boyle

Dorothy Hamm Middle School

Teacher: Marszalek

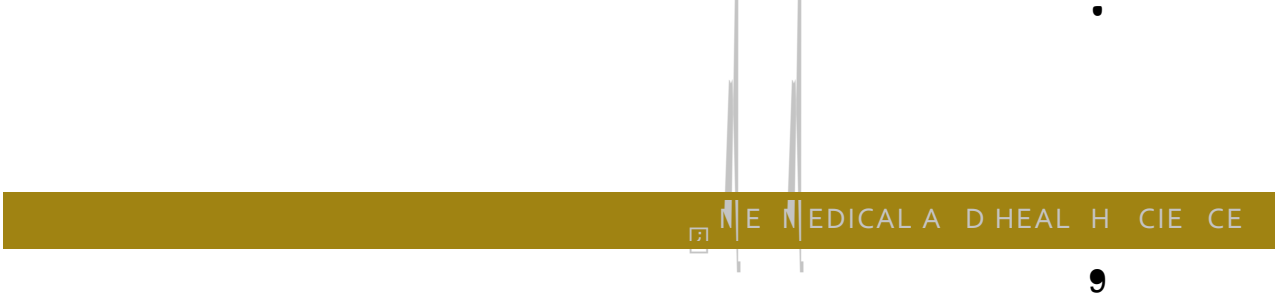
Daphnia magna

Microplastics are everywhere, from the water we drink to the bottom of our oceans. The purpose of this experiment was to stimulate how microplastics can affect the survival rate of aquatic organisms. While researching, I found that microplastics can have detrimental effects to other organisms, so I wanted to see how the amount of microplastic would affect the survival rate of a model invertebrate, Daphnia magna. It was hypothesized that the group of Daphnia with the most microplastic would have the lowest survival rate because microplastic can intoxicate and even kill other aquatic organisms who are exposed to microplastic. To test the hypothesis, I set up three different ecosystems: one with no microplastic, another with 0.5 ml of microplastics, and a third with 2 ml of microplastics. I had three trials and put the same amount of Daphnia magna in each ecosystem. The survival rates of the Daphnia were monitored until all of the Daphnia magna died out. The researcher's hypothesis was supported: the group with the

Alexandria City High School

Teacher: Johnson

The question I was researching for this project was, what after school activity has the most positive effect on someone's blood oxygen level? I used three groups of 15 students grades 8-12 to collect data. The first group was people who play soccer on a regular basis. For this group I used people on my soccer team. The second group was people who sing on a regular basis (choir students) and the third group was people who do neither soccer nor singing on a regular basis. I took blood oxygen measurements using a pulse oximeter. The data I collected from all three groups was very similar. Depending on the way I average the data, different after school activities seem to have a higher blood oxygen level. When the 15 data points from each group are averaged by finding the mean with one data point removed as an outlier, the order of activities from highest to lowest SpO2 is soccer, singing, and then control group.However, if you average the data by taking the median of each group, the singing and soccer groups both have a 98 average SpO2 and the control (neither) has the highest at 99 SpO2. Because the data points show no definite order of the activities from highest to lowest SpO2, I can conclude that there is no discernible relationship between afterschool activities and Blood Oxygen levels.



Wakefield High School

Teacher: Muñoz González

We are enduring a worldwide crisis of mental illnesses affecting every human either directly or indirectly. Scientists are desperately looking for solutions to this growing problem, it's possible that neurostimulation will solve it.

The tACS neurostimulation (Transcranial Alternating Current Stimulation) specifically is being investigated. The difference between tACS and other technologies is that it's a non-invasive method that applies a weak external current stimulating one neuronal cell, which stimulates the next, etc. until transforming into a new brainwave. Scientists have proven that inducing Alpha brain waves using tACS is beneficial in long-term treatment of mental illnesses. The question explored was: Which frequency best artificially induces Alpha brain waves? If a researcher uses tACS technology at the ideal strength, then they will be able to induce an alpha brain state and test it using an EEG.

In this research analysis, experiments with varied participants who received stimulation from a bihemispheric tACS cap were studied.

Those results explained that a frequency of 10 Hz was ideal for inducing an Alpha wave. At that frequency, the participants had less control of complex bimanual actions, speed, and a high error rate. These were all signs of low cognition, which was desired to obtain a state of trance or intense tranquility. Research scientists and engineers must work in harmony to create a new effective neurostimulation treatment.

