Project # **J0101** Category: **Animal Biology - Jr**

Student: **Dro Aboulian** Grade: **8** G: **M**

School: **Chamlian Armenian School**

Title: **An Alternate Source of Protein, The Black Soldier Fly**

The increasing gap between supply and demand for protein and increased burden of methane produced by decomposing food waste on the environment are two major problems that need more research and optimal solutions. The purpose of my project is to show that the black soldier fly larvae is a good candidate to tackle both problems.
These larvae are able to naturally convert nutrients from pre-consumed food waste into a clean source of protein. As they grow and feed, they eliminate tons of food waste that would otherwise end up in landfills. These larvae have similar protein per gram to beef and almost twice its leading competitor, soy. On top of this, Black Soldier Fly larvae castings can be used as fertilizer.
Black soldier fly larvae were weighed on three occasions to assess their growth and food consumption. Three sets of similar weight larvae were measured at weekly intervals. The flies began at an average of 184 milligrams and in two weeks grew to an average of 9134 milligrams, almost a 50 fold increase. For my second experiment, I used frass as a fertilizer for tomato plants and showed improved growth with soil and frass compared to regular soil.
Black soldier flies are a great solution to two major problems, lack of sustainable protein and methane producing food waste. Growing larvae consume the food waste and they can also be used as animal feed. Larvae frass contribute to improving plant growth as a fertilizer.

Project # **J0102** Category: **Animal Biology - Jr**

Student: **Raphael Kaplan** Grade: **7** G: **M**

School: **La Canada Preparatory**

Title: **How Do Raptors Survive in L.A.?**

OBJECTIVE:
The study compared the survival breeding behaviors of Cooper’s and Red-tailed Hawk raptors with human and natural factors over time.

MATERIALS AND METHODS:
I participated in an observational study with no physical contact with raptors or of raptor nests in 2018 - 2022 in Los Angeles. The 2022 sample included 185 Cooper's Hawk and 161 Red-tailed Hawk nests. I got my data from the study tables and annual reports and from the County Covid 19 website. I investigated the connections between breeding behaviors and human and natural factors of new Covid cases and of rainfall. I interviewed two raptor experts who aided in my data interpretation.

RESULTS:
I tracked the survival breeding behavior variables of: proportion of nests fledged, territory fledging rate, and number of chicks, between 2018 - 2022 for the Cooper’s Hawk compared to the Red-tailed Hawk. The number of human Covid-19 cases corresponded with the breeding behaviors of the two species. Rainfall changes during that time appeared to have no effect on the breeding behaviors of each species.

CONCLUSION/DISCUSSION:
My hypothesis of differences in the associations of Cooper’s and Red-tailed Hawks survival breeding behaviors and the human factor of new Covid cases and the natural factor of rainfall was partly correct from year to year. I discovered that scientific knowledge related to raptor survival in urban areas needs to focus on the complex relationships between breeding behavior and human and natural factors. Public awareness must be improved so that humans and raptors can cohabitate beneficially.

Project # **J0103** Category: **Animal Biology - Jr**

Student: **Ayah Hamdan** Grade: **7** G: **F**

School: **Al-Huda Islamic School**

Title: **Are Fingerprints Inherited?**

The purpose of my experiment was to determine if fingerprints are inherited. It was hypothesized that if fingerprints of pairs of siblings and those of unrelated pairs are collected, then the fingerprints of siblings will show similarities in patterns. In order to test my hypothesis I tested 10 pairs of middle school students; 5 related pairs and 5 unrelated pairs, to see if they will have similar fingerprints. The related pairs had 3 out of 5 sibling pairs that had similar fingerprint patterns. Siblings pair 2 had the same thumb finger print pattern: accidental whorl. Also, Siblings pair 4 both had Central Pocket Whorl. Siblings pair 5 had similarities in their right index finger. Only 1 out of 5 unrelated pairs had the same right index fingerprint pattern which is Plain Whorl. After looking at my result I identified that 60 percent of sibling pairs had similar fingerprint patterns. I also identified that 20 percent of non-related pairs had similar fingerprint patterns.
Finger prints are unique to each individual, and no two people on earth have the exact finger print, not even identical twins. This project proved that similarities in finger print patterns can exist between siblings, which means that fingerprint patterns could be a genetic trait. The hypothesis was supported.

Project # **J0104** Category: **Animal Biology - Jr**

Student: **Idris Abdul-Malik** Grade: **6** G: **M**

School: **Institute of Knowledge Middle School**

Title: **The Heat is On: Examining the Impact of Temperature on Painted Lady Butterfly (V. cardui) Development**

My question is: How does temperature affect the growth rate of butterflies?
Procedure: My mother bought me caterpillars. I placed half into warm and cold environments each, and I recorded observations in my lab notebook as they developed into chrysalides. After placing them in a net with flowers, some butterflies emerged but were initially still. Later, one butterfly started to move, and I provided them with oranges to eat while continuing to make observations in my notebook.
Results: In the cold environment, there were 7 butterflies, and in the warmer environment, there were 3. The average temperature range for the cold environment was 16-17°C, and for the warmer environment, it was 19-21°C.
Conclusion: In summary, my hypothesis was partly accurate as the caterpillars' growing rate was affected by temperature, contrary to my expectation. The colder temperature led to faster growth instead of the warmer temperatures as anticipated. These results support the idea that temperature influences caterpillars' growth rate, which may explain why butterflies migrate during colder seasons. My research suggests that the caterpillars' body temperature could vary up to 10 degrees Celsius due to changes in shade and direct sunlight, impacting their growth rate.

Project # **J0105** Category: **Animal Biology - Jr**

Student: **Yousef Elrabat** Grade: **7** G: **M**

School: **New Horizon School**

Title: **Using Mealworms to Effectively Biodegrade Styrofoam**

The objective of this experiment was to test if mealworms could biodegrade Styrofoam. The hypothesis of this experiment was that if mealworms are fed with Styrofoam pieces, they will effectively biodegrade the Styrofoam. The materials used in this experiment were clear cups, Styrofoam pieces, a fine weighing scale, clear film, and 225 mealworms. First, one-gram pieces of Styrofoam were placed into 15 clear cups. Next, 15 mealworms were placed in each cup. The cups were covered with clear film. Then holes were poked in the film so that the mealworms can get air. The mealworms were not provided with any other food. In this experiment, the average amount consumed over 8 days was 0.32 grams, and over 10 days, was 0.37 grams. Results indicate that as days progressed more Styrofoam was consumed. One problem that occurred is that they were not eating the Styrofoam for the first few days which is why the data was first collected on the eighth day. In the future, several kinds of Styrofoam will be tested. Mealworms will be placed in Styrofoam pieces with and without food. Placing both together will give a complete picture of their eating habits. It will be tested if they will choose to eat Styrofoam in the presences of their usual food. This experiment is very useful because mealworms will lower the amount of Styrofoam that ends up in landfills and waterways.

Project # **J0106** Category: **Animal Biology - Jr**

Student: **Adina Tariq** Grade: **8** G: **F**

School: **Al-Huda Islamic School**

Title: **Stuck with You! A study on the Long Term Side Effects of Covid-19.**

In December of 2019, the world was hit with the Novel COVID-19 Virus. The virus was still new and we did not know much about it. As we learned more, it became clear that there are many aspects of the virus that remain unexplained. Long-term covid, or long-haul covid was identified as patients who contracted the illness and suffered symptoms for three month or more after initial infection. The CDC states that “People with post-COVID conditions can have a wide range of symptoms that can last weeks, months, or even years after infection.” This project examined the percentage of patients that developed long-term symptoms, and the percentages of each symptom within that group. The population for the experiment was covid-19 patients, and the strata was those with long term symptoms against those without. It was hypothesized that: If a group of people who are otherwise healthy who contracted the Covid-19 virus are surveyed regarding long term effects, then a substantial percentage will show that they suffered long term effects of the virus. An online survey with 101 responses showed that 40.2% of those with a confirmed PCR test, and no known pre-existing medical conditions exhibited long term effects running 6 months after contracting the virus. Breathing issues, joint or muscle pain, and neurological changes were the most prevalent of long-term symptoms. While there may be speculations, no one definitively knows why some develop long-term symptoms and others don’t. In future research, I would hope to find answers to that question.

Project # **J0201** Category: **Animal Physiology - Jr**

Student: **Faris Hafid** Grade: **7** G: **M**

School: **Al-Huda Islamic School**

Title: **Is There a Correlation between the Epstein-Barr Virus (EBV) and Developing Postural Orthostatic Tachycardia Syndrome (POTS)?**

Postural Orthostatic Tachycardia Syndrome (POTS), is an autonomic dysfunction condition. Many factors can cause POTS. This study focused on one factor, which is testing positive for the Epstein Barr Virus (EBT). It was hypothesized that contracting the Epstein Barr Virus (EBV) is a leading cause for developing Postural Orthostatic Tachycardia Syndrome (POTS). In order to test the correlation, a survey was created to test EBV patients to see if they developed POTS after contracting the virus. 16 responses were received, which was less than hoped for. To achieve a more accurate conclusion, an additional survey was created to test POTS patients regarding the cause of their condition. 22 additional surveys were received. After the data was collected and analyzed, the results showed that the hypothesis was supported. The results from the first survey showed that 43.75% of subjects with a positive EBV result developed POTS after contracting the virus. The results from the second survey showed that the highest percentage of subjects surveyed had POTS as their primary condition with a percentage of 40.91%. The second highest cause for POTS was after contracting the Epstein Barr Virus infection with a percentage of 18.18%. All other reported causes tied at a percentage of 4.55%.
The Epstein Barr Virus is believed to release neurotoxins that cause POTS symptoms. Understanding the causes of chronic diseases is crucial to patients and doctors as it may help patients receive diagnoses earlier which allows them to manage their condition in a better way.

Project # **J0202** Category: **Animal Physiology - Jr**

Student: **Azmavet Inocente** Grade: **8** G: **F**

School: **Magnolia Science Academy 6**

Title: **The Build Of The Artificial Pancreas**

My objective for this experiment was to build a circuit that would support a diabetic person's blood sugar and figure out what time of the day they would need to take an insulin shot. I constructed the circuit board using a solderless breadboard, Arduino UNO, Male - Male jumper wires, 5V peristaltic liquid pump, USB A-B cable, N-channel MOSFET, 100 k resistor, alligator clips, and a digital multimeter. Both tap and distilled water were correlated to see when a diabetic person takes an insulin shot. I added salt to the water to represent blood sugar levels in a diabetic person's bloodstream in each trial. My result indicates that an hour before consuming a meal is the most appropriate time for a diabetic person to take an insulin shot. Each of these trials represented a different point of the day with the blood sugar levels for that period. Most of my rounds shared similar averages, making my results more precise. Based on these results, I can assist more diabetic people with their blood sugar levels to a healthy level. Before I started this experiment, I hypothesized that a diabetic person would need to take an insulin shot an hour before bed since that is when their blood sugar levels drop to the lowest. Throughout my experimentation, my results did not support my hypothesis. The next time I complete this experiment, I would like to see if other scenarios require a diabetic person to take an insulin shot to maintain their blood sugar.

Project # **J0203** Category: **Animal Physiology - Jr**

Student: **Autrin Anousheh** Grade: **7** G: **M**

School: **Mirman School**

Title: **The Role of Wearable Electrocardiogram Technology to Detect Electrical Abnormalities Associated with Sudden Cardiac Arrest in Young Athletes**

Sudden cardiopulmonary arrest is the major cause of death in young athletes which is primarily caused by structural or electrical abnormalities of the heart. Detecting these abnormalities is done in a healthcare setting where individuals will be evaluated by traditional ECG machines or cardiac ultrasound which can't detect exercise-induced conditions. These machines require 12 electrodes to take an ECG whereas the Wellue ECG monitor utilizes only two. This study aims to measure the accuracy of these devices to potentially suspect these conditions. Subjects obtained the device per study protocol and were continuously monitored during physical activity. The electrocardiographic data were de-identified and then scrutinized by two independent cardiologists. Sinus tachycardia was the predominant rhythm for all subjects which is defined as a normally elevated heart rate greater than 100 beats. Rare isolated extra beats (Premature ventricular contractions) were noted in some tracings which were deemed without any major clinical significance by supervising physicians, but it was found to be exercise-induced which supports the reliability of these devices in detecting heart conditions that are exercise-induced which clinical ECG machines cannot detect. The quality of the recorded ECGs was deemed acceptable by analyzing physicians. Although all subjects in this study had no ECG evidence of underlying structural or electrical cardiac abnormalities, future implications are extremely beneficial. This study supports the benefits of reliable electrocardiographic data recorded by portable wearable monitors. Because of its accessibility, feasibility, and ease of use, it can be used by individuals or institutions as a rudimentary screening tool.

Project # **J0204** Category: **Animal Physiology - Jr**

Student: **Yash Jaju** Grade: **7** G: **M**

School: **La Canada Preparatory**

Title: **Planaria, Regeneration, and Future of Medicine**

Aloe Vera Juice has been used for thousands of years to accelerate wound healing. However, it's difficult to test its effects on human beings, we can use planarian worms to model this. Planaria worms do not feel pain, and are able to regenerate different body parts when cut.

Materials:

Planaria Worms
Pipette
Petri Dishes
Egg Yolk
Razor Blade
Notebook
Microscope
Microscope Slides
Lamp
Magnifier
Aloe Vera
Spring Water
Grinder
Eye Dropper
10 mL and 100 mL graduated cylinder

Methods:

I fed planaria egg yolk and waited two days. I prepared the aloe vera solutions. I put one planarian per dish in 3 dishes and added , spring water, 1%, 5%, and 10% aloe vera, and then amputated.

I repeated two times,

Results:

The 5% aloe vera had an optimal concentration of glycoproteins and polysaccharides including glucomannan for fastest planarian regeneration. The planarian cells were able to efficiently specialize and form new tissue.

The spring water was the slowest because it did not have any glycoproteins or polysaccharides to enhance regeneration time.

Conclusion:

My hypothesis was consistent with my results. If I were to do something differently, I would try to cut the worms differently, such as vertically. There were exceptions, because not all worms had the same regenerative abilities and some amputated pieces were larger than others. Time allowing, on a third trial, I would sill like to repeat the procedures using the best aloe vera solution, spring water, and two different concentrations of agar nutrient solution.

Project # **J0205** Category: **Animal Physiology - Jr**

Student: **Ani Bristow-Ingkom** Grade: **8** G: **F**

School: **Arroyo Seco Museum Science Magnet School**

Title: **Facial Features: Featuring Faces**

My objective is to learn which facial feature humans depend on to recognize a familiar face. Two paper sets each containing 5 portrait pictures of select Arroyo Seco Museum Science Magnet staff were used. One set was separated into mouths, eyes, noses, and eyebrows of each face. A paper list of the staff's names was also used. For the experiment, a middle school student was first shown the set of unaltered staff pictures. If the student was able to correctly identify all five, they were given a choice between two assortments of ten randomly grouped facial features. Once the student made their choice, the assortment was placed in front of them, picture side down. The list of names was also placed in front of them. They picked out a facial feature and verbally identified who they believed it belonged to while referencing the list. The facial feature was then removed. The experiment concluded once the student identified all ten facial features. The answers from the students were recorded digitally and compared with the correct answers. In total, there were 5 wrong answers overall when identifying the eyes, 11 for the mouth, 22 for the nose, and 23 for the eyebrows. Thus, with viewing the eyes, participants were able to identify more staff members correctly than with the other features. My hypothesis that eyebrows would be the most identifiable feature was incorrect. Future investigations could consider how different age groups might perform with this experiment, and if the recognition process changes with age.

Project # **J0206** Category: **Animal Physiology - Jr**

Student: **Khadijah Aliuddin** Grade: **8** G: **F**

School: **Institute of Knowledge Middle School**

Title: **Far From Home and Back Again: Tracking the Journey of the Eastern Kingbird (T. tyrannus) and Its Seasonal Lifestyle**

Problem: I am investigating how bird migration impacts their lifestyle.
Procedure: The procedure is simple: I used the Audubon app to track an Eastern kingbird during migration, observed its eating habits, and recorded the changes.
Results: In my study, I observed a change in the birds' lifestyle. While in North America, they consumed bugs and dispersed more widely, but in South America, they clustered together and fed on fruit. Further research on this topic will be discussed later.
Conclusion: After conducting my research, I found that the lifestyle and eating habits of the Kingbird had indeed changed significantly. This supports my hypothesis, which was that environmental changes would impact the bird's behavior. It was intriguing to learn about bird migration and how they adapt their lifestyles to different environments.
Overall, the research experience was exciting and fulfilling, and I gained a deeper understanding of the complex behaviors and adaptations of birds. In the future, I would be interested in conducting more research on this topic and expanding my knowledge of avian migration and behavior.

Project # **J0301** Category: **Behavioral Science - Non-Human - Jr**

Student: **Jennifer Velasquez** Grade: **7** G: **F**

School: **Sierra Vista Junior High School**

Title: **Sugar Addiction: A Study of the Effect of different nutrient Sources When Exposed to Different Environmental Temperatures**

The objective of this project is to understand a problem that exists in our global community related to sugar. Choices we make in what we consume affect all living things, especially when considering excessive consumption of sugar. Sugar addiction has become an epidemic problem causing many adverse effects on human health. There is some correlation between seasonal changes and increased consumption of sugar. The hypothesis is there would be an increased attraction to artificial sugar in cooler temperatures than natural sources. This study was initiated with a test using Lady painted butterflies, noting an increased preference for an artificial sugar source (Gatorade) over the natural source (orange juice) at room temperature. The fruit fly, D. Melanogaster, was then studied under different environmental temperatures and the hypothesis was that they would prefer the artificial sugar source (sucralose) in cooler temperatures compared to other temperatures. Between 9-22 flies were placed in an enclosed insect maze with access to different nutrient sources including corn syrup, corn oil, cane sugar, sucralose (artificial sugar source), salt, and water as the control. Each maze was left for 8 hours in warm, room, and cool conditions with the % of flies found at a particular sugar source recorded. Analysis of the data revealed that there was no increase in artificial sugar in cooler temperatures. The hypothesis was incorrect, in addition, flies preferred corn syrup over any nutrient source. There is still plenty of research that needs to be done to fully understand the addictive quality of sugar.

Project # **J0302** Category: **Behavioral Science - Non-Human - Jr**

Student: **Jonah Aftergood** Grade: **7** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **Which Beverages Stain Teeth The Most?**

It is helpful for people to know how their teeth are being affected by certain beverages. This project attempts to determine what drinks stain teeth the most? In my hypothesis I said that the diet coke stained egg would be the most stained out of all the eggs, but I was wrong. The most stained egg out of all of them was the grape juice stained egg. To perform this experiment, I had to get out all my supplies and pour the exact amount of certain liquids into each of the cups. Then, I carefully placed the eggs down and observed them at the 15 hour, 24 hour, and the 48 hour marks and recorded my discoveries. In conclusion, it was very interesting to see how the different beverages stained the eggs. I think that when people see my project, they will think twice about drinking certain beverages.

Project # **J0303** Category: **Behavioral Science - Non-Human - Jr**

Student: **Penelope Ungersma** Grade: **7** G: **F**

School: **Portola Highly Gifted Magnet**

Title: **Anthophila Preferences for Colored Flowers**

The purpose of this experiment was to determine what color bees like the most, allowing people to attract bees to certain areas by planting a specific color of flower in/around that area. My scientific question was; What color of flower are bees most attracted to? Using research about the ultraviolet spectrum and bee vision, I developed my hypothesis; If four colors of flowers are placed in different areas with similar settings, bees will visit purple flowers most out of white, yellow, red, and purple. I set up four groups of white, yellow, red, and purple flowers with motion-sensitive cameras that made a video every time a bee approached the flowers. To collect data, I watched all videos and counted how many bee visits each group of flowers received each day. Over the course of 6 days, the yellow flowers received 130 bee visits in total, averaging 22 bee visits per day, white received 23 bee visits averaging 4 per day, red received 4 bee visits averaging 0 -1 bee visits per day, and purple received 3 bee visits, averaging 0-1 bee visits per day. The yellow flowers received the most bee visits out of the four colors tested, disproving my hypothesis, while purple and red flowers received the least bee visits. Possible reasons for these results are the bright color or arrangement/shape of the yellow flowers, as bees require a flat or tubular place to land. To conclude, bees are most attracted to yellow flowers, proving my hypothesis wrong.

Project # **J0304** Category: **Behavioral Science - Non-Human - Jr**

Student: **Ella Markarian** Grade: **6** G: **F**

School: **St. Gregory A. & M. Hovsepian School**

Title: **Did the Dog Do it Or Not**

The objective of this research was to find how sound can be effective in training dogs in a new skill. I hoped to find what the best reinforcing tool was to impact training dogs. I read scientific research on dog training and watched videos of expert dog trainers. It's important for people to know effective ways to train dogs. Many dog owners love their dogs but do not actually do research about them. I was assisted by an amazing and experienced dog trainer, Julie Armentrout. She gave me some references. In my research I studied two things. One was how dogs react to sound. The other is which parts of their brain are responsible for reacting to sound. My main category will be on which tools to train dogs with. I will also include how their brain works and some tips on training them to be more well behaved. My main two tools that I researched were the clicker and the whistle. I have gotten articles as precedents in order to complete this project. I have also read a training guide from Julie Armentrout herself. After reviewing all these resources it is clear that sound is effective in training dogs in a new skill.

Project # **J0305** Category: **Behavioral Science - Non-Human - Jr**

Student: **Mazzy Wortman** Grade: **8** G: **F**

School: **Arroyo Seco Museum Science Magnet School**

Title: **Comparing Learning Capabilities Between White's Tree Frogs and Feeder Mice**

This project's purpose was to determine whether White's Tree Frogs (Litoria caerulea) were capable of learning at a similar rate as mice (Mus musculus).
I constructed a cardboard maze that was 20.3cm in width and 16.3cm in height. I placed colored paper on two of the walls. The first trials were to determine which colors the subjects showed the least bias against. I placed the subjects inside the maze facing the northern wall and gave them a maximum of 10 minutes to touch one of the colored walls. Once I found the colors that would be used, I began phase two of my experiment. At first, I placed a food item in front of the color the subject was supposed to go to. Gradually, as the subjects began to associate that color with food, I gave them the treat after they chose the correct color. I rotated the color in each trial between the different walls.
The mice and frogs chose yellow and blue each five times. I am still processing the results of the second phase.
I hypothesized that the mice would perform higher on the cognitive ability tests than the frogs. The results of the first part of my experiment showed that both showed no preference for blue or yellow. The results of the second phase are still pending, although I believe they will support my hypothesis. In the future, I would like to possibly compare the frogs against another species and develop new testing methods.

Project # **J0401** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Cathryn Abrishami** Grade: **8** G: **F**

School: **Arroyo Seco Museum Science Magnet School**

Title: **The Art of Deception**

This project's goal is to see if age affects the ability of a person to identify lies. To collect this data, I gathered 15 elementary students (ages 7-10) and 38 middle school students (ages 12-14) to play a game. Once consent forms were collected, five students at a time were asked to play a game. In order to play, three of the participants were given an empty bin and one was given a bin with a stapler. The participants were instructed not to tell who had the stapler and were told that they could lie if they felt it was necessary. The fifth participant was invited to ask questions to determine who had the stapler. Results showed that 46% of elementary students correctly identified the person with the stapler while only 28% of the middle school students got the answer correct. My hypothesis that middle school students would be better at identifying a lie was incorrect. In the future I would like to test people of all ages.

Project # **J0402** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Kealani Vega** Grade: **8** G: **F**

School: **Miraleste Intermediate School**

Title: **Age Analyzation Towards Learned and Conditioned Responses**

Learned and conditioned responses are ways we react to situations in an accustomed way, and the ways we've changed behaviors due to limitations that prevent us from successfully executing our learned response. The objective is to test whether old age of 35 years plus, or young age of 34 years under responds more accurately to a task with a given condition. I hypothesized that the younger age group would respond more accurately in terms of technicality. I thought the younger age group would have more flexibility to complete the tasks and that the older age group would have more limited creative adaptations.

A total of 48 participants were asked to draw a sailboat on a blank piece of paper while being timed. The sailboat was meant to be simple and not include much creative detail. Then, the participants were asked to draw the same sailboat on another piece of paper but given the condition of not being able to see, due to a blindfold. Results were compared and analyzed.

The results of this experiment included no dramatic differences between the two age groups. Each age group averaged with a similar time per each boat (4-6 seconds). Most participants had similar drawings per each boat.

The results of this experiment did not support my hypothesis, for one age group did not perform better in terms of technicality compared to the other. This experiment has expressed that as we age, we do not respond incredibly different through learned and conditioned responses.

Project # **J0403** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Ashley Chan** Grade: **8** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **The Bystander Effect on Humans**

Objectives

My objective was to test the bystander effect in my school. To do this, I tested how the number of people in a room, 1, 3, 5, and 10 people affects the time it takes for someone to offer help.

Materials and Methods

Before I ran my trials, I had possible participants fill out a pre-participation form and those who chose to participate filled out a consent form. Using that information I formed groups of 1, 3, 5, and 10 people, and gave each participant a number they would be referred to during the experiment. At the beginning of the trials, I had participants in each group to take a questionnaire form, then 5 minutes in, I dropped a bucket full of supplies. Then, my supervisor measured the amount of time it took for someone to offer help starting from when I dropped the bucket.

Results

My data had no definitive trend between the different trials. The group of 10 helped the fastest in 5.78 seconds, then the group of 3 in 11.21 seconds. When someone was alone, they took 18 seconds to help out, and the slowest was the group of 5 with 62 seconds.

Conclusion

My results disproved my hypothesis because I hypothesized that a person alone in a room would help the fastest following the bystander effect. My data should have trended upwards, but the largest group helped in the least amount of time. This demonstrates that the bystander effect isn't always in effect.

Project # **J0404** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Sophia Spencer** Grade: **6** G: **F**

School: **Mirman School**

Title: **Eye color and Photophobia: the effect of vision in light and dark.**

The purpose of this study is to measure the impact of light sensitivity and eye color. Photophobia is a source of eye discomfort in bright light environments, but its relationship to vision is unknown. This is a cross-sectional study that evaluated participants in an elementary school population including students, teachers and administrators ranging in age from 6-72. Best corrected visual acuity was assessed by a Rosenbaum Vision Chart. Photophobia was assessed using a modified 3 question UPSIS-17 Photophobia Symptom Impact Scale. This study shows that 19.5% of subjects saw better in the light whereas 2.6% saw better in the dark. A Fisher's Exact Test shows no significant difference in light vs dark across eye colors ($p=0.065$) however 26.7% of people with blue eyes had better light vision compared to 18.4% with brown eyes and 15.4% with green/hazel eyes. Correlation testing shows that light and dark vision are strongly analogous (Spearman's $Rho=0.56$, $p<0.001$). A Kruskal Wallis test did not detect differences in LogMAR Scale between eye colors in both light ($p=0.7336$) and dark ($p=0.5816$) vision, thus indicating there is no significant difference between photophobia and eye colors ($p=0.7264$). There is no correlation between light vision and photophobia scores (Spearman's $Rho=0.08$, $p=0.4610$.) In Conclusion, no substantial difference in vision by eye color was observed. Remarkably participants who reported high levels of photophobia did not have decreased light vision.

Project # **J0405** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Jenna Orefice** Grade: **8** G: **F**

School: **Sierra Vista Junior High School**

Title: **How does your nightly routine and environment before sleep affect the quality of sleep and your overall health?**

What can a bad night routine do to your body? It can make you tired the whole day, create a bad mood, make you more vulnerable to viruses, and so much more. Having a bad night routine can have deleterious effects on your health and well-being. This is a common problem for most teens and is not good for their developing bodies. We want to stop that problem. To fix this problem we have 4 trials to see how teenagers' bodies react to different pre-sleep routines. In comparing four experimental conditions, we hope to find some relatively easy and feasible solutions. The pre-sleep conditions include exposure to electronic devices, calming music, upbeat music, and no use of electronics. Each trial will be 3 days long. We'll be measuring how long the body was in REM, deep, and light sleep. REM is the most important kind of sleep. We hypothesize that whichever condition has the highest REM average, will become the best pre-sleep environment. Materials will include an electronic device, Apple AirPods, a Smartwatch, and a journal. Results were surprisingly close in range. Many of the trials were similar in REM and light sleep. As hypothesized, the pre-sleep condition with the most REM sleep was No Electronic use before bed. With an average amount of 2.20 hours of REM sleep. In conclusion spending, 30-60 minutes without electronics before bed will help you with more sleep, better health, and a better sleep routine.

Project # **J0406** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Ryan Kim** Grade: **6** G: **M**

School: **Stratford School**

Title: **Does differently colored food change our food preferences?**

Project # Category: Human Biology
Student: Ryan Woobin Kim
Grade: 6
School: Stratford School
Title: Does Differently Colored Food Change Food Preferences?
The objective is to see if differently colored food can change a person's food choices. The goal is to see if a person will react differently to a differently colored food. My hypothesis is that if people react differently to differently colored food. Then I can determine if humans will react differently to new things or not (Normal things and Different things). 7 reactions recorded on a survey will help me determine if the experiment was successful or not. Also non-toxic food coloring will be poured on a solid food (no soups) and each time a different colored food will be pronounced. There will be bread, corn, and apples colored differently presented to the 7 subjects in separated trials. The trials will be 7-8 minutes and there will be 3 minutes between each session to record results on a chart. The results were 5 people reacted like they didn't want to eat it and the other two reacted the same as they would to any normal food. The expected results were that 6 people did not thiink of it as eatable food and 1 person had thought of it as normal. This experiment turned out to be very interesting and gave me info on how a human thinks. In conclusion my hypothesis was that more people wouldn't like the food and my estimated guess was correct. The results were a little different but similar to my original hypothesis in the end. Next time I suggest not putting non-food colored food at parties.

Project # **J0407** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Audrey Chin** Grade: **8** G: **F**

School: **Ridgecrest Intermediate School**

Title: **Stroop Effect: Congruent VS. Incongruent Stimuli**

The objective of our research was to learn about how the human brain responds to different stimuli. An additional aim was to increase our understanding of the frontal lobe. To research these topics, we found the Stroop effect test which records the reaction for humans to the Stroop effect. The Stroop effect refers to the difference in reaction time between congruent and incongruent stimuli.

Participants of ages 13-14 were recruited from Ridgecrest Intermediate School and handed two sheets of paper. One paper included congruent stimuli, while the other included incongruent stimuli. Participants were instructed to read the color ink of the words written down and disregard the word itself, the congruent sheet first, the incongruent sheet second. We recorded the time taken for each sheet and the number of mistakes made throughout the experiment.

A comparison of the times for congruent stimuli vs. incongruent stimuli shows an average increase of 26.85 seconds during testing for incongruent stimuli. This trend helps us conclude that the brain is generally slower when processing incongruent stimuli, contrasting to the often fast time for processing congruent stimuli. Through these results we have understood that the brain's response to different stimuli may vary in reaction time.

After conducting the experiment, our results strongly support our hypothesis that students would take longer when asked to read incongruent stimuli. This provides a strong base to add further knowledge about the human brain to. Increased understanding of the human brain leads to improved comprehension of human behaviors.

Project # **J0408** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Janelle Peralta** Grade: **8** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **The Effect of School Gardens on Students' Well-being**

Many students come to school and already feel like leaving because school has been painted in a negative way. School should be an enjoyable place for students as they spend the majority of their lives there. Clubs have been offered to students at Dodson Middle school, including horticulture. So, how does involvement in school gardens affect students' well-being? Learning this effect will determine whether or not the establishment of school gardens should be encouraged. To execute the project, letters to six teachers, consent forms for each teacher's students were passed out. Then, the consent forms were collected and allowed those who filled them out to take a survey that documents their experience in school gardens, or the lack of it. The independent variable is the amount of student involvement in school gardens while the dependent variable is how they feel about it. Other researchers have found that because gardening requires physical activity, it helps people lose weight and lessen their depression ("Benefits of Gardening," n.d.). According to Laurie Brekke, school gardens have encouraged students to be active in learning (TEDx Talks, 2014). Positive feedback from the surveys we conducted from students who participate in school gardens. Many of the students taking part in school gardens have fun and enjoy gardening. Based on the results of the experiment and research, school gardens can improve students' lives.

Project # **J0409** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Liliana Ponnezhan** Grade: **6** G: **F**

School: **Stratford School**

Title: **Does Guided Deep Breathing Exercises Improve Test Outcomes in Elementary Students?**

Category: Human Subjects

Student: Liliana Ponnezhan
School: Stratford School Altedena
Title: Does Guided Deep Breathing Exercises Improve Test Outcomes in Elementary Students?

Problem: Students are under stress most of the time they take their test. They can sometimes see problems they don't remember how to answer and get really stressed. Can guided deep breathing exercises improve test outcomes in elementary students?

Background: Guided deep breathing exercises have become popular with many adults for stress reduction. Many apps are available for guided deep breathing exercises. Little research has been done with children.

Study Design and Methods: I will use the 3rd and 4th grade students in my school. I will alternate having the teacher use and not use guided deep breathing exercises on the iWatch with their class for 1 minute before each of their planned exams. I will do this every week for 8 weeks. I will analyze the data from each group's test scores and see if there was an improvement in their test scores for the students on days that they did the guided breathing exercises, versus the days when they did not.

Hypothesis: I hypothesize that on the day's students use the guided deep breathing exercises they will perform better on their tests.

Project # **J0410** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Noa Delson** Grade: **7** G: **F**

School: **Temple Beth Am Pressman Academy**

Title: **Gossip Girlz**

The purpose of this project is to see how a story changes as it passes through many people. I hope to find out where rumors have their starting point and from this point how it affects the end results. How does a story change as it passes around through a day? My hypothesis is that if one hears a story from a classmate, and then one tells it to a friend the story will have changed in some way from the original story. First I got a group of volunteers. Then the first person in the chain came up with a fictional story. Then waited 10 minutes then told the next person and then the next person in the chain and so on. The last person writes down the story that they were told. By the end of the experiment the story was down to a few sentences but in the beginning it was ¾ of a page. My hypothesis was supported because through the process the story kept on getting simpler and less detailed. That is what I had predicted. Which proves my hypothesis correct.

Project # **J0411** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Jenny Hernandez** Grade: **8** G: **F**

School: **Magnolia Science Academy 6**

Title: **Which is Candy?**

My objective in this project is to test whether students from ages 11 to 13 can tell the difference between a piece of candy and medicine drugs by looking at images. In my project, I chose a variety of candies to see which ones deceptively resembled medicine drugs. I collected consent forms from the student's parents prior to conducting the experiment. Using a Google form with pictures of the candies and drugs, I asked participants to select which image they thought represented the candy. The first trial focused on "white pills" which consisted of Acetaminophen, Ibuprofen, and Clavulanate, and the piece of candy I used was white Tic-Tacs. The second trial focused on "colored pills" and consisted of Quetiapine, Lisinopril, Clonazepam and Sweet-Tarts. The third trial focused on "different shapes of pills" and included Methanol, MDMA, and Fentanyl, and the candy for the third trail was Hard-Boiled Candy. I compared the data from each trial to see which candy was most mistaken for medication. I hypothesized that colored pills would be the most mistaken trial group and my data did support my hypothesis because the category "colored pill" had the most number of participants mistaking a drug for a candy. The second trial had 9 out of 15 participants who identified the image 4 drug, Lisinopril, as candy. Next time, I would like to see if the results would differ if I add more participants in each age group for each trial and add more candy images in the trial.