11 810

Washington-Liberty High School

Williamsburg Middle School

Teacher: Willet

The purpose of this experiment was to identify the dirtiest surface in the school. With COVID variants coming this informs how to avoid getting sick, so with this and the places in a school to take extra precautions. The surfaces swabbed were the door handles, toilet seats, sink handles, iPad screens, and locker locks. It was hypothesized that if the door handles were swabbed, then they would grow the most bacteria, because kids tend to not wash their hands after various activities that would gather germs, and are then passing on said germs to the door handles. The experiment was conducted over three days in a research lab, everything was sanitized to make ensure no cross-contamination. The agar was autoclaved and was then poured into 45 separate Petri dishes which were left to cool overnight. Once cool each sample was streaked three times, and was then incubated for 24 hours at 37 degrees Celsius. The stated hypothesis was rejected because the locker locks actually grew the most bacteria with 7 colonies, and the toilet seats grew the least with 0 colonies. The greatest range was in the iPad screens which had a range in data of 13 colonies, and the least range was the toilet seats with a data range of 0.
Possible places where error could've occurred include cross contamination of the samples, inconsistent swabbing of the surfaces, and inconsistent inoculating of the plates. Ways to extend this experiment could include determining the type(s) of bacteria that were grown.

Dorothy Hamm Middle School

Teacher: Marszalek

Tylenol has different coating types, making the medicine easier to swallow. I wanted to test the

8904

Gunston Middle School

Teacher: Robles

Yorktown High School

Teacher: Paz-Soldan

In a world full of harmful germs, bacteria, and disease, scientists are constantly searching for efficient ways to maintain clean, sterile environments. Ultraviolet radiation has been used for decades to disinfect water, surfaces, and the air. The type of ultraviolet ray best suited for eradicating pathogens is known as UV-C. UVC is commonly used in hospitals, labs, and even

H-B Woodlawn Secondary Program

Teacher: Young

A rise in the prevalence of antibiotic-resistant infections has begun a search for alternative methods to combat bacteria in the human body. Bacteriophages (or “phages” for short) are a type of virus that can kill specific strains of bacteria, and were first observed in the early 20th century, just before the discovery of penicillin. The difficulty associated with finding phages targeted to a specific infection is one reason the treatment is used relatively infrequently. The prospect of personalizing phage treatment by isolating new species for individual infections is promising. This study aimed to isolate phage species for multi-drug resistant strains of Pseudomonas aeruginosa and Staphylococcus aureus, the most common causes of chronic infections in patients with cystic fibrosis. Three samples of human fecal matter, one sample of feline fecal matter, and one sample of rich soil were tested for the presence of both S. aureus- and P. aeruginosa-hosted phages. Using the double agar overlay method of phage enumeration, it was found that six of the ten stocks contained bacteriophages, at titers ranging from 3.9x10^4 pfu/mL to 2.8x10^7 pfu/mL. The potency of the Pseudomonas-hosted isolates in eradicating biofilms was compared to the efficacy of an antibiotic cocktail and the enzyme cellulase through an in vitro resazurin cell viability assay. Each treatment was performed in sextuplicate. Metabolic reduction of resazurin to resorufin (which proceeds in the presence of live cells) was quantified at 24 and 48 hours of growth using a microplate reader set to measure absorbance at both 570nm and 595nm.

Yorktown High School

Teacher: Amarasinghe

This experiment was conducted to compare the effect of different water treatment methods on the growth of microorganism colonies in water. The hypothesis is that “If the method of water treatment is a UV light, then the least amount of microorganisms will grow because the Deoxyribonucleic acid (DNA) of the cell is disrupted.” For this experiment, water was collected from a pond in Arlington, VA and treated using four different methods of water treatment: two chlorine-based, one iodine-based, and one using a UV light. A fifth level was not treated, which was the control. The water samples were incubated on Agar Plates for 48-hours, and the resulting number of microorganism colonies were counted, and the average number of each method of treatment were calculated. The hypothesis was rejected, as the most effective method of water treatment tested was a Chlorine-based method, not the UV Light method. The null hypothesis, which was that there is no effect of the type of water treated on the growth of microorganism colonies was rejected. A One