Project # **J0412** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Remi O'Dell** Grade: **7** G: **M**

School: **Mirman School**

Title: **The Influence of the Pygmalion and Golem Effects on the Confidence, Mental Health and Math Test Scores of a Student in Middle School**

The purpose of this study is to test the perception of middle school students and the Pygmalion and Golem Effects prior to taking a pre algebra math test and projection of negative or positive expectations and influence on students' mental health. Participants answered a questionnaire referencing their mental health prior to testing and were informed of the difficulty level of a 10-question, grade-appropriate pre algebra math test. Following the test, subjects again answered questionnaires referencing their mental health and confidence on the pre algebra math test. Test scores from the 'hard' group averaged higher than the control group by 17.2 points. The 'easy' group averaged 8.6 points lower than the control group. A comparison of the groups and test scores showing $p=0.02$ (statistical One Way ANOVA Test) indicates a strong correlation between the groups and pre algebra math test scores. The difference shown between questionnaires 1 and 3 for the 'easy' group = -0.4, and 'hard" group = -0.9 was observed. A $p=0.01$(statistical Linear Regression Test) indicates a strong correlation between test difficulty and subject's mental health following the math test. If educators project negative expectations on students before the test, they receive higher scores on the math test, as stated in study by Rosenthal, Robert, and Lenore Jacobson, however, participants feel worse after. Educators projecting positive expectations prior to the test, results in participants scoring lower on the test but feeling better about themselves afterwards.

Project # **J0413** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Rasmi Mustafa** Grade: **8** G: **M**

School: **Institute of Knowledge Middle School**

Title: **Brave New World: Exploring the Potential of Virtual Reality Therapy in Overcoming Fears**

Problem: This study examined the effectiveness of virtual reality in helping people overcome mild fears such as glossophobia
Procedure: Six males and six females were recruited to participate, with half serving as a control group and half receiving the VR experience before reciting a poem. Heart rate was monitored and participants rated their fear and experience on a scale of 1-10.
Results: The control groups got an average of plus 3 beats per minute while reciting the poem to the audience. The contestants who used the VR got an average of 1 BMP during the experience. After the VR experience, they got an average of -2 bpm. Results showed that the VR group had a lower heart rate during the recitation and a further decrease after the experience, suggesting increased confidence.
Conclusion: my results supported my hypothesis, the VR experience did help people gain more confidence meaning that they are overcoming their fear. However, the study could have been improved by starting earlier and using a smaller sample size. This is an ongoing study and an updated abstract will be in the final report.

Project # **J0414** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Arielle Goldscheider** Grade: **8** G: **F**

School: **Temple Beth Am Pressman Academy**

Title: **The Power Of Color**

The goal of this project is to figure out if each color category's, (warm and cool) reflective property affect your emotions. A hexagon shaped cardboard booth with white paper lining inside was built, and an L.E.D light inside the booth with a connecting U.S.B cable coming out of the booth was attached to the inside of the booth. The test subjects were given a self check in form asking what their current emotion is. Based on their current emotion, either warm or cool colors were projected on the walls for five minutes in complete silence. If the test subject chooses a negative or neutral emotion, cool colors will be projected. If the test subject chooses a positive emotion, warm colors will be projected. After the test, the same self check-in form will be given to the test subject. This test was performed 10 times on 10 different test subjects of various genders and ages. In conclusion, since each color has a different reflective property then each category of colors (warm and cool) can affect your emotions and mental health. Warm colors tend to have a negative affect on people, and cool colors have more of a positive affect.

Project # **J0415** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Simon Goldberg** Grade: **7** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **The Proof are in the Prints**

The purpose of this experiment is to explore if fingerprints are inherited and if this helps society by learning if they can be linked to diseases and if it can be helpful in criminal investigations. If fingerprints are an inherited trait, then will all siblings have the same fingerprint pattern? The hypothesis is that if fingerprints are an inherited trait, then all siblings will have the same pattern. In this experiment, two groups were tested. The first group was pairs of related siblings and the second group were unrelated pairs. Each participant had their fingerprint taken and the pattern was examined and determined using a magnifying glass. This experiment showed that 50% of the related sibling pairs had the same fingerprint pattern; Only 20% of the unrelated pair had the same fingerprint pattern. The hypothesis was not supported due to the fact that not all of the related sibling pairs had the same fingerprint pattern.

Project # **J0416** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Allysson Gomez** Grade: **8** G: **F**

School: **Arroyo Seco Museum Science Magnet School**

Title: **Differing Styles, Varying Views**

My project is about gathering opinions, through a survey, about how adults between the ages of 25 to 45, view modern clothing. After getting the consent of the participants, I gave them a survey with pictures of mannequins wearing six different outfits. I asked participants to rate the outfits on a variety of factors. Results showed that participants who thought the outfit was expensive were less likely to think that a person wearing the outfit was friendly. In the future i would like to collect more data so that I can more accurately compare the ratings of men and women.

Project # **J0417** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Sandy Htwe** Grade: **8** G: **F**

School: **Al-Huda Islamic School**

Title: **Exploring Short-Term Memory Retention with Visual versus Auditory Methods.**

This project is to test which memory method is more effective for short term memory, visual or auditory. We use these methods of memorization in school on a daily basis. We use sight to look at our textbooks or our study guides to memorize important information. We use our hearing ability to hear our teachers saying important details necessary for our learning. Our ability to remember things is very important, and knowing how you learn best can help you focus more on that method.
This project tested if students memorize better with visual or auditory methods. It was hypothesized that: If a student is asked to recall a set of numbers once by hearing them and another by seeing them, then the retention of numbers recalled will be better with seeing the numbers.
20 students ages 13 to 15 from my middle school were asked to recall two set of similar numbers, once by seeing the numbers, and another by hearing the numbers. After concluding the experiment and analyzing the results, it was observed that the average recalled numbers for the twenty subjects with the auditory method was 2.95 words, while the average recalled numbers with the visual method was 4.45 words. The hypothesis was supported! Students retained more information with the visual method.

Project # **J0418** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Aleena Alkwadri** Grade: **6** G: **F**

School: **Al-Huda Islamic School**

Title: **Examining the Stress Relieving Powers of Aroma Therapy.**

Aromatherapy is the practice of using essential oils for therapeutic benefit. When inhaled, the scent molecules in essential oils travel from the olfactory nerves directly to the brain and especially impact the amygdala, the emotional center of the brain. The purpose of this project was to find out whether eucalyptus spearmint aromatherapy helps to reduce mild stress level in adults. This was calculated by comparing an experimental group that was subjected to eucalyptus spearmint aromatherapy with a controlled group which was not subjected to eucalyptus spearmint aroma therapy. Heart rates and blood pressures before and after were measure to reach a conclusion.
It was hypothesized that: If a person is subjected to eucalyptus spearmint oil and lotion for a period of ten minutes, then their stress level will be reduced by lowering their heart rate and blood pressure.
Twenty adult subjects between the ages of 18-25 years were used for the experiment. They were each asked to participate twice. One time with aroma therapy, and one time without. Their heart rate and blood pressure levels were measured and compared.
In conclusion, the hypothesis was supported! The experimental group that was subjected to the eucalyptus spearmint stress relief aromatherapy proved to have a lower reduction of heart rate, systolic blood pressure, and diastolic blood pressure than the controlled group.
Finding natural ways to reduce stress is beneficial to people with mild stress levels as it is readily available, affordable, and almost has no side effects, unless you are allergic.

Project # **J0419** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Lucas Woo** Grade: **7** G: **M**

School: **Mirman School**

Title: **Examining the Influence of Bedtime Bright Light on Cognitive Function in Middle Schoolers**

This study is the result of examination of bright light (from light emitting devices) on reaction time and alertness in middle school students. Participants (n=10) received a questionnaire, lux light meter, and instructions on light meter operation from the lead investigator. Participants were instructed to take a light reading 1 hour prior to their planned bedtime at approximately 0° of the participant's field of view (~15 cm from iris). The following morning during a time period spanning 10:30 - 10:45 a.m, participants completed a computerized reaction test as well as a Psychomotor Vigilance Test, which is a measure of alertness. Lower evening light levels were correlated with quicker morning reaction times (Pearson correlation coefficient [r] = 0.43), although this association did not reach statistical significance in a linear regression model ($p = 0.22$). Light levels were not associated with alertness ($p = 0.75$). Longer total sleep time the night before the testing period was correlated with quicker reaction time the following morning($r = -0.41$), but the association was not statistically significant in a linear regression model ($p = 0.18$). This study suggests that middle school students who wind down in darker spaces (~43 to ~190 lux) and students who sleep longer may achieve quicker reaction times the following morning, but a study with a larger sample size is needed to confirm findings. These findings regarding the negative relationship between evening light levels and reaction time are in line with prior research findings conducted in adults.

Project # **J0420** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Rose Lehrer** Grade: **6** G: **F**

School: **Walter Reed Middle School**

Title: **Mind the Sign**

The goal of this project was to find the most effective sign in making cars stop at stop signs. For my experiment, I found a stop sign and made 2 signs. One was “A stop sign ticket costs $238!”, and another was “Children play here!” I set them up underneath the stop sign, and then counted how many cars stopped. I collected data for each of the signs, and a control condition without a sign. I found that, “A stop sign ticket costs $238!” sign led 78% of people to stop, while the other sign and the control condition got 52% and 40%, respectively. Based on this, I concluded that: “A stop sign ticket costs $238!” was much more effective. This supports my hypothesis, or claim, since I predicted that more cars would stop when that sign was up.

Project # **J0421** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Ameya Balaji** Grade: **7** G: **F**

School: **Cathedral Chapel School**

Title: **Reiki: Unwind Your Mind**

The objective of this project was to determine if reiki, a Japanese relaxation technique, reduced stress in middle schoolers (aged 11-14). I hypothesized that stress relief would be evident after a reiki healing session.

First, signed consent forms were collected from volunteers. A Google Forms survey was created to capture the volunteer’s age, gender, and stress level (before and after the Zoom distance healing session). Participants were experimental or control based on assigned numbers (odd numbers were experimental; even ones were control). Experimental subjects received 20 minutes of reiki, while control subjects did not. A reiki practitioner must have reiki certification. Participants needed a digital device to join the meeting and complete the survey. I conducted the experiment on 30 middle schoolers (15 experimental and 15 control).

In the experimental group, 73.33% observed reduced stress levels, while 26.67% did not. 40% went from mild to no stress, 26.67% went from moderate to no stress, and 6.67% went from moderate to mild stress. In the control group, 40% noted reduced stress levels, while 60% had no change in stress. 20% went from moderate to mild stress, 13.33% went from mild to no stress, and 6.67% went from moderate to no stress.

Overall, my hypothesis was proven correct. Reiki healing did reduce stress in middle schoolers in the experimental group, though there was a placebo in the control group. If I repeated the experiment, I would use a stress monitor to provide quantitative evidence to support my hypothesis.

Project # **J0422** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Natasha Ramos** Grade: **7** G: **F**

School: **Mark Twain Middle School**

Title: **Does video game music productivity.**

The goal was to find out if it is possible for video game music to increase a person's productivity

Subjects completed an online enneagram quiz was completed two times. Mario kart music will be played in the background the second time taking the quiz to see is it decreases the time. A phone timer will be used for both trials to record timing and see the difference. A parental consent form will be given to all participants to ensure each child's safety.

When adding the results of each participant's scores before the music and averaging it, it was a total of 14 minutes and 4 seconds. Then when averaging the results with music, its an estimate of 8 minutes and 84 seconds. Making the time decrease by an average of 5 minutes and two seconds.

After looking over the results I've realized that video game music (specifically mario kart music) does in fact increase a person's productivity. After all 15 participants had taken the quiz it was clear that playing the music in the background decreases the time. If I chose to continue the experiment it would interesting to see if different music created for certain video games would have different effects.

Project # **J0423** Category: **Behavioral/Social Sciences - Human - Jr**

Student: **Zayneb Qazwini** Grade: **7** G: **F**

School: **Institute of Knowledge Middle School**

Title: **Black, White, or Something in Between? Exploring the Impact of Text Color on Readability**

Problem: My project aims to investigate whether text color affects readability, with the goal of identifying the most readable and least readable colors. The findings could be useful for individuals, particularly students, who read frequently and help them select the best colors to use in their daily lives.
Procedure: I will conduct an experiment with 40 participants using a laptop and a Google Document. The document will have four sentences, one in black and three in different colors (red, green, and blue). I will measure how long it takes participants to read each sentence in its respective color using a stopwatch.
Results: In my project, I found that the average reading times for the four colors were: black (16 seconds), red (15 seconds), green (18 seconds), and blue (17 seconds). The slowest color to read was green, while the fastest was red. Black and blue had similar reading times, ranking second easiest and second hardest to read, respectively. In conclusion, reading in red may be easier than reading in green. This could be because green is a lighter color and harder to see, while red can help prevent declining eyesight by stimulating the mitochondria in the retina.

Project # **J0501** Category: **Biochemistry & Molecular Biology - Jr**

Student: **GUGLIELMO CORDARA** Grade: **7** G: **M**

School: **La Canada Preparatory**

Title: **SALT AND SUGAR: TWO SILENT ENEMIES!**

I am trying to answer the question of how much sugar and salt are contained in the food we eat and how both can impact our health: my hypothesis is that the most common foods will contain a lot of sugar and salt and vs. the healthy foods.
I researched the effect of salt and sugar on health, and they are both critical if consumed correctly, but too much salt can provoke high blood pressure, heart disease, and stroke; sugar is one of the causes of diabetes, heart disease, and obesity.
I then designed an experiment to measure the quantity of sugar and salt in ten common types of food (like potato chips, pizza, etc.) and ten healthy foods (broccoli, beets, etc.).
To measure salinity in the food, I used an optical refractometer, a tool that measures the percentage of salt through reflection of the light. To measure glucose, I used glucose test strips that react with different colors to the different percentages of sugar in a substance.
I prepared all the samples to be tested by crushing the food with a food processor and then creating a solution of 10% of the food and 90% of the water.
The results were in line with my hypothesis: the most common foods tend to contain more sugar and salt than the healthy ones. My conclusion is that you need to have a balanced diet and understand how much salt and sugar you eat daily.

Project # **J0502** Category: **Biochemistry & Molecular Biology - Jr**

Student: **Varsha Murali** Grade: **8** G: **F**

School: **Portola Highly Gifted Magnet**

Title: **GlutoPen : A Novel Solution to Allergen Detection**

USING CALCIUM OXIDE, LITMUS PAPER, AND TRANSGLUTAMINASE ENZYMES TO DETECT GLUTEN IN FOOD. Varsha Murali and David Schmidt(teacher), Portola Highly GIfted Magnet, 18720 Linnet Street, Tarzana, CA, 91356.
The purpose of this experiment is to create a test that detects gluten in food so people with gluten intolerance can check their food before consumption. Can litmus paper, calcium oxide, transglutaminase enzymes detect gluten in food? The invention is going to be an easily performable test that can be done by someone anytime anywhere to ensure that the food they are eating is safe for them to consume. When transglutaminase is added to foods with gluten, it breaks down the structural proteins glutenin and gliadin into a chain of amino acids, this change can be detected using a protein test that we do before and after adding transglutaminase. This protein test uses calcium oxide and litmus paper. Calcium oxide targets proteins in foods and turns them into acids which can be detected by the litmus paper. In foods with gluten, there would be a difference in the before and after test. In foods without gluten there would be no change. The hypotheses were proven true so it can be concluded that the test is useful.

Project # **J0503** Category: **Biochemistry & Molecular Biology - Jr**

Student: **Natalie Davidian** Grade: **7** G: **F**

School: **Chamlian Armenian School**

Title: **Electrolyte Challenge**

Electrolyte Challenge - Abstract

The purpose of the Electrolyte Challenge experiment is to demonstrate which of the five liquids, milk, Gatorade, coffee, Coke, and Vitamin Water has the most electrolytes. A multimeter with specific values in milliamps (mA) was used to measure the electrolytes of each individual liquid. In addition, two strips of copper wire, each 5 centimeters (cm) long, were wrapped around in a 3 cm long straw in a tight spiral fashion. The multimeter was then connected to the end of the straw via the provided clamps and the straw submerged into each of the individual liquids for collection of measurements. A set of three measurements was collected at each depth of 1 cm, 2 cm, and 3 cm for a total of 9 measurements for each liquid in order to maximize accuracy of the collected data values. The experimental results showed that Milk had the most electrolytes with an average of 38.5mA, while Vitamin Water had the least 4.7mA. The entire set of values are as follows: Milk (38.5mA), Gatorade (21.2mA), Coffee (15.2mA), Coke (10.3mA), and Vitamin Water (4.7mA). The initial hypothesis was that Gatorade would have the most electrolytes due to its well-advertised research and popularity with athletes. However, after unbiased experimentation, milk was discovered to have the most electrolytes, leaving Gatorade in second place. A continued investment to the Electrolyte Challenge experiment may yield a liquid better suited than milk regarding the experiment's purpose.

Project # **J0504** Category: **Biochemistry & Molecular Biology - Jr**

Student: **Shravanthi Raja** Grade: **8** G: **F**

School: **Hale Charter Academy STEAM Magnet**

Title: **How Does Narrowing the Diameter of an Artery Affect Blood Flow Rate?**

Every year over 610,000 people die due to Atherosclerosis and over 382,820 people die due to a type of Atherosclerosis called coronary artery disease. This experiment determines how the artery clogged by plaque affects the blood flow rate. If the diameter of the artery is clogged with 50% plaque, then the blood flow rate will take twice as much time to reach the organs because the blood circulation will be cut off by half. Stimulating the arteries was achieved by attaching two tubes each with a diameter of ¼ inches and three eighth inches to a bucket with valves and then observing the time taken by each tubing to fill 1 gallon of water. The ¼ inch tubing, stimulating an unhealthy artery took approximately 6 minutes to 'pump' one gallon, whereas the three-eighths tubing, stimulating the healthy artery took only 2 minutes. Research yielded that the difference in the blood flow rate while using the tubing is similar to the real data i.e, difference in the blow flow rate between a healthy artery and a clogged artery. Using the data from the trials, it was found that an artery clogged with 50% plaque has a blood flow rate 2.36 times slower than a healthy artery. This experiment was successful.

Project # **J0505** Category: **Biochemistry & Molecular Biology - Jr**

Student: **Ximena Nunez** Grade: **8** G: **F**

School: **Montebello Intermediate School**

Title: **Are fingerprints inherited?**

Objective:An experiment was conducted to see if fingerprints are inherited from one's parents. Alternatively, fingerprints might be genetically derived from the individual. Even though no two people's fingerprints are identical, it is still conceivable that we inherit our distinctive fingerprints from our parents. And that is my primary goal of the mandatory research project.

Materials and method: A magnifying glass, white paper, a pencil, and tape were used in order to conduct this experiment. The pencil will be used to scribble on white paper. After that, the opponent must rub their finger across the paper until it is stained with pencil ink. Then, participants will put their fingerprint on a piece of tape and tape it into a blank paper. I'll need to examine the person's fingerprints closely in order to identify the similarities/ differences.

Results: The basic whorl, arch, and loop may seem to be similar for the individuals but the details of the patterns indicate a different form.

Conclusion: Through the research conducted a judgment was created. Fingerprints aren't inherited from your parents, they are created in the womb through some of the factors that occur during the fetal process. The dermatoglyphs develop before birth around 3 months old and are completed at 6 months old. The finer details of the fingerprint pattern is developed through some of the factors that occurred in the womb. Which include, substances that were taken during the pregnancy and the environment inside of the womb in which the fetus was in.

Project # **J0506** Category: **Biochemistry & Molecular Biology - Jr**

Student: **Leana Asatourian** Grade: **7** G: **F**

School: **Chamlian Armenian School**

Title: **Sugars in Your Smoothies!**

Objective / Goal:

The purpose of this experiment is to find out which flavor and brand of smoothie has the least amount of sugar, and which will be the healthiest. The objective is to narrow down my choices to the healthiest smoothie with lowest sugar levels. This motivated me to read some articles and do research to find out more details about sugars and the role of enzymes.
I hypothesize that the “Naked” brand of mango smoothies will result in the highest sugar levels.

Materials and Methods:

“Naked,” “Evolution Fresh,” and “Bolthouse Farms” smoothies, sucrose, lactose and maltose sugars, invertase, lactase, and maltase enzymes and urinalysis test strips. The sugar solutions were tested after adding enzymes to obtain the time needed for enzymes to convert sugars. Then the smoothies were tested in a set time interval. The procedure was repeated three times with and without enzymes, and results were obtained. Tables and graphs were created to better understand the outcome.

Results:

“Naked” brand of mango, “Evolution Fresh” brand of carrot and peach had overall lowest sugar content.

Conclusion:

I concluded that there are different types and amounts of sugars in each brand and flavor smoothies. For instance, the brand “Naked” had the most maltose sugar but lower sucrose and lactose levels, in comparison to “Naked” carrot smoothie which had the highest sucrose. Finally, one should be wise when it comes to choosing the smoothie and consider the nutrition facts labels.

Project # **J0507** Category: **Biochemistry & Molecular Biology - Jr**

Student: **Sofia Akopyan** Grade: **8** G: **F**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **How much fat is in your food?**

Almost every food we eat has some sort of fat in it, whether you see it or not. The type of fat you don’t see is called invisible fat. Fat is essential for a healthy diet, but not all fats are good. It is important to know how much fat is in your food in order to have a healthy diet. Fat is one of the three macronutrients, along with protein and carbohydrates. High-fat consumption has been associated with an increased risk of heart disease and obesity. Eating processed foods increases the risk of overconsuming fat. 20 to 30 percent of your calorie intake should include fat. Even though fat can be unhealthy if consumed wrong, our body uses it in positive ways, such as storing energy and digesting essential vitamins and nutrients. There are good fats and bad fats. All fats are based on a similar chemical structure and are derivatives of fatty acids and glycerol. When three fatty acids bond to a glycerol molecule, they form a fat molecule, also called triglyceride. Fatty acids can differ by length and type of carbon bonds they have. If the fatty acids contain one or more double bonds in their chain structure, they are called unsaturated fatty acids, if there are no double bonds present, they are called saturated fatty acids. Fats that are liquid at room temperature, or oils, tend to have a higher content of unsaturated fatty acids and also shorter hydrocarbon chains.

Project # **J0508** Category: **Biochemistry & Molecular Biology - Jr**

Student: **Derek Gao** Grade: **6** G: **M**

School: **Sierra Madre Middle School**

Title: **The secrets behind large and sweet strawberries**

Have you ever entered a store and noticed how different the sizes of the strawberries were? You could assume that this is due to the type of fertilizer, the soil's condition, or the quantity of water, but in reality, these factors do not make a significant impact. The strawberries are actually that big due to genetic engineering. It's a common process that occasionally involves modifying the number of chromosomes to produce GMOs and produce larger sweeter fruits. Therefore, I was interested in determining whether there was any difference in the amount of DNA present in equal amounts of wild-type and genetically modified (GMO) strawberries. Since I understood that GMO strawberries will have more chromosomes inserted, which are simply DNA tightly wound around proteins, I hypothesized that the GMO strawberries would have more DNA. Additionally, I learned from my research that non-GMO strawberries were often diploid, whereas GMO strawberries were octoploids, so non-GMO strawberries would have two chromosomes per set compared to eight in GMO strawberries. I tested my theory by conducting an experiment: I extracted the DNA from both strawberries and tested to see which sample had the most. My hypothesis was that the GMO strawberries would be octoploids, and I was correct! The GMO strawberry had almost exactly four times the amount the non-GMO strawberry did, which aligned with the fact that the GMO was octoploid, and the non-GMO was diploid. My experiment proved that the amount of DNA in a strawberry actually did affect the size and taste of the strawberry.

Project # **J0601** Category: **Chemistry - Applied - Jr**

Student: **Ayesha Qureshi** Grade: **6** G: **F**

School: **Islamic Center of Claremont School (ICCS)**

Title: **How Acids Affect the Rate of Corrosion**

This experiment was to see what kind of acids affect the rate of corrosion. In this chemistry science fair project, you'll learn why rust, a type of corrosion, is a serious problem. You'll also discover that not all rains are the same! Find out which ones can speed up the rusting process. I used different acids including orange juice, lemon juice, and white vinegar to see which one would have a better result. I also made sure that everything would have the same amount of measurement. I had to find out the pH of the different acids. I also made sure to include my data table in which I included the temperature and the time. My hypothesis is that the vinegar would have the most amount of corrosion on the steel wool because the pH is higher, (so more acidic) but the lemon has a very close chance because it has a very close pH to the vinegar. My hypothesis was correct, the vinegar corroded the steel wool the most out of all the acids.

Project # **J0602** Category: **Chemistry - Applied - Jr**

Student: **David Enfiadjian** Grade: **8** G: **M**

School: **Chamlian Armenian School**

Title: **Benzene Breach!**

Many companies, like Johnson and Johnson and Neutrogena are being sued due to their sunscreen products containing a harmful compound known as benzene. As a result, I took it upon myself to test these sunscreens, as well as one of the main active ingredients, avobenzone, to see if these lawsuits had any merit. I selected a wide range of sunscreens and tested them on GCMS both before and after exposure to direct sunlight. To my surprise, benzene was found in trace amounts well below 1 PPM. A little more benzene was found in samples left under the sun, but still well below the 1 PPM threshold. In conclusion, these companies undergoing legal accusations had a small amount of benzene in their products, which wasn’t really a problem because I have been using these sunscreens at a young age and haven’t experienced any skin damage or harm.

Project # **J0603** Category: **Chemistry - Applied - Jr**

Student: **Amelie Palma** Grade: **6** G: **F**

School: **Sierra Madre Middle School**

Title: **Ice Cream and Salt**

My chemistry experiment tested two questions: a. Does ice cream freeze faster when you add salt to the ice cream making process? b. Will changing the flavor of the ice cream affect the melting rate? I made the hypothesis that salt would make the ice cream freeze faster and that changing the flavor of the ice cream would slow down the freezing fate of the ice cream. I completed the two experiments and recorded the data on a chart and then analyzed the data. I discovered that the ice cream freezing rate speeds up when salt is used in the process of making ice cream. I also found that the more ingredients you add to the ice cream the longer it takes to freeze and it melts faster.

Project # **J0604** Category: **Chemistry - Applied - Jr**

Student: **Allison Wong** Grade: **8** G: **F**

School: **Hale Charter Academy STEAM Magnet**

Title: **Can CaCO3 Solve the Effects of Acid Rain?**

Acid rain affects people around the world daily, as well as the health of natural communities- even though we don't see it on the news. The Taj Mahal, Leaning Tower of Pisa, Colosseum of Rome, and many marine habitats around the world are being greatly affected. But isn't acid rain just…an acidic blend of naturally-occurring chemicals/gasses? Couldn't Limestone, a naturally-occuring, basic rock sediment, neutralize acid rain in marine environments? If powdered Limestone, CaCo3, is mixed into water samples from the San Gabriel Watershed, then the Ph will be increased by 1 because Limestone is more basic than water from a system connected to a watershed for drinking water. Purified water was used as the control to find how many milligrams of powder it takes to increase the Ph by 1, but lack of precise tools and Limestone's nature to settle instead of fully dissolving made this difficult. Many tests were run on samples from 4 different locations within the San Gabriel Mountains and Valley, and it was concluded it takes between 25mg and 50mg of powder to increase the Ph of 8 ounces of water by 1. This project was too small-scale for exact results, proven through some past successful, similar experiments. Acid rain is not an issue in Southern California, although Limestone powder would be an affordable and safe solution for other areas. Increasing the amount of water per sample would have borne better results, but the main idea for the Limestone solution still stands.

Project # **J0605** Category: **Chemistry - Applied - Jr**

Student: **Andrew Benneian** Grade: **7** G: **M**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **What Cools a Soda the Fastest?**

I did this project to see where a soda will cool the fastest. I tried 4 different areas, the refrigerator, freezer, a bucket of ice, and a bucket of cold water. I put 4 Pepsi cans into each area and each Pepsi started at 72 Fahrenheit. Then, I checked the temperature of each can every 5 minutes for 30 minutes and checked which one's temperature decreased the fastest and stabilized. The thermometer I used was an electrical laser thermometer.

Project # **J0606** Category: **Chemistry - Applied - Jr**

Student: **Frankie Cortese** Grade: **7** G: **M**

School: **St. Cyril of Jerusalem School**

Title: **Which Cleaning Liquid Creates the Most Rust on Spoons?**

In my project I wanted to test which cleaning liquid creates the most rust on spoons. I tested bleach, vinegar, water, and salt water which are all substances used to clean spoons. I laid a spoon in each solution for 12 hours and monitored them every hour to see which ones if any produced rust on the steel spoons.

Project # **J0607** Category: **Chemistry - Applied - Jr**

Student: **Maral Erdenesuren** Grade: **6** G: **F**

School: **Sierra Madre Middle School**

Title: **Can candles harm you and your health?**

I will get different candles and experiment on each of them. My main goal is to see if there are harmful chemicals in a candle. My other goal is to find out which candles are the safest to use, and won't damage your health. I also want to find out how to easily see which candles are harmful. So if people are candle shopping they can quickly know which are harmful. I will test around 8-10 candles and rate them from least harmful and most harmful.

Project # **J0608** Category: **Chemistry - Applied - Jr**

Student: **Shiloh Rosner** Grade: **6** G: **F**

School: **Temple Beth Am Pressman Academy**

Title: **Whipped Cream Awesomeness**

We tested 8 batches of whipped cream with 4 different kinds of milk find out which one would have the highest density. The different kinds of milk were whole milk, almond milk, chocolate milk and nonfat milk. Our hypothesis was that the whole milk would have the highest density because it has the most fat and the almond milk what have the lowest density because it has the least fat. The 2nd trial of whole milk had the highest density. The first trial of chocolate milk had the lowest density. Our hypothesis was partly supported because whole milk had the highest density like we said, but almond milk didn't have the lowest.

Project # **J0609** Category: **Chemistry - Applied - Jr**

Student: **Adelrio Efendy** Grade: **7** G: **M**

School: **New Horizon School**

Title: **Comparing different brands of Vitamin C for their solubility in Soda, Room Temperature Water, and Body Temperature Water**

The objective of this experiment was to find which brand of Vitamin C dissolved faster in soda, room temperature water, and body temperature water. It was hypothesized that if different brands of Vitamin C (CVS, Walmart- Spring Valley, Walgreens) are dissolved in room temperature (210C), body temperature water (37°C), and soda, then the Walgreens brand vitamin C would dissolve faster in all liquids tested because it is the most expensive. The materials used were water, soda (Sprite), three different brands of Vitamin C tablets, stopwatch, thermometer, cups, measuring cup, and an electric stirrer. The method was to heat a cup of water (125mL) to 37°C and cut and place a fourth of a vitamin C tablet, then stir continuously using an electric stirrer till it completely dissolves and record the time taken to dissolve completely and repeat the above steps nine more times. Then the same method was used for room temperature water and soda with all the three brands were tested. Spring Valley Vitamin C brand was the fastest to dissolve in soda (2443 sec), in body temperature (1416.91 sec), and room temperature water (1786.6), followed by CVS (7582.8, 3496.27, 3922.5 sec), and Walgreens (14536.4, 49123.64, 17358.5 sec) respectively. The hypothesis was proven to be incorrect. Errors could have occurred when cutting the vitamin tablet or when recording the time taken to completely dissolve. In the future, other types of vitamins will be tested in liquids with digestive enzymes and varying levels of acidity to mimic the stomach.

Project # **J0610** Category: **Chemistry - Applied - Jr**

Student: **Zein Fawaz** Grade: **7** G: **M**

School: **New Horizon School**

Title: **Transforming Drinks Into Semi-Solid Juice Balls That Pop In Your Mouth**

The objective of this experiment was to transform drinks into semi solid juice balls. It was hypothesized that if Fanta, 7up, and Fanta with orange juice are made into popping boba balls, then Fanta will taste better and make the most spherical balls. The materials used were plastic syringe, sodium alginate(brown algae), food grade preservative, measuring cups, wax paper, blender, plastic wrap, spoons, graph paper, and different kinds of liquids. The method was to make the sodium alginate solution with the first food chosen and carefully drop a single drop of the sodium alginate solution using a syringe into the bowl with preservative solution and let it sit for 60 seconds. Carefully remove the ball with a spoon without any excess liquid from the solution. The average size of the Fanta balls was 0.56 cm and 7up was 0.5 cm. On the taste scale, Fanta was 2.15 but 7up was 1.46. On the shape scale Fanta was 1.83 and 7up was 1.33. Fanta proved to be better than 7up. In the future, other types of liquids juice will be tested. In the future, several tests will be conducted to transform fruit vegetable juices and soda into popping boba balls. This will help children get their daily dose of vitamins while making it fun to consume. This project is useful because it is a fun way to consume soda for both children and adults and it also limits the amount of soda children can consume.

Project # **J0611** Category: **Chemistry - Applied - Jr**

Student: **Benjamin Brady** Grade: **7** G: **M**

School: **Mirman School**

Title: **The Efficiency of Aluminum Potassium Sulfate in Fireproofing Cloth**

The purpose of this investigation is to determine the applicability of KAl(SO4)2 (aluminum potassium sulfate, “alum”) on fire-retarding cotton muslin fabric. The experiment consisted of treating muslin with varying concentrations of alum in solution with previously deionized and distilled water, to ignite and burn these fabrics once dried. Several highly unscientific sources, the only accessible for this rarely investigated method, suggested that treatment of fabric with alum would affect its flammability, and were used as the basis for this investigation. Water was heated to 40° Celsius before being mixed with alum in proportional amounts by volume in standard conditions, including for control groups without the presence of alum. Three 6x6 inch squares each of alum-treated muslin fabric were submerged into variously concentrated resulting solutions. Once all groups were air-dried, flame testing of fabrics in progression of least to most treated was conducted within a fume hood. After making adjustments to the initial experiment design, the alum was found to have a noticeable effect, with ignition times increasing for every amount above 12.5 ml. Times to finish burning were on average over one minute for the 75 and 100 ml treated, all of which extinguished before the full test area had burned, and the only one of which that took less than 59 seconds to burn had taken 14.76 seconds to ignite and burned <50% before extinguishing. Despite these findings, this subject requires future research to determine more specific alum concentrations and standardize ignition conditions.

Project # **J0612** Category: **Chemistry - Applied - Jr**

Student: **Jordan Rowe** Grade: **7** G: **F**

School: **The Science Academy STEM Magnet**

Title: **The effects of the enzyme Proteinase K on the biodegradation of plastic**

The purpose of this experiment is to test a way to lessen the growing amount of plastic in the environment. Plastic has been a cancer on the natural world and to be able to alleviate its effects would be a major improvement to our Earth. My inspiration for this experiment was a study by a professor at Berkeley: Ting Xu. However, I wanted to see if the information produced by that study was accurate or exactly what environments or quantities it could work in. My hypothesis was that if more Proteinase K is added to soil, then the plastic disks will biodegrade more. The Independent Variable is the amount of Proteinase K (0 mg, 10 mg, 40 mg), which is the enzyme. The Dependent Variable is how much the plastic degrades. This was both measured by observing each sample and running Image J, a surface area computing software that can measure the surface area of an object from an image. The Constant Variables were the brand of soil in each container, the type of container, and the amount of soil. There is one control and it is the container with soil that does not have Proteinase K mixed in it. The soil was measured with a scale, the Proteinase K was measured with the cap of its bottle, and the surface area was calculated by the software Image J. Overall, the data produced by this experiment showed that Proteinase K is effective in biodegrading plastic, therefore the hypothesis was supported.