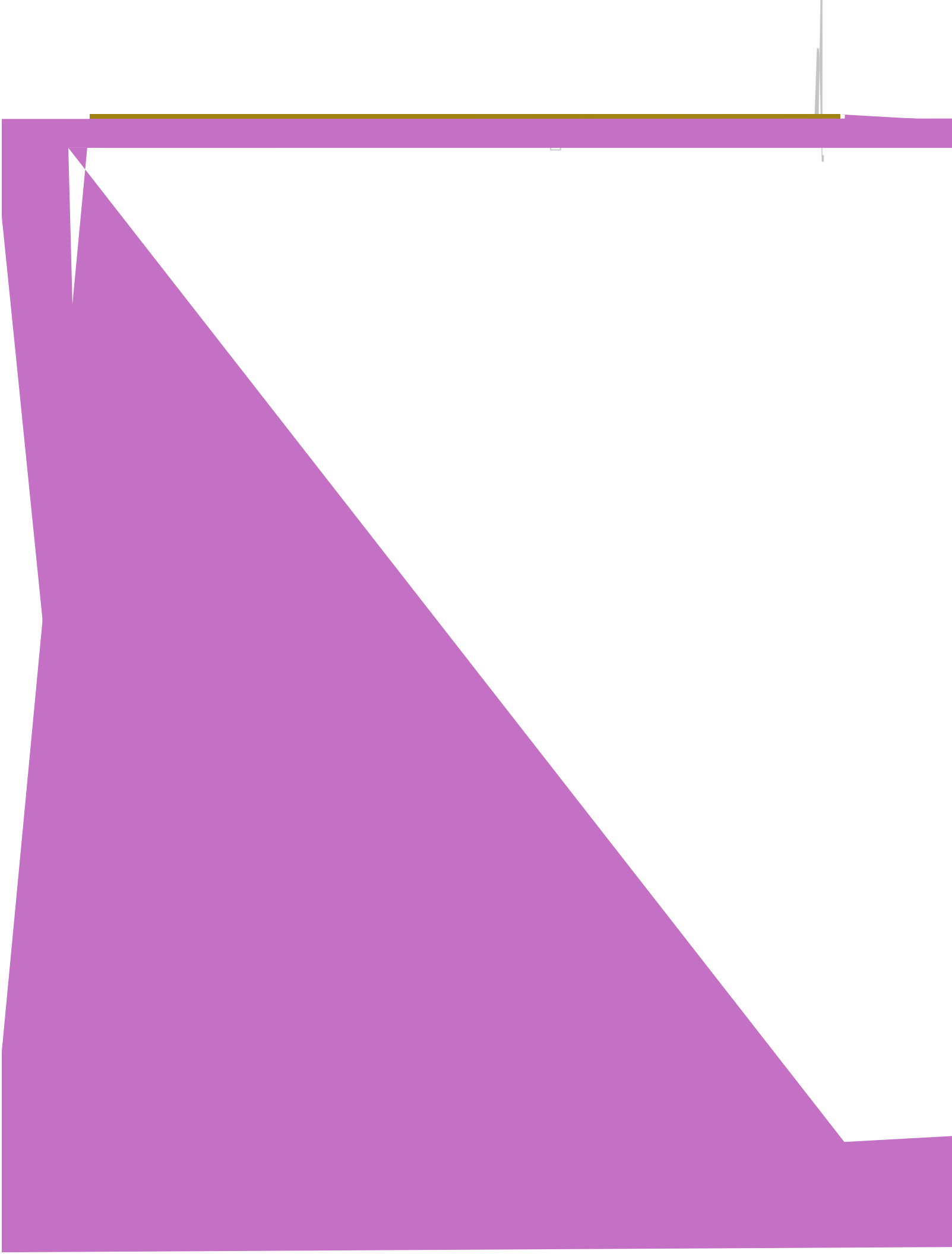
11 913

Washington-Liberty High School

Teacher: Hedderly

Caenorhabdi is elegans

An electronic cigarette is a device that simulates cigarette or tobacco smoking by atomizing a liquid into an inhalable vapor. It is often billed as a smoking cessation device, safer than cigarette smoking; however, these devices are feared to work inversely as a gateway to cigarette smoking through nicotine addiction. In addition to the danger from e-cigarette injury and death, there are also neurological implications to using an e



7

George Washington Middle School

Teacher: Thomas

Our purpose was to see if we can demonstrate the way astrologists can detect black holes using magnets. No one should care about our project, as it didn't work and you cannot use this information. This is not something that should cause people to change the way they go about life? As we made an inaccurate hypothesis and our data did not add up. This was not a great experiment and it was more of a fun experiment and not a science fair project.

Problem: We did not have a problem but we did have a purpose. And that was to see if we can demonstrate the way Astrosists can detect black holes using magnets and we got into that and our project was inconclusive.

Procedure: We had a pretty direct approach that was to set up an environment to simulate as if we were in space And we use magnets to demonstrate the black hole and the things being

H-B Woodlawn Secondary Program

Teacta Hsc:lSTllTc-Ea slMcFñtMc:lltMc:ScBwyMyckBwlIBlcBl:HS:wBSdSwSaTslBlMcagstylMcaasISFñ

Dorothy Hamm Middle School

Teacher: Marszalek

Alexandria City High School

Teacher: Riley

Alexandria City High School

Teacher: Matthews

My research objective was to find the material that best stops the decay of radioactive material. I approached this by testing Americium 241(Am-241) in 3 different materials which were paper, aluminum foil, and cloth; I also tested the Am-241 by itself with no materials covering it as a constant. I was testing for which material had the least number of tracks and smallest size in centimeters. The paper had the lowest number of tracks at 12 and aluminum foil had the smallest tracks at 2.33 centimeters. I concluded that both aluminum foil and paper were the best ones to choose from.