Project # **J0613** Category: **Chemistry - Applied - Jr**

Student: **Madison Gonzalez** Grade: **6** G: **F**

School: **Pomona Unified School District Junior Division**

Title: **Gummy Expansion**

This experiment was designed to determine which liquid would expand the gummy bear the largest by measuring the length. The liquids I tested were water, salt water, and sugar water. I believe the gummy that was submerged in the water for 12 hours expanded the largest because it is less dense. I placed one gummy in each liquid for 12 hours, and after the 12 hours, I took the gummy bears out to measure each of their lengths. I then used cups to hold the water with each liquid inside, measuring half a cup of water in each cup. Then one tablespoon of either salt or sugar. I then compared the lengths of each gummy bear. The gummy bear that was submerged in the water was 1 1/16”by 1 1/16”, the gummy bear that was submerged in the saltwater was 13/16’ by 12/16”, and finally, the gummy bear that was submerged in sugar water was 1” by 14/16”. After reviewing my results I found out that the gummy bear that was submerged in the water expanded the largest. My hypothesis that said the water gummy bear expanded the largest was supported by my results. It is important because you never know if water, salt, and sugar are the least dense.

Project # **J0614** Category: **Chemistry - Applied - Jr**

Student: **Zainab Zubairi** Grade: **7** G: **F**

School: **Institute of Knowledge Middle School**

Title: **Fiery Fabrics: Unraveling the Impact of Fabric Softener on the Flammability of Textiles**

Question: The effect of fabric softener on fabric flammability.
Procedure: The study examined the flammability of three fabrics - cotton, cotton blend, and polyester - through six trials for each fabric type. Half of the trials involved soaking the fabrics in liquid fabric softener (independent variable), while the other half did not. The time it took for each fabric to burn out completely after being ignited with a blow torch was measured as the dependent variable.
Results: I hypothesized that fabric softener would increase flammability, and my experiment partially supported my hypothesis. Fabric softener does affect fabric flammability, but its effect varies depending on the fabric type. For cotton, fabric softener made the fabric less flammable, as it was unable to maintain a flame long enough to burn out. However, for the cotton blend, fabric softener increase flammability. Without fabric softener, it took an average of 87.23 seconds for the blend to burn out, whereas with fabric softener, it took an average of 33.74 seconds.
Polyester is a synthetic fabric that is less likely to catch fire than natural fibers like cotton or wool. This is because polyester has a higher melting point and is more heat-resistant.
My hypothesis was partially supported as fabric softener affects fabric flammability. The effect varied by fabric type: fabric softener reduced cotton flammability, while increasing flammability for cotton blends. Without fabric softener, the cotton blend took an average of 87.23 seconds to burn out, while with fabric softener, it took 33.74 seconds

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Project # **J0615** Category: **Chemistry - Applied - Jr**

Student: **Jasmine Hsiung** Grade: **8** G: **F**

School: **Sierra Madre Middle School**

Title: **Between Granulated Activated Carbon Filters, Powdered Activated Carbon Filters, and No Carbon Filters, Which One Works Best?**

For my experiment, I'm trying to see whether granular activated carbon filters, powder activated carbon filters, or no carbon filters leads to the best drinking water. In my experiment, I used activated charcoal instead of activated carbon, since they are basically interchangeable, and mixed it with a food coloring solution. I would then drain it with a coffee filter. My experiment and data showed that powdered activated carbon/charcoal filters work best.

Project # **J0616** Category: **Chemistry - Applied - Jr**

Student: **Aspen Chung** Grade: **8** G: **F**

School: **The Science Academy STEM Magnet**

Title: **Producing Hydrogen Gas Through Electrolysis: How Different Amounts of Magnesium Sulfate Affect the Rate of Electrolysis and pH Change**

The purpose of this project is to determine the most efficient and effective way to produce hydrogen gas, by answering the question, "How do different amounts of magnesium sulfate affect the rate of electrolysis and pH change?" This project is significant because it provides more information for a new, modern field of science centered around discovering cleaner forms of fuel that do not contribute to climate change. It can also educate those that are unaware of these greener forms of energy production and help them to understand how electrolysis functions, as it becomes a larger part of our daily lives. The hypothesis states that, if the water has more magnesium sulfate, then the rate of electrolysis will be faster and the pH will change quicker. The amount of magnesium sulfate will be changed throughout the experiment, between 20, 45 and 75 grams (independent variable), and will determine the pH change (dependent variable). During the experiment, the temperature, time of testing (90 min), amount of water, and amount of pH indicator will all remain constant. In order to measure the pH change, a pH meter is used for precise measurements, up to the hundredths decimal. The results ended up proving the hypothesis correct, as 75 grams of magnesium sulfate had the largest change in pH, both basic and acidic.

Project # **J0617** Category: **Chemistry - Applied - Jr**

Student: **Yousef Hawa** Grade: **8** G: **M**

School: **Islamic Center of Claremont School (ICCS)**

Title: **How pH-resh is your Water?**

The purpose of my experiment is to see the acidity levels of different water sources. It is also to see if the water is more acidic over the course of fifteen days. I think that out of the natural water sources, rain water will be least acidic and sink water will be most neutral because it is less contaminated and is purified before leaving the faucet. After seven days, I think that all the water will grow more acidic because it is more contaminated with the atmosphere. I also think that all four water samples will become dirty and none of them will look the same as they did in the beginning. First, I got four cups and then filled each one with my choice of water. In my case, sink water from a private residence, sink water from a public park, rain water, and lake water. The lake water was taken from San Dimas Lake. Using my pH tester, I tested each one once, all on the same day. After I had done all that, I waited a week and tested the waters again. My hypothesis was partially correct because I predicted that all the pH levels would drop after seven days, although the public sink water was at the same level as when it started. I also predicted that the sink water would be most pure but it was at the same pH level of the public sink.

Project # **J0618** Category: **Chemistry - Applied - Jr**

Student: **Gisabella Ruiz** Grade: **6** G: **F**

School: **Pomona Unified School District Junior Division**

Title: **Walking Water**

This project was designed to see which temperature of water would transfer the color best from one cup to another through the paper towels. I believed the hot water would transfer the color best because it has the most energy. The temperatures I tested were hot, warm, and cold water. The water moves up the paper towels through a process called capillary action. I conducted this experiment 3 times by switching out the water with a different temperature of water. I put water in every other cup.. I put 5 drops of food coloring in the cups with water, 1st water was red, 3rd was yellow, 5th was blue and 7th was red. I then put a total of 6 paper towels, one end was in one cup and the other was in the cup beside it. Lastly, I waited 20 mins each time and watched the colors move. The amount of water that was transferred from one cup to the other was compared to see which temperature worked the best. The orange cup with hot water measured about 2 centimeters, the cold water measured about a little less than one cm. After reviewing my results I found that the colors in the hot water transferred the color best. My hypothesis that the hot water would transfer the color best was strongly supported by the results. It would be more interesting to repeat the experiment with different types of liquids to see if they would transfer better than the water.

Project # **J0701** Category: **Chemistry - General - Jr**

Student: **Cormac Malloy** Grade: **6** G: **M**

School: **St. Timothy School**

Title: **The best water filters: Homemade vs. store bought**

This project was designed to discover the most effective water filtration between two consumer systems and one homemade system.
In my experiment I showed that expensive water filtration systems are not better than a homemade system at improving water quality.

I set up 3 water filtration systems, two being store bought, and one being homemade. All three filtration systems were carbon based. I created my own dirty water and ran 500 ML of the dirty water through each filter three times. Then I measured the TDS (Total dissolved solids) and found the average for each system. Given that the TDS was the most important variable in my experiment I was able to determine the best filtration system.

Different water filtration systems were compared to see which one made the cleanest water after dirty water was filtered through it. The ending results had the BRITA water filter with the lowest TDS average of 242 TDS. The highest TDS was ZEROWATER at 262. The filter in between is the homemade filter at 246 TDS. But the lowest score of all nine tests was the first test of the homemade filter at 237 TDS.

Project # **J0702** Category: **Chemistry - General - Jr**

Student: **Douglas Trinh** Grade: **6** G: **M**

School: **Pomona Unified School District Junior Division**

Title: **Crushing Cans With Air Pressure**

So to summarize all this information that we collected, 2 ounces is the best amount of water when trying this experiment while six ounces of water will not be able to crush the can and make sure to check more than 1 source like a video. Since we watched more than one video, we got more information and got our measurements right. Also, we made sure that our questions and purpose made sense for this experiment.

Project # **J0703** Category: **Chemistry - General - Jr**

Student: **Ellie Chang** Grade: **6** G: **F**

School: **Stratford School**

Title: **Pods compared to non-concentrated dish soap**

Student: Ellie Chang
Teacher: Mr. Del Mundo
Grade: 6 ~ Stratford Middle School ~
Date: 13 October, 2022
Pods or Non- concentrated Dish Soap?
The objective of this project is to unravel the discovery of which is better, pods or soap bottles? The question is, “which is more effective?” The discovery will show if Cascade pods are better than the bottle of dishwasher soap itself. The hypothesis is that the Cascade pods may clean dishes better than the dishwashing soap itself because it looks as if it includes a larger variety of different particles in the pod. It is also because pods are used in dishwashers. Machine may clean better than by hand. To test this hypothesis two equally dirty and sized plates will be used. Then the plates will be washed one with a pod and the other with the soap itself. They will be dried in the same dish drier.
To test it, UV/LED lights will be used. To be exact, the other cleaning product soap that will be used will be the Dawn brand. This is because after some research, the closest dishwasher detergent to the Cascade pod is the Dawn detergent. This way, the two soaps are fairly compared. It would also mean that the results will be resolved equivalently.

Project # **J0704** Category: **Chemistry - General - Jr**

Student: **Elle Shepela** Grade: **7** G: **F**

School: **Saint Martin of Tours Elementary School**

Title: **Glucose in Apples**

Glucose helps us stay energized all day and helps us stay healthy. I wanted to discover which breed of apple has the most glucose. Why apples were chosen is because it is one of the most popular fruits eaten today. 4 different types of apples were chosen, which included the Granny Smith, Fuji, Honeycrisp, and the Red Delicious Apple. The hypothesis was that the Fuji apple would contain the highest level of glucose during the experiment because of its high sugar level. Apples were cut into four equal pieces, mashed it with a fork then put it through a blender. Then squeezed out a few drops of juice. The liquid was extracted using the refractometer. This process was repeated for all the apples for the next four days. Then I graphed my results making sure to add the averages of each apple. At the end of the project it was therefore concluded that the hypothesis was accepted because the Fuji apple produced the greatest amount of glucose. Though the hypothesis was correct, I still learned many valuable lessons. I learned that each time you do a step it doesn't always go the same way you planned it too. But most importantly this experiment shows that we might now always know what's in certain foods. Even though glucose is vital for our survival, too much of anything is never good.

Project # **J0705** Category: **Chemistry - General - Jr**

Student: **Adalina Alshurbaji** Grade: **6** G: **F**

School: **Islamic Center of Claremont School (ICCS)**

Title: **Which Salt Allows for the Best Crystal Formation to Occur?**

The purpose of our experiment is to see which salt forms the best and the fastest crystal. Our hypothesis is that we think that the borax crystal will form faster, and the baking soda crystal will form with a better formation. Baking soda had only one ingredient which is sodium bicarbonate and borax had a combination of boron, sodium and oxygen, which means that it might take longer for the baking soda to form and faster for the borax to also form. First we put boiling water in both jars then added borax in one jar and in the other, baking soda. We tied a string to the pipe-cleaner (for each jar), and added a pencil for balance. After over an hour, the crystal with borax added grew while the baking soda crystal did not. Our hypothesis was half-correct, while the borax crystal did form faster, the crystal with baking soda did not have a better formation.

Project # **J0801** Category: **Earth / Space Sciences - Jr**

Student: **Mila Boyamyan** Grade: **6** G: **F**

School: **St. Gregory A. & M. Hovsepian School**

Title: **Stellar Engines**

This project, Stellar Engines, is designed to discover the ways we can manipulate the gravitational pull of the sun and the solar system. Stellar Engines are designed to move the solar system in case of an emergency, like the mass extinction of humanity. There can be a gigantic asteroid hurtling towards Earth that we cannot destroy. Stellar Engines are then used to move the solar system out of its orbit in the galaxy, to somehow dodge the potential threat. For my Science Fair project, I will make a prototype of these Stellar Engines. There are two Stellar Engines that scientists are planning to do more work on—the Shkadov Thruster, which is a huge mirror that reflects the sun's light, pushing it forward. Then, there is the Caplan Thruster, which gathers the sun's energy, pushing the sun in the wanted direction with the Dyson Sphere. What's unique about my science fair project is the fact that it is not an experiment, but simply based on heavy research and conversation. The goal of my project is to show others the amazing minds of scientists out there, that have come up with amazing ideas. In these models/prototypes, I will show others how the Stellar Engines work on the solar system.

So, in conclusion, my science fair project is about Stellar Engines. I will create these Stellar Engine's models, and explain how they work and why. This isn't your normal experiment, but a research-based project. The Stellar Engines help move the gravitational pull, or the sun, to a different location in the galaxy to remover potential threats of mass extinction on Earth.

Project # **J0802** Category: **Earth / Space Sciences - Jr**

Student: **Amelia Sarkisian** Grade: **8** G: **F**

School: **Brentwood School - Junior Division**

Title: **No Glo Radiation-Protective Garments: Carbon-Fiber Filament Meshed in Fabric - the Way to Reduce Natural Radiation Exposure**

As more civilians gain access not only to the Earth's skies but also to space, can we create a garment that protects individuals affected by radiation without needing bulky radiation protection garments that inhibit the user from performing their tasks? Our objective is to create a light and user-friendly garment for aviators, flight attendants, and space tourists, which protects them from harmful radiation by creating a fabric mesh with integrated carbon fiber filament. A safe radiation protection mesh may help lower the risk of getting radiation-caused diseases, cardiovascular diseases, and cancer when put in between layers of an EVA flight suit and other garments high-risk workers wear to perform tasks. We are using our mentor's flight suit as a protective radiation garment prototype and incorporating different carbon meshes into the layers of the garment. We will make 6 x 6-inch testing patches of the mesh. The suit fits perfectly on a 5'10" woman, giving more surface area for testing. The carbon fiber filament will be a non-toxic material to start the foundation of this protective material to protect the body from harm. Our school's 3D printer will convert the carbon fiber filament into a mesh. Then the mesh will be integrated into the flight suit in different areas in order to ensure comfort and easy mobility by the user. For different occupations, the lead will be of different thicknesses; for higher-risk workers, the mesh will be thicker; for lower-risk workers, the mesh in the garment will be thinner.

Project # **J0803** Category: **Earth / Space Sciences - Jr**

Student: **Hayes Elbert** Grade: **7** G: **M**

School: **Hale Charter Academy STEAM Magnet**

Title: **Are Horizontal Windmills more efficient than Vertical Windmills?**

The experimenter created this idea when he was driving through palm springs and he saw tons of x axis windmills. He decided to do this experiment because he saw no y axis windmills. The importance is to decide which windmill is better for green energy. This can help the future because people then decide if there should be a different kind of windmill in other places and whether to keep making x/y axis windmills. The hypothesis is: If a horizontal wind turbine produces some amount of energy then the vertical windmill will produce more energy, because the horizontal wind turbine produces power from just the front, while the vertical wind turbine is producing power from the wind for 360 degrees. This experiment is building two different types of windmills, The x/y axis windmills. To build them both you need an anemometer to tell how many volts are being measured. When there's focused wind, the y axis windmill is better, however when there is a wide range of wind and hardly any focused wind, the x axis windmill is better. When the x axis windmill measured 1.1 volts for the small fan on setting 1, the y axis windmill got 0.0 volts because of the focused wind the small fan does not have a great wind vortex of focused wind. However, when the hair dryer was used, the y axis windmill generated the most volts. In conclusion, both windmills do have their ups and downs for both. In the future when stationing those windmills in those places, the creators need to understand where the wind is coming from, and how much wind is created there.

Project # **J0804** Category: **Earth / Space Sciences - Jr**

Student: **Jeremy Colato** Grade: **6** G: **M**

School: **St. Timothy School**

Title: **Biogas Production: Which Balloon Will Grow The Tallest?**

This Project was designed to discover which Biomass will produce the most biogas to inflate the balloon to its tallest height. I filled the bottles, using the mix of items involved. The most important variables were: Cow manure, vegetable peelings, and mashed banana. Since these were the materials that would produce the air to inflate the balloon, my research showed that the amount of air that the biomass would produce is very much time based. In the end Cow Manure + Mashed Banana inflated the most, but in the first 6 days Cow Manure balloon grew the most. On average each balloon grew about 2-3 cm per day. In days 7-12 some of the balloons grew 1 cm or didn't grow at all. While some balloons that didn't have any growing time in the first 6 days grew a lot in days 7-12. On the morning of Day 12, I saw that Cow Manure + Mashed Banana grew 5 cm overnight, the second most any of the balloons have grown overnight. Before doing my experiment, I thought that Cow manure + vegetable peelings would grow the most. In fact it grew the least out of all the balloons in the 12 days. Next time, I would like to see if using a mix of vegetable peelings, or using just one of the vegetable peeling types would affect it differently. (For example, using tomato peelings, or carrot peelings, since I only used Potato peelings.)

Project # **J0805** Category: **Earth / Space Sciences - Jr**

Student: **Sara Ziyad** Grade: **6** G: **F**

School: **Institute of Knowledge Middle School**

Title: **Tumbling Through Space: How Does Speed Affect Orbiting Altitude?**

Question: How do speed and mass impact a satellite's altitude in orbit, and how does the mass of a planet affect the satellite's trajectory and gravitational pull?
Procedure: For this project, I followed a procedure that involved using a white paper to record test results. To represent satellites, I used marbles and clay with varying heights to simulate the gravitational pull of different planets. I used food coloring to depict the trajectory of the marbles with different masses and speeds. By marking the marbles left behind, I was able to measure the distance to the center and analyze the variables of speed and mass. The length and angle of the clay pillar for each planet was determined by its mass, with Jupiter having a longer clay pillar compared to Earth and Saturn.
Results and Data: The results indicate that higher satellite speed and planet mass cause the satellite to move closer to the planet in a curved and angled trajectory. The data also suggest that a higher mass of the marble creates a more curved trajectory and brings it closer to the center.
Conclusion: The results of the experiment supported the hypothesis that larger mass planets have a stronger gravitational pull on satellites, causing a curved trajectory, and that the faster the speed and greater the mass of the satellite, the closer it moved to the planet. This explains why the moon orbits around the Earth instead of drifting away.

Project # **J0806** Category: **Earth / Space Sciences - Jr**

Student: **Melissa Meneses** Grade: **8** G: **F**

School: **Magnolia Science Academy 6**

Title: **Heat Up! Water Temperature in Solar Oven**

The objective of this project is to know which type of cooking pot is more effective when heating water. To conduct this experiment, 2 different pots were compared and tested in a homemade solar oven. The two pots that were being compared were a stainless steel pot and a regular black pot. Two solar ovens were made for each pot. The solar ovens were made out of a cardboard box that was entirely wrapped around the inside with aluminum foil, and the top was covered with saran wrap to allow the aluminum foil to reflect the sun’s heat into the solar oven. Each pot had 2 cups of water, and the water temperature was taken before each experiment. Both ovens were set under the sun for an hour. When the hour was over, I measured the temperature of the water using a thermometer. The experiment was done again on a separate day using the same procedures. After conducting the experiment twice, the results showed that the temperatures of the second trial were much higher than the first trial. One of the trials supported my hypothesis because the black pot was more effective in heating up the water. In the second trial, the stainless steel pot was more successful. Overall, the black pot averaged 1.833k higher than the stainless steel pot. The outcome of these results did support my hypothesis. Next time I would like to try to use different colored pots that are brighter such as pink and blue.

Project # **J0901** Category: **Ecology - Jr**

Student: **Sophie Herbert** Grade: **7** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Deadly algae: How fertilizers create algae blooms and decrease dissolved oxygen levels**

Objectives

Our objective was to find which fertilizer causes the most algae growth and how that algae growth affects dissolved oxygen levels. With the goal of showing how fertilizer runoff makes its way into aquatic environments and affects them.

Materials and Methods

Our experiment used 3 different fertilizers (monoammonium phosphate, liquid nitrogen, miracle-gro plant food) in two different concentrations (1mL and 2mL). In each flask there was 100 mL of conditioned water, 100 mL of algae gro, and 3 mL of chlorella algae. With three of each flasks for 1mL of each fertilizer and three flasks for 2mL of each fertilizer. We let the algae grow for 2 weeks and took measurements every three days with a dissolved oxygen probe (to measure dissolved oxygen in the water) and a spectrometer (to measure the amount of algae through transmittance).

Results

The results were based on an average transmittance and dissolved oxygen after the 14th day. We found that our flasks containing 1 mL of liquid nitrogen grew the least (83.05 %)and had the highest Dissolved oxygen level (4.76 DO). Which makes sense because there is a direct correlation between algae growth and dissolved oxygen based on research. This is also seen with 1 mL of miracle gro having the most growth (64.6%) and the least dissolved oxygen (4.5 DO).

Conclusion

In conclusion, our data proves that algae growth from fertilizer runoff does affect dissolved oxygen levels which in the long term affects aquatic life negatively.

Project # **J0902** Category: **Ecology - Jr**

Student: **Ariel Hopenstand** Grade: **6** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **Sea Change**

“Sea Change” is a project designed to see if climate change will affect the communication and echolocation of marine animals. Climate change is predicted to increase the temperature, salinity, and acidity of the ocean. Therefore, I researched what effect those changes might have on sound waves underwater that are used by mammals for communication and echolocation. I recorded myself blowing an underwater whistle with a hydrophone in my bathtub. By changing the temperature, adding salt, or adding acid to the bath water, I can see the difference in decibels among the different factors to the same sound. I found that increasing the temperature and acidity increases the amplitude of the sound, but adding salt decreases the amplitude. Work still needs to be done on this subject to combine my data into one net effect. Without calculating the exact net effect, I predict that climate change will increase the amplitude of sound running through the ocean. My research concluded that the climate change effects on marine mammals will probably be that sound pollution will increase, thus making it more likely mammals will be confused by other mammals’ signals far away.

Project # **J0903** Category: **Ecology - Jr**

Student: **Mason Whittemore** Grade: **6** G: **M**

School: **Walter Reed Middle School**

Title: **Unclear Contamination**

The problem I am trying to solve with this project is if LA always needs to filter its water. My assumption, as stated in my hypothesis, is "If a water's source is contaminated, then the treated water will be harder to filter, because higher contamination makes filtration harder." I have tried to prove this through my experiment, in which I sampled water from 8 different locations, tested them and compared the results to the container to decipher them, and then documented the data. All of the data collected was suprisingly similar. All of the categories, for each location, hovered around 40 total alkalinity, 6.5 pH, 0 hardness, 0.5 total chlorine, 0.5 free chlorine, 0.5 free bromine, 0 nitrate, 0 nitrite, 0 iron, 1 chromium, 0.005 lead, 0 copper, 0 mercury, 0 fluoride, and 20 carbonate root. This shows that no matter how dirty looking, all water is generally the same. All of what I have learned from my experiment and research has proved my hypothesis wrong. A water's source doesn't have to be the site of first contamination, and water doesn't often come out unclean.

Project # **J0904** Category: **Ecology - Jr**

Student: **Leon Hairabdian** Grade: **7** G: **M**

School: **Chamlian Armenian School**

Title: **How Does Your Location Affect Air Quality?**

Chamlian Armenian School Science Fair 2023

Abstract

How Does Your Location Affect Air Quality?
Levon Hairabdian
713B
7B

PROBLEM
The purpose of this experiment is to prove that air quality is a major problem in the U.S. and is worse near freeways rather than away from freeways. I hypothesize that the air quality device will record more particles closer to the freeway because there is traffic and there will be more pollution causing the air quality to be worse.

PROCEDURE
Get Air Advice Air Quality Device.
Connect the device to a charging outlet and let it run for 30 minutes outside of each location.
Once 30 minutes is done for the first trial, call the Air Advice company in Portland, Oregon.Give the serial number of that device and give your email, so they connect the device for it to send the results to your email each time.
Write results by making a graph on a piece of paper (Ugm3, Time, Temperature each trial had).
Repeat steps 1,2,4 three times in the morning, afternoon, and at night.
Repeat steps 1,2,4,5 in two locations (Less than 1 mile away from freeway and 4 to 6 miles away from freeway).

SIGNIFICANT FINDINGS
The results of this experiment were that the air quality was worse near the freeway than the air quality away from the freeway. However, both of the locations had poor Ugm3 which shows that air quality is a major problem in the U.S.

Project # **J0905** Category: **Ecology - Jr**

Student: **Ranjana Sathish** Grade: **8** G: **F**

School: **Hale Charter Academy STEAM Magnet**

Title: **How does Supplemental Carbon Dioxide Affect Algae Growth?**

Too much carbon dioxide causes detrimental harm to the environment, but it can be beneficial to algae. In 2023, CO2 levels have almost doubled since the pre-industrial era, generating more urgency to find innovative ways to improve Earth's climate. Algae, a carbon dioxide sequester, can help reduce CO2 levels on Earth. If carbon dioxide is created with 2 teaspoons of sugar and 1 teaspoon of yeast which is added to the 3 experimental bottles, then the algae will grow significantly more, growing 4-5 grid levels(4-5cm) higher, producing 2 teaspoons more than the control, and/or 2x darker green colored water. This is because more carbon dioxide added causes the cluster of the enzyme, Rubisco, to fix CO2 at a faster rate, producing more algae. For a month, 6 algae-filled water bottles were consistently measured by height, examined, and placed in indirect sunlight. Three of the bottles, the experimental group, had an airline tube running through the inside, which was attached to another bottle, containing sugar and yeast, producing carbon dioxide. After a month, the experimental bottles had a larger algae height than the control bottles, experimental bottles 2 and 3 reaching 13 and 8 centimeters. There was also 0.5-1.42 teaspoons more algae in the experimental bottles, compared to the control bottles. In the future, a more accurate measuring system should be used rather than height. Additionally, conducting this experiment in summer/spring months for a longer time period might yield better results.

Project # **J0906** Category: **Ecology - Jr**

Student: **Francis Lawton** Grade: **8** G: **M**

School: **St. Timothy School**

Title: **Water is Water is Water**

This project was designed to find out if greywater and treated greywater can safely hydrate plants, and promote plant growth, just as well as tap water. I live in drought-prone California and it's important to find different ways of conserving water. My experiment tested the watering of grass pots with three different types of water (independent variable): Tap water, Greywater, and Greywater treated with Activated Charcoal. Over the course of 8 weeks, I measured plant growth, soil Microbial Biomass Carbon (MBC) levels and soil Fungi to Bacteria (F:B) ratio (dependent variables). Many controlled variables ensured a valid experiment. I hypothesized that each of the water types would result in the same growth rate, soil MBC and soil F:B ratio. My hypothesis, however, was incorrect. Greywater resulted in stunted growth and spiked the F:B soil ratio so high that the pot sprouted 13 fungi heads. Tap water and Treated Greywater, however, were equally good in terms of healthy plant growth and both pots had the two best average F:B ratios closest to 1:1 (which is the best ratio for grasses). Neither of these pots produced fungi. Soil carbon levels (MBC) fluctuated for all three plants, however each plant maintained an "Excellent" level. This indicated that each water type was fine for watering grass if you don't mind stunted grass growth and some fungi in your lawn. My experiment also proved that Activated Charcoal effectively "adsorbs" chemicals in greywater that alter a soil's F:B ratio.

Project # **J0907** Category: **Ecology - Jr**

Student: **Beau Cartwright** Grade: **8** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Effects of glyphosate-based roundup on gonad mass and cellular structure in freshwater mussels**

Objectives

My objective was to see if the addition of a glyphosate-based herbicide, an endocrine disruptor, could decrease the gonad mass, this would show that the mussel has been feminized. Thus showing the effects of herbicide runoff on aquatic life.

Materials and Methods

My experiment used 3 different concentrations of Roundup (glyphosate-based herbicide) in mussel tanks: 0 mg/l, 5 mg/l, and 10 mg/l. I constructed three 6L tanks, containing 3 pieces of elodea, 3 cm of coarse sand, 6 pellets of daphnia food, and 4-5 mussels per tank. I left mussels in their environment for 14 days. I dissected the gonad and used their mass and length to calculate their BMI. After this, I made impressions of the gonad to look at the cellular structure.

Results

My results were based on the average gonad BMI (Kg/m^3). There was a linear decrease in mussel mass as the concentration of herbicide increased. The control group had a BMI of 0.72 Kg/m^3. The tank with 5 mg/l of Roundup had a BMI of 0.49 Kg/m^3. The tank with 10 mg/l concentration of Roundup had a BMI of 0.39Kg/m^3. I didn't find a correlation between the addition of glyphosate and the cellular structure in the impressions.

Conclusion

In conclusion, the higher concentrations of glyphosate lowered BMI. I hypothesized the groups with the higher concentrations of Round-up would have a lower gonad mass. My data supports this.

Project # **J0908** Category: **Ecology - Jr**

Student: **Shaheer Hashmi** Grade: **8** G: **M**

School: **Institute of Knowledge Middle School**

Title: **Chilling Out Sustainably: The Quest for an Affordable and Eco-Friendly Cooling Solution**

Problem:

Conventional air conditioners have negative environmental impacts, are costly, and require significant energy consumption for maintenance.

Procedure:

1.I created a prototype by inserting elbows and a fan through the lid of a cooler, and added ice to the bottom.
2.I added pipes to the elbows and connected them to the floor of the container with minimal gaps.
3.I placed a net inside the container and added ice on top, allowing it to partially melt to create a layer of cold water and a layer of remaining ice.

Results:

My prototype initially threw out temperatures of 67-69 degrees, while the pipes threw out 71 degrees and the net only 55 degrees. Despite the pipes appearing to be a drawback, they were actually essential for the net to function effectively.

Conclusion:

My results supported my proposed solution, and I discovered that there are a lot of ways to cool ourselves that are cheap and environmentally-friendly.

Project # **J0909** Category: **Ecology - Jr**

Student: **Guthrie Luke** Grade: **8** G: **M**

School: **Portola Highly Gifted Magnet**

Title: **The True Cost of Disposable Diapers**

This study examined particulate shed and consumer disposal methodology in synthetic diaper use. The experiment sought to determine whether synthetic components of disposable diapers, primarily polyethylene plastics, shed particulate microfibers when subject to normal agitation. It was hypothesized that if synthetic diapers are worn by an infant, microparticulate shed would be present, some of which will be fine (less than PM2.5). Ultrafine particles can enter deep into lungs and permeate cell tissue, posing health consequences for developing children. A clean glovebox was constructed, with a HEPA-filter and a filtration system. Synthetic microfiber shed was then quantified using the DustTrakTM II Aerosol Monitor 8530 (DT8530). The DT8530 is able to measure aerosol concentrations corresponding to PM2.5 and PM10. Tests showed agitation of synthetic diapers resulted in particulate levels consistently at 5,000 micrograms/m3 with recorded levels reaching as high as 20,200 micrograms/m3. Additionally, it was hypothesized that consumers may not follow guidelines for feces disposal with synthetic diapers. With a trillion diapers thrown away annually in the US alone, the consequences of improper feces disposal are catastrophic with pathogens being introduced into the environment through landfills. An online survey was created to evaluate consumer practices and knowledge of current disposal recommendations. Results indicate the vast majority of caregivers are both unfamiliar with disposal recommendations and disinclined to alter current practices.

Project # **J0910** Category: **Ecology - Jr**

Student: **Norah Fuad** Grade: **8** G: **F**

School: **Al-Huda Islamic School**

Title: **Disinfecting Undrinkable Water with Sunlight.**

Have you ever thought about the people in other countries who don’t have access to safe drinking water like us? In this project, I tested to see if you could use sunlight to disinfect undrinkable water. I collected water from a creek and tested if putting it under a UV light for 12 hours made it grow fewer bacteria than without the light. It was hypothesized that: If I put 3 bottles of water from a creek under a blue reptile bulb to replicate the sun for 12 hours, then there will be less bacteria in the water than the bottles not left under the light.
The result of my project was that the bacterial colonies of the untreated water were bigger in diameter, but the UV light treated water and the water left in the bottles without UV light had more bacterial colonies.
My hypothesis was not supported. On day 16, the average number of colonies for the untreated water was 90.67 colonies, and 263 colonies for the water left under the UV light. The average diameter of the colonies for the untreated water was 8.67mm and the water left under the light had an average bacterial diameter of 4mm.
A possible reason to why my hypothesis was not supported could be that I needed to keep the bottles under the UV light longer.

Project # **J0911** Category: **Ecology - Jr**

Student: **Hovannes Benneian** Grade: **8** G: **M**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **Rethink Your Drink!**

I did this project to learn more about how different liquids can affect the growth of an organism. The materials I used were 3 plants, a bottle of Pepsi, a bottle of Perrier Sparkling water, and a bottle of water. I watered each plant with the same amount of liquid each day for a span of 7 days. This project was about how what you put into your body affects how you grow and how you develop physically.

Project # **J1001** Category: **Engineering Applications - Jr**

Student: **Naira Badalyan** Grade: **8** G: **F**

School: **The Science Academy STEM Magnet**

Title: **3D > 2D: Nonplanar Solar Panels to Increase Surface Area and Efficiency**

As renewable energy becomes increasingly important to humanity and our planet, and also becomes more widespread and available, some technologies are gaining prevalence. In the desert environment of Southern California, many people put solar panels on their rooftops in an effort to gain as much power as possible, and for this you need a large surface area on which to put many solar cells. However, many rooftops do not have this area. In addition, for flat solar cells, no part of the panel is always facing the sun directly. This project is meant to conceptualize and test a technique in which solar panels are placed in non-planar configurations that allow more energy to be produced per unit footprint and that allow the sun's rays to hit at least part of the solar panel directly at any time of day. In addition, this technique allows one to "pack" more surface area into a smaller footprint. Our configuration is spherical in order to have sun rays always directly hit at least part of the panel. However, manufacturing curved solar panels is complicated, so the configurations were approximated with flat solar cells. Measuring current every hour proved that the spherical configuration produces more current than the flat one, even though the experiment used the same amount of solar cells on each panel and the surface area benefit was not used. This is because the sun is angled most of the time, rather than overhead, and the spherical panel works better in these conditions.

Project # **J1002** Category: **Engineering Applications - Jr**

Student: **Arpi Hokhikyan** Grade: **6** G: **F**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **Build a heart rate monitor**

Many people use heart rate monitors each day. For example, patients in a hospital might have stationary / bedside equipment to monitor their heart rate and alert medical staff in case of an emergency. Someone going for a run might wear a portable heart rate monitor to keep track of their workout intensity. Hospice workers will use portable heart rate monitors for their patients. Heart rate monitors are not all the same. Their looks and functions will vary depending on the intended use. In this presentation, you will see how I made and programed, and all the challenges that I faced while making my very own heart rate monitor.