Alexandria City High School

Teacher: Riley

The purpose of my project was to see if 3d printed PLA rockets can fly better than traditional model rockets. This is significant because PLA rockets are more durable and cheaper, making them a better option to use. This research is potentially very important because it could change the entire model rocketry view. For example, instead of using mostly cardboard rockets, people could start printing their own rockets or buying PLA rockets. The approach for this experiment was to create a rocket that flew, I had little knowledge of rocketry. The procedure for this experiment was to first fly the Estes rocket, to have something to compare the 3d printed rocket's results to. X1 and X2 were then designed and flown and new rocket designs were created, printed, and eventually flown. Throughout a lot of trial and error, the results concluded that X7 performed the best, with acceleration and speed that compared to the Estes rocket. If designed and experimented with, a 3d printed rocket can perform better than an Estes rocket.

This test demonstrated thatthere was statisticalsignificance between experimenta levels

H H IC A DA N

10 1016

Wakefield High School

Teacher: El-Gamal

The experiment was undergone in an attempt to determine if certain inorganic compounds were more effective in the blocking of UV-A radiation. The independent variables in experimentation were the different inorganic compounds used, being Titanium Dioxide and Zinc Oxide. The dependent variable was the UV intensity after the application of Titanium Dioxide and Zinc Oxide, measured in μW/cm². Several control groups were instituted to avoid the development of potential confounding variables, accounting for outside factors that may have impacted the reliability of the data. It was hypothesized that if a UV-A light was placed under Zinc Oxide, it would be able to limit the transmission of UV light to the greatest extent, resulting from Zinc Oxide's photostability. To test this, one gram of each inorganic compound was placed on separate sheets of quartz glass, which were raised two inches above the ground. A UV intensity meter was placed underneath each sheet, with a UV-A light placed approximately 8 inches above the quartz glass. Eight trials were undergone. The results showed that on average, Zinc Oxide was able to most effectively limit the transmission of UV-A radiation, with an average UV intensity of 28.625 μW/cmμdwWvoinsvo svocsvoosvomsgopsarson o Titanumoosvoxsde, whchhad a

7 1100

Kenmore Middle School

Teacher: Schnappinger

When chemicals are sprayed on yards and farms, rain can wash those chemicals into waterways and bodies of water where it can harm aquatic plants and other life. It is important to know what concentration of chemicals can cause damage to the ecosystem. The purpose of this project was to determine what concentration of toxic runoff kills aquatic plants. One such plant is duckweed. Duckweed oxygenates the water and provides nutrients for aquatic life. It is assumed that higher concentrations of chemicals cause increased plant death. In this project Duckweed was placed in 4 different jars of aquarium water, each with different concentrations of the herbicide, Roundup (0cc, 10cc, 15cc, and 25cc each). It was hypothesized that at least 25cc of Roundup in 600cc of water would cause at least 20% plant death. Notes were taken using observations and common knowledge of plant and water coloration to measure the viability of the Duckweed over time. After a week of conducting the experiment, the data put into tables and graphed. At the conclusion of the project, it was shown that the original hypothesis was supported, since the concentration of 25cc reduced the viability of the duckweed by at least 20%.

Washington-Liberty High School

Teacher: Bohn

Did you know that composting dog waste and cow manure can be vital to prevent pollution? The purpose of this experiment was to determine the effects of composted dog waste, cow manure, and vegetable peelings on the growth speed of a bean plant. The hypothesis of this experiment was if bean plants are treated with different types of composted organic waste, then those treated with dog waste compost will grow the fastest because it supplies

11 1111

Yorktown High School

Teacher: Parent

This experiment's purpose is to test how different types of growing mediums used in a hydroponic system can impact the production of Swiss chard. The results of this experiment helps at-home gardeners, professional farmers, and engineers decide if the type of growing medium they use in a hydroponic system will affect their plant's growth. The hypothesis was that if the type of growing medium is coco coir, then plant growth will be the greatest because it has a medium porosity in comparison to rock wool and clay pebbles. This was hypothesized because background research shows that plants need a growing medium with enough air pockets to keep their roots from drowning due to a lack of oxygen. To test the hypothesis, 21 plants (7 per each level of the IV) were grown using wick-