Project # **J1003** Category: **Engineering Applications - Jr**

Student: **Anna Schofield** Grade: **6** G: **F**

School: **Walter Reed Middle School**

Title: **Trussworthy?**

In this project, I was trying to figure out what the most effective type of truss is for bridge building. I tested five different trusses: Pratt, Howe, Baltimore, Warren, and the K-truss. My hypothesis was that either the Baltimore or the K-truss would support the most weight because they have the most triangles, which are the strongest shape when building a truss. My bridges were made out of balsa wood sticks ? inch thick and normal wood glue. I tested the bridges using a wooden block on top of each bridge with a bucket attached to the block. The bridge rested on two tall, flat surfaces. I gradually added sand to the bucket. When the bridge broke, I weighed the sand, added the weight of the testing apparatus, and found the weight the bridge could hold. Then I calculated the efficiency of each bridge, which was the weight the bridge held over the weight of the bridge itself. The Pratt truss held the most weight and was also the most efficient, weighing only 9 grams but supporting roughly 31 pounds. I now realize that my hypothesis was probably wrong because the Baltimore and K-truss have more joints where the members intersect, which, after observing how the bridges broke, I figured out are actually the weak points of the trusses. Also, the efficiency levels of the two bridges were much worse than the others because they both weighed a lot.

Project # **J1004** Category: **Engineering Applications - Jr**

Student: **Darett Estrada** Grade: **8** G: **F**

School: **Montebello Intermediate School**

Title: **Need A Leg?**

Need A Leg?

Objective: The objective of the experiment is to make a prosthetic leg that can assist people with an amputated leg.The prosthetic leg is made of materials that are affordable so that it can be made by anyone who needs a quick and effective wait to have a leg again.

Materials and Methods: A crutch is cut to the size of the amputee's amputated leg for it to be straight down. The church is attached to the boot with a 3 ½ inch by ¼ inch metal bolt that is fastened with a flat washer that is ¼ inches and a bolt nut that is also ¼ inches. Inflatable foam is then placed into the boot and is let to dry. After the foam dries, a calf brace is bolted with the same metal bars to the top of the crutch.The amputee can now put a calf brace onto the cut limb and placed inside the fastened calf brace.

Results: Using the heavy-duty yet affordable materials leads to a very structured and capable homemade prosthetic leg.

Conclusions: The conclusion is that making an affordable prosthetic leg is easy and doable in case of insufficient funds or a long wait list.

Project # **J1005** Category: **Engineering Applications - Jr**

Student: **Elise Sarmiento** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **The Auto-Crate**

People who are elderly and disabled often have a difficult time moving their belongings. Therefore, the Auto-Crate was developed that works to help these people move their items from one place to another. The device was built starting from the frame. Then, using Arduino components, the Bluetooth and movement systems were built and developed. Several mock trials were used to test the robot and to make sure that all systems were functional. Over time, the device was able to develop, so that the robot was able to function, with some faulty sections. Despite the fact that the device can be improved to carry bigger and heavier items, the Auto-Crate allows elderly and disabled people to have an easier time moving their belongings.

Project # **J1006** Category: **Engineering Applications - Jr**

Student: **Ibrahim Shawky** Grade: **6** G: **M**

School: **New Horizon School**

Title: **Designing a Comfortable Bike Seat**

The purpose of this engineering project is to make a comfortable bike seat for an enjoyable ride. When people are biking after a while, their bottom begins to hurt. This project’s objective is to prevent that pain. Memory foam and regular foam are known to provide good support and good comfort. The prototype is used to make a bike seat that will allow people to bike for longer distances pain free, mainly using a regular foam pillow and shredded memory foam. Other materials that were used were a plastic bike seat, a hot glue gun, hot glue sticks, a roll of duct tape, a tie-die shirt, and zip ties. First, the shredded memory foam was hot glued to the plastic bike and covered in a layer of duct tape. Then, more shredded memory foam was glued over the duct tape. One more thin layer of duct tape was taped over the second layer of shredded memory foam. Lastly, a foam pillow was connected to the seat. Using these materials and procedure, the seat became much larger but provided much more cushion. Using this information, bike companies could use my design for affordable yet very comfortable bike seats.

Project # **J1007** Category: **Engineering Applications - Jr**

Student: **Katia Thomas** Grade: **8** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Building an Aerodynamic, Sustainable Steam Engine**

Our objective was to create an efficient steam engine model. We investigated different handmade turbine designs and measured how much energy was produced from each. Steam energy is one of the most efficient sustainable energy sources, which is why we want to determine the best design. Our experimental groups consisted of four different types of turbines attached to a steam engine model: One 6-winged, curved 3D printed turbine, one 6-wing rounded 3D printed turbine, one handmade vertical curved axis rotation turbine made from aluminum, and one handmade vertical rounded turbine made out of PVC pipe. To execute this, we will attach a wire stand to a slab of wood, and rest a can full of water on top. The can will have a small tube that the steam can escape from. We will attach a piece of pvc pipe to the wood and attach a motor to that. This will be our base that we use throughout our experiment. We will attach each of our previously described turbines to this base separately during testing. The differences in our experimental groups are the different turbines we have attached to our steam engine model. This was so we could see what type of turbine would produce the most volts measured with a voltmeter. We are still in the process of experimenting. Our results will be presented at the LACSEF.

Project # **J1008** Category: **Engineering Applications - Jr**

Student: **Sara Schneider** Grade: **6** G: **F**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **Robot Arm**

Imagine having your own hydraulic-powered robot arm. Well, then this project is right for you! This invention could help the world in so many ways such as helping industries and people do tasks or work.

Project # **J1009** Category: **Engineering Applications - Jr**

Student: **Yanar Akoshali** Grade: **7** G: **M**

School: **New Horizon School**

Title: **Constructing a Solar Water Heater and Testing its Efficiency in Heating Water From a Hose.**

The objective of the project was to construct a Solar water heater measure its efficiency by heating water from a garden hose. The materials used were Copper pipe, lumber wood, glass, screws, metal handle, garden hose adapter, and other materials. For the frame construction, drill holes on every piece of lumber wood and screw them. Next, drill holes and screw the wooden base onto the frame. Place the copper tube coil on the wooden board and drill a hole on the side of the board so the pipe could go in on both sides of the frame. Spray paint it black. Place the glass on top of the frame. Screw the garden hose assembly and push it onto one side of the copper pipe. Add a handle on top the frame and screw it to easily move it. Leave it in the sun for 3 hours. Attach the solar heater to the garden hose and run the water. Check the temperature of the water. It will show that the water gets heated up. The initial water temperature was 90 degrees F (32.2C) and it rose to 142.4 F (61.3C). The first prototype constructed had two problems. One was that the pipe was too thin so a lot of water could not go through it. Another problem was that the glass was not the correct size and it had to be cut down to fit the frame exactly. Future improvements will include different sizes and a comparison of effectiveness.

Project # **J1010** Category: **Engineering Applications - Jr**

Student: **Christopher Avila** Grade: **7** G: **M**

School: **Montebello Intermediate School**

Title: **ZA Bullet**

Objective:
The train was to use the magnetic field created by two neodymium magnets attached to a battery contained within a copper solenoid to achieve magnetic levitation. The repulsion and attraction forces of the magnetic poles of the magnets would allow the battery to move within the copper solenoid at a constant rate of speed. This would achieve a form of clean energy transportation.

Materials and Methods:
Neodymium magnets attached to a battery contained in a solenoid made of 18 gauge copper wire.

Results:
The battery was able to move inside the copper solenoid at a constant rate of speed when the magnets were attached to it. To ensure the motion of the battery the magnets attached had to be of a larger circumference than the circumference of the battery. Similarly, the copper solenoid also had to have a diameter larger than the circumference of the magnets attached to the battery. The magnetic field created within the 18 gauge copper solenoid was strong enough to move the battery as predicted.

Conclusion:
Magnetic levitation of the battery was successful and was done in a clean energy system where no harmful exhaust was emitted. Further applications of a similar system of magnetic levitation could lead to significant changes in the amount of carbon emissions released by the school bus system.

Project # **J1011** Category: **Engineering Applications - Jr**

Student: **Coco Sakuma** Grade: **8** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Stop Building Damages Using Earthquake-resistant Supporters**

The objective of this project is to find a solution to damages of buildings caused by earthquakes. Earthquakes have been making disastrous effects throughout the world. As a result, many people are losing their houses, schools, and places to work. From 1998-2017, 750,000 people have died from earthquakes. Most people who die by earthquakes lose their lives from damaged buildings. Others experienced trauma-related injuries and losses. Areas where the ground consisted of high moisture would cause liquefaction, bringing great consequences. To prevent further disasters, I propose to design and test a supporter on the base of a building that would minimize the damage by the earthquake. Using TinkerCAD, I designed a 5 cylinder earthquake-resistant supporter, and printed it out with a 3D printer. I also designed 3 other prototypes with different shaped supporters. With a VEX robot motor that was coded to simulate an earthquake, the prototypes were tested in containers consisting of sand and water. The 5 cylinder earthquake-resistant supporter would prevent the tilting, swaying, or sinking of the building. This would prevent big impacts of earthquakes on buildings, which would decrease death and injury rates by earthquakes. During testing, recorded in qualitative data, I found that the prototype was highly successful and met all of the requirements. The supporters trapped sand between the legs, which prevented that area from liquefaction, leaving the building with no damage. This would help create a safer environment for people who live in areas where earthquakes occur frequently.

Project # **J1012** Category: **Engineering Applications - Jr**

Student: **Davit Abgaryan** Grade: **6** G: **M**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **Rc blimp**

Hey, you there wouldn't it be cool if you could have your own drivable remote control blimp well follow me thru the process of making one on my science project. some of the variables you can measure after making one are how much weight it can carry and how long you could drive it. so follow me and if you do everything right you will
have a brand new RC blimp in no time.

Project # **J1013** Category: **Engineering Applications - Jr**

Student: **Chloe Peralta** Grade: **7** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **Cake Cutter**

The purpose of this project is to cut the cake easier and evenly for you. Why this is important? Well imagine eating a cake and you see your sibling, with a bigger slice, and it's your favorite flavor. Now that would look unfair. So basically our problem is to solve is to get rid of that uneven cut we have. Our procedure was to meet up on the weekends and do it together, but we had schedules so we couldn't meet up, so we split the project in half and did them. Our main or most important materials were plastic(Home Depot Bucket) and wire string. The most important variable is the dependent variable in my opinion. The dependent variable's value depends on changes in the independent variable. The idea or creation of this project was a bit of an accident and if I'm correct, this might be a thing scrolling through the internet, the cake slicers I'm seeing are the ones to make layers. After some adjustments, the project worked and managed to slice the cake.

Project # **J1014** Category: **Engineering Applications - Jr**

Student: **Cody Smith** Grade: **7** G: **M**

School: **The Science Academy STEM Magnet**

Title: **Changing Concrete: A Resourceful Approach to Construction by Using Different Materials**

The question trying to be answered in this experiment is if a satisfactory replacement for sand and gravel in concrete can be found with materials from landfills. The purpose of this project is to try to make concrete with materials found in urban environments that would have originally gone to landfills. This project is being done because of sand shortages that are happening in the world. This topic should be cared for because most of our sand is used even outside of construction; ecosystems and technology would be affected by a sand shortage. This project is providing new information as it shows how concrete can be made from other materials. If the aggregates in concrete are replaced with materials commonly found in urban environments, then the resulting concrete will be usable in construction. The I.V. is the replacement material for the aggregate in the concrete. The D.V. is the resulting compressive strength in psi, how much pressure it can withstand before fracturing. The control is the commercial concrete from Home Depot that is used in construction. The units were measured using ½ oz and 1 oz measuring cups with a 16 oz plastic mixing container. The results were that some of the replacement concretes were slightly weaker and one of them was stronger than the commercial concrete. The hypothesis "if the aggregates in concrete are replaced with materials commonly found in urban environments, then the resulting concrete will be usable in construction." appeared to be supported.

Project # **J1015** Category: **Engineering Applications - Jr**

Student: **Jonathan Nunez** Grade: **8** G: **M**

School: **Montebello Intermediate School**

Title: **Space cleaners**

Objective: Our objective is to clean all the debris around the earth, by using magnets to pick up all the destroyed pieces of satellites floating around the earth. This will help us a lot because it will make it easier to make it to space better and can always hit old satellites. With the magnets we can have a better chance of making earth clean again.

Materials and Methods: Tri-fold/Cardboard/Paper/Foam/toilet paper rolls/StyroFoam Paint - Black, White, Orange paint, Water Bottles Cotton, Magnets, and Napkins. How I made the space shuttle was I got a paper drawing the shape of the space shuttle and bought a foam board cut out this shape with a knife cut to lines for the toilet paper roll. I put the toilet paper roll in the lines perfectly and super glue it on the foam. I got some tape and covered the front of it so it can look like the front of the shuttle and the back as well.I painted the pace shuttle white and added the little details on it.For the side rockets I got 2 little soda cans and glued them together and painted it and added color.

Results: I have tested the space shuttle on the earth and it worked. How it worked: the space shuttle picked up the magnets on earth model.

Conclusion:My conclusion was that we found out there is magnetic force in the debris and that gives us a chance to clean it up before it harms our home.

Project # **J1016** Category: **Engineering Applications - Jr**

Student: **Nick Honda** Grade: **8** G: **M**

School: **Palos Verdes Intermediate School**

Title: **Fog Collection for Agricultural Irrigation**

According to the 2017 Census of Agriculture, California uses 24.5 million acre-feet of water per year for farming. One acre-foot of water is 325,851 gallons. This project aims to harvest water vapor in a fog collection device that, if utilized on a larger scale, could supplement California's strained water supply.

To build a prototype device, I used PVC pipe to construct a 5x7 foot frame. Then I put a tightly woven mesh on the left half of the frame and a loose mesh on the right half. I put a gutter at the bottom leading into 2 separate measuring cups to catch the water. I would then measure the water from both daily. Measurements were taken for a total of 8 weeks or 56 days

The tight mesh averaged 270 milliliters of water each day and the screen averaged 250 milliliters each day.

For this water collection method to become feasible on a farm, the mesh would need to be much larger. For one acre of farm to be watered using this device alone, the device would have to collect 56,074 times as much. That means a mesh of 1,962,590 sq ft or 1400 ft by 1400 ft. Because a net this big would be very difficult to make, the device would be best for supplementing some of the water used for crops. If it only supplemented 2% of the water used on farms, it would still save 199,666 gallons of water in California.

Project # **J1017** Category: **Engineering Applications - Jr**

Student: **Ilinca Sasu** Grade: **8** G: **F**

School: **Portola Highly Gifted Magnet**

Title: **How Does the Size of the Filament Affect the Brightness of the Bulb and the Time it Takes to Burn Out?**

The purpose of this experiment is to find out which size of pencil lead is the most effective in keeping the bulb burning the longest and the brightest. Copper wire was also used as an extra. How will the thickness of a filament affect the outcome of the experiment? To answer this question, a hypothesis was formulated: “If the size of the test filament increases, then it will take longer for the bulb to light up, last longer, and it will burn brighter light.” A homemade lightbulb was assembled using electrical clips, electrical tape, different leads, copper wire, and Duracell Batteries; The electrical clips were attached to the batteries that were already attached using the tape. Pencil lead and copper wire of different sizes were tested. The 1.3-millimeter pencil lead performed the best with a brightness of 190 lux and a lasting time of 1:54.24 minutes. The average time the leads and copper wire lasted was 58.6 seconds and the average brightness was 133.5 lux. Excluding the copper wire, the average time was 55.5 seconds and the brightness was 129.1 lux. As the sizes got thicker, the bulb took longer to start producing light. The copper wire, despite being the same size as the 0.5-mm lead, performed worse in time. The copper wire performed better in brightness, indicating that the best materials and sizes are needed to create the most effective lightbulb. In conclusion, my hypothesis was proven correct by my results.

Project # **J1018** Category: **Engineering Applications - Jr**

Student: **Shahrzad Dardashti** Grade: **7** G: **F**

School: **Beverly Vista Middle School**

Title: **Decentralize Desalination**

We want to help fix the water crisis that is happening in California. Currently there are a few large ocean desalination plants in California that produce fresh water, but they are very expensive to build and they have a negative impact on marine ecosystems. Most communities don’t want the plants built in their neighborhood. We want to fix this by decentralizing desalination. Pipe sea water to communities and allow people to desalinate in their home. However there currently aren’t effective home desalination systems. We endeavored to build a distillation device and then compare it to an existing reverse osmosis device. We wanted to see which would be most effective at removing salt. We had hypothesized that the distillation device would work better than reverse osmosis and, after many design iterations, we found out that the distillation device worked best since it eliminates almost 100% of the salt. Our design could be further optimized for mass production home use.

Project # **J1019** Category: **Engineering Applications - Jr**

Student: **Irene Kwon** Grade: **7** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Oil Filtering from Water**

Our plan for our project was to create a device that would filter water from oil. We intended to use a microcontroller for this goal. In our project, some parts we used were a solenoid valve, an Arduino, and a moisture sensor. We intend to fasten plastic bottles to a solenoid valve before using an Arduino to program the valve. This project shows how it is possible to extract water from oil. Our goal was to filter oil from water because of the oil spills in the ocean. The oil spills are collected, but there are still some hints of water with the crude oil. This could impact the way to reuse the oil, resulting in having to get more oil, which is environmentally harmful. With our project, it is possible to separate these two substances, which can lead to helping our environment.

Project # **J1020** Category: **Engineering Applications - Jr**

Student: **John Erikson** Grade: **8** G: **M**

School: **Miraleste Intermediate School**

Title: **Device for Efficient Measuring of Solar Power**

As solar power is continuing to become the favored renewable energy source, the goal of my research project is to create a portable device that can determine what areas are best for solar installation.

A digital multimeter was attached to a solar panel to measure the voltage it was producing. I used a 3D printer to create a “case” to make it simple and straightforward to use. This project is a great step forward towards a better understanding of solar power.

I hypothesized and determined that daytime is the best time for solar panels to produce electricity. As expected, averages from my data collection show that daytime is the best time for solar panels
What I did not expect however, was that at times such as 4:45pm, when there was no sunlight shining on the panel, it was still producing 4-5 volts of power. It turns out that it is not an immediate switch from high voltage to low voltage, but a somewhat steady drop.

My project’s objectives were accomplished, and gave me a new perspective on how solar power works. I think that with this information, we as a society have a greater understanding of solar power and what times of day are most effective, as well as a design for a device that will help find the optimal locations for solar panels to be installed.

Project # **J1021** Category: **Engineering Applications - Jr**

Student: **Valeri Petrosyan** Grade: **8** G: **M**

School: **The Science Academy STEM Magnet**

Title: **The Fuel of the Future: Harvesting Biofuel from Algae**

Society needs a reliable and renewable source of energy for the future. To stop global warming we need a net zero carbon emission. One way of trying to do that is harvesting the energy stored by algae. This has been tried in laboratories, but not at the “home level”. To be at this level, the materials needed for such energy need to be available commercially. It should also be able to be harvested in mass amounts. The outcome of the process should be a fuel that when used or burned, has a net zero carbon emission. Unfortunately, the dried biomass was not able to produce fatty acids when burned, with the given procedure. Therefore, biofuel cannot be extracted from algae at a home level with the procedure given.

Project # **J1022** Category: **Engineering Applications - Jr**

Student: **Harley Carmona-Gonzalez** Grade: **7** G: **M**

School: **Montebello Intermediate School**

Title: **Magnetos GLove**

Objective: The objective of our project is to help people pick up things easier. For example construction workers can pick up screws easier with our electromagnetic glove.

Materials and Methods: Our materials are. Work gloves,metal bolt, 24 gauge magnetic wire, 9V battery and connectors,velcro. One of our methods is to wrap the bolt with the wire and connect it with the battery and put everything on the glove. Some metal bolts did not work, along with the fact that some wire did not work. For example a certain type of copper wire did not end up working for the glove.

Results: Our electromagnetic glove works and can pick up various screws, bolts, and metal nuts. You can also easily replace the batteries, which means you can use this design multiple times without building a new glove. Also as a result of our continuous experiments theoretically speaking if we add more batteries the glove will get stronger as a result of a higher voltage.

Conclusion: The conclusion to our project is that we can pick up various metal items under a certain weight like screws,nails and bolts.This means that our problem could be solved with our solution based on our results and data.

Project # **J1023** Category: **Engineering Applications - Jr**

Student: **Vienna Carlin** Grade: **7** G: **F**

School: **Montebello Intermediate School**

Title: **The Handy Hand**

THE HANDY HAND

OBJECTIVE:

I decided to design a robotic hand that picks up trash on its own with just a bit of your help. Research has shown that you can get diseases or viruses when picking up trash. This is due to the number of bacteria, insects, and vermin in the trash, they escalate the risk of you getting another well-known disease known as salmonella. Covid cases have risen rapidly, with 27,076 new cases, 58 deaths, and 328 in the hospital. Statistics show that 1 million people have died from covid-19. The average hand has about 3,200 different germs belonging to 150 different species which can be very harmful and cause infection. Imagine touching your face, your mouth, or touching your eyes all of that is now on your face and in your mouth.

MATERIALS AND METHODS:

The design involved 2 prototypes due to the measurements on the first one being incorrect. Items such as hot glue sticks, cardboard, and cable ties had to be purchased multiple times due to the material and amount. I took data for 5 days.

RESULTS

My hand was able to hold a crayon box and a banana, it can also hold a vacuum extension and a television remote.

CONCLUSION

After many attempts and failures, I found that the second prototype worked the best as the fingers moved better and faster. I also found that it can hold a crayon box, a vacuum extension, and a remote.

Project # **J1024** Category: **Engineering Applications - Jr**

Student: **Michelle Garcia** Grade: **8** G: **F**

School: **Montebello Intermediate School**

Title: **Bicycle Ice Cream**

Bicycle Ice Cream

Objective: The objective of this project is to find a new way to make ice cream in a productive way. The expectation of this was to ride the bike causing the jar in the front of the bike to spin and cause the ingredients for the ice cream to become a solid making ice cream.It was also to find a way to solve child obesity, so that if those kids want a tasty treat they have to work for it.

Materials and Method: The plan was to get a bike and set up the jar on top of the wheel so that when you ride it, the jar can spin. Once the bike is set up the way it is meant to be you ride it for approximately 15 minutes. At the end of the ride, the result of the ingredients in the jar should have made ice cream.

Results: The apparatus did in fact work. The only problem about this project was that I did not have the proper ingredients to create the ice cream. I tried doing it with the ingredients I did have but it still proved to not work.

Conclusion: In conclusion, my deisgn did work, but the ice cream was not a sucssess because of the lack of things I needed to create it.

Project # **J1025** Category: **Engineering Applications - Jr**

Student: **Charles Wittnebel** Grade: **6** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **Better Living Through DIY Air Filtration**

Abstract

Particulates have adverse effects on human health. 2.5 micron particulate matter (PM 2.5) can worsen asthma and lead to heart disease and death. Children are more susceptible to side effects from these particulates due to smaller lung and airway sizes. Air filtration is effective at removing PM 2.5 from indoor spaces and there is a need for affordable filters people can use at home, work and school environments to promote health. In this experiment, I constructed and tested three different filter and fan combinations to see which Do-It-Yourself (DIY) air filter has the best Clean Air Delivery Rate (CADR).

Testing involved using filters to remove smoke from an airtight tent. I used a home particulate monitor to measure particulates every 30 (s) until particulate counts were low. The results were graphed and curves were fitted to find the Air Change Per Hour for each filter. These were converted to CADR. Multiple runs were performed for each filter. Results were averaged to identify the filter with the best CADR.

I expected my cylindrical filter to be the best but the PC fan had the best CADR so it beat both the Corsi Rosenthal Box and the Cylindrical filter. This is important because previous research has shown that the Corsi Rosenthal Box is effective and one of if not the best DIY filter to build and utilize. My results show that the PC filter is a better choice.

Project # **J1026** Category: **Engineering Applications - Jr**

Student: **Bilal Mala** Grade: **6** G: **M**

School: **Islamic Center of Claremont School (ICCS)**

Title: **If More Light is Concentrated on a Solar Light Will it Produce More Electricity and Allow Items to Charge Faster?**

The purpose of my experiment is to see if the solar charger can give energy and charge items faster. Also if someone doesn't have a charger, then a solar panel could be important. My hypothesis is that if more light is concentrated on a solar light, the device will charge faster because the wires you put in the solar charger get energy and put it in the device by going in the charger. First thing I did was I got a small piece of cardboard. Second, I put some wires in it. Third, I put the wires and put the solar panel on top of it. Finally one wire was connected to the charger so I can put the device. My hypothesis was correct. The more sun that hit the solar panel, it gave more energy, charging the device faster.

Project # **J1027** Category: **Engineering Applications - Jr**

Student: **Colin Sweeney** Grade: **8** G: **M**

School: **Sierra Madre Middle School**

Title: **What mask best blocks a sneeze?**

The purpose of this experiment was to try to find the answer to the question “Which mask best blocks a sneeze?” The researchers Hypothesis was that the N95 mask would perform the best

The procedure was as follows, gather the mask and place it above the kleenex. The researcher collected the Kleenex after waiting 30 seconds and took a picture of the result under a strong light. After this, he measured the area of the leakage on the website https://sketchandcalc.com. The researcher repeated this process for all 5 masks, and for 2 types of sprays, which gave him the data he needed.

The researcher found that all of the masks blocked the water spray, except for the cloth one. The cloth mask leaked 288.42 cm² of the spray over the course of 30 seconds. The second spray, the vegetable oil spray resulted in another outcome though. The KN95 mask and N95 mask held strong, leaking nothing. On the other hand, the medical mask leaked 29.51 cm² of vegetable oil, the cloth mask leaked 52.22 cm² of vegetable oil and the white mask leaked 22.37 cm². In the end, The researcher’s hypothesis was correct. His data supported it, and the experiment generally went smoothly!

Project # **J1028** Category: **Engineering Applications - Jr**

Student: **Danielle Tsao** Grade: **8** G: **F**

School: **The Science Academy STEM Magnet**

Title: **How much more power can a solar panel capture from the sun by using an active tracking system?**

The purpose of this experiment is to create an active solar panel system that captures more energy than an earlier passive design. This helps society by reducing the need for fossil fuels and reducing global warming. The question is whether a tracking solar panel can increase the electrical conversion efficiency as well as use otherwise wasted thermal energy to further heat up the water. The hypothesis is if a solar panel with heatsinks rotates in a manner continually perpendicular to the sun's rays, then it would produce more electricity and the thermal energy transferred will heat the water up more than the static solar panel with heat sinks.
Independent variable: the different types of solar panels.
Dependent variables: the amount of electrical power and heat produced.
Tested variants: a rotating solar panel with heat sinks and a water tank, a static solar panel with heatsinks and a water tank, a static solar panel without heatsinks, and an exposed water tank.
Controls are the solar panel without heatsinks and the exposed water tanks.
The power is measured by a multimeter and the temperature of the water is measured by a thermometer. An Arduino is used to collect data. The productivity of the solar panel increased by 70% and the water temperature increased by 10% compared to the controls. The hypothesis which appeared to be supported is: An active solar tracking solar panel with heatsinks captures more solar power than a static one with heatsinks.

Project # **J1029** Category: **Engineering Applications - Jr**

Student: **Travis Bader** Grade: **8** G: **M**

School: **Miraleste Intermediate School**

Title: **Using Modularity to Make Everyday Items More Efficient**

A modular system can help reduce waste and improve the useability of objects such as desk organizers. The goal is to make a customizable modular system and see if it is better than traditional organizers. Then if able we would like to implement the system into other activities such as board games and make it able to build in the third dimension.

We designed a module that was similar to a puzzle piece and made connectors to connect them together. Then we made new modules using the initial module and remodeled it to fit specific needs. We used a 3D printer to create the modules.

The system helped customize to certain needs giving people what they needed. It can also help reduce waste from how products are nowadays where people just throw away the old one and buy a new one. We created new modules such as pencil holders.

The results showed that the system helped people customize to their needs. On this small scale, it did not show much reduction of waste. If we continued and made it on a larger scale we might be able to reuse plastic and recycle old modules.

Project # **J1030** Category: **Engineering Applications - Jr**

Student: **David Melkonyan** Grade: **6** G: **M**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **Point of a Parabola**

Have you ever had poor Wi-Fi reception on your phone, laptop, or tablet? Have you ever tried to do something about this problem to resolve it?

In this experiment, you will learn how to build a parabolic reflector with your router to boost your internet connection.

Project # **J1031** Category: **Engineering Applications - Jr**

Student: **Kayla Arvizu** Grade: **7** G: **F**

School: **The Science Academy STEM Magnet**

Title: **Water On The Go: Creating an Emergency Water Filter**

In this engineering project, a dependable water filter is attempted to be made. Its purpose is to purify water in case no purified water is available and it is urgently needed. This is important because if drinkable water is ever out of reach, this is a useful device for a period of time, or until safe water is nearby. This engineering project was made to test if a water filter could be made using simple items that could easily be acquired. The layers in each test of the filter are kept the same. The TDS meter is the tool used to measure the change in dirtiness of the water before and after it is put through the filter. A TDS meter measures how many particles are in the solution, so it will be used to measure the change before and after it is filtered. Overall the water filter worked, but it was preferably not drinkable because it was still partially dirty and we were unable to measure the smaller particles and bacteria still in it.

Project # **J1032** Category: **Engineering Applications - Jr**

Student: **Leila Boles** Grade: **8** G: **F**

School: **Incarnation Parish School**

Title: **Amazing Origami: Fold into Function**

Amazing Origami: Fold Into Function. The purpose of this project is to explore how the ancient art of origami is being used in advanced technology in the fields of science, medicine and engineering. I want to see how techniques based on the folds of origami are used to solve limited space problems in our world today. I am also testing how much weight the herringbone tessellation models I made can withstand. My hypothesis is that smaller folds will hold the most weight, since more folds will strengthen the paper. I created six herringbone tessellations: three with large folds, and three with small folds - each size made from copy paper, cardstock, and foil poster board. I built frames out of foam core to support the models. I weighed each book before placing it, and added up the weights at the point where the paper buckled and when it collapsed. I recorded the data - weight held for each type of paper and tessellation size - and compared them in graphs. The small foil poster board did the best out of the six models. The small tessellation held 38 lbs 4 oz, and the large held 21 lbs 5.7 oz. The final graph shows the percentage increase in ability to hold weight for each type of paper. My conclusion is: the small herringbone tessellations did better than the large, because they not only have a larger amount of surface area, but also were reinforced because of the number of folds in the paper.

Project # **J1033** Category: **Engineering Applications - Jr**

Student: **Nathan Barrera** Grade: **6** G: **M**

School: **Magnolia Science Academy 6**

Title: **The Obstacle Dodger**

My objective is to see which brand box is easier for the rover to detect obstacles. To build the rover, I used a blue plastic rover chassis, 4 AA batteries, breadboard jumper wires, a power switch, 1 H-bridge motor driver, 4 10k resistors, 2 lever switches, double-sided foam tape, and 2 popsicle sticks. First I put the bottom rover chassis together with the wheels and motor drivers and connected the motor driver to the bottom chassis with screws. I used box A (18cm x 14cm), box B (17cm x 12cm) and a box C (36cm x 25cm) to see which box is easier for the rover to dodge. I made an obstacle course for each type of box. I placed 14 boxes for each trial. When the rover detected the box it either turned to the left or to the right. My data indicated that box B was the easiest to dodge. I think it was because box B was 40% larger than box A and box C. Box B was also denser than the other boxes. I hypothesized that box A would be the easiest for the rover to dodge. My results did not support my hypothesis because box B was easier for the rover to detect and dodge. Box C also was too small and too light, which caused the rover to run through box C. If I were able to do this project again I would use something other than boxes such as humans, furniture, and plants.

Project # **J1034** Category: **Engineering Applications - Jr**

Student: **Donovan fuentes** Grade: **8** G: **M**

School: **Montebello Intermediate School**

Title: **Solar panel car**

Solar Panel Car

Objectives: This solar panel car is to lower down the pollution in the air and to lower down the usage of electricity. The solar panel car can help in many ways like not needing to put in gas in your car or not needing electricity.The car will mostly work in the summer, but with the looks of things the car will work.

Material and methods: my plan is to buy the parts off amizon because where eals would they some from right next I have to connect the panel with the wires and to connect to the batteries. Im going to get popsicle sticks and hot glue it to form a type of box to but in the batteries to keep it in one place. Then get make a car shape out of cardboard and put everything inside it, Im also going to glue the panel on top of car.

Results: In the end the panel with charred and the car will be able to move without a remote controller. Now that theres no up coming son im going to use a heater to power the car.

Conclusion: The conclusion is that a solar panel can change the world in a little amount of time.
Without needing to pollute the world with the air all of us breath we could and will save the air that we need to breath.

Project # **J1035** Category: **Engineering Applications - Jr**

Student: **Emma Melgoza** Grade: **8** G: **F**

School: **Montebello Intermediate School**

Title: **Fiddler Prevention Team**

Objective: Fiddler's neck is a condition found in mostly those who play the viola and violin. One of its causes is due to constant harsh friction and rubbing against the neck of the player. The plastic button constantly rubbing against the neck can be very uncomfortable. This paper aims to prevent this for all violinists by creating something to provide comfort.

Methods and Materials: This engineering experiment will use fabric and foam against the instrument to prevent the constant friction while also allowing the player to play easily. This project will test out different methods of creating the final product. Till the end result is something desirable in the eyes of violinists. Materials of the experiment may vary depending on what works best. The product will need the following materials to start, soft fabric, thread, foam, needle, and an adhesive. Measuring tape will also be used to measure the length of viola in use.

Results and Conclusions: The final product was able to fit the designs purpose. It wrapped around the end of the viola perfectly. It was sewn with a band to wrap along the side of the instrument. Foam didn't work very well, it was very messy and just made playing the viola feel strange. In conclusion the final product did what it was designed to do, but it didn't completely accomplish the goal. It is believed that the friction against the neck would be less harsh, but not completely eliminating risk of fiddler's neck.

Project # **J1036** Category: **Engineering Applications - Jr**

Student: **Meryem Bellabouah** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **The Pi Plant**

During this project, the conductor wanted to know how to make a device that will talk to you for water. So the conductor started on the journey of science, of many new things to learn. She had wanted just to code a box, but that was more than was expected, it taught her a new language. She had started off with making a box, and learning a new programming language. She had also found out how to use a Raspberry Pi. She used many things, Raspberry Pi, Jumper wires, Micro-SD cards, power drills, and a Windows computer. She found out that Python was a pretty easy and fun way to learn computer programming. She finally found out that coding can make things that are not really what others might expect.

Project # **J1037** Category: **Engineering Applications - Jr**

Student: **Ma'Kyla Whitaker** Grade: **8** G: **F**

School: **Los Angeles Academy Middle School**

Title: **Solar-powered Kart**

Objective or Goal: Our goal is to convert our electric-powered razor go-kart to run on solar power. We want to test if the go-kart runs longer on solar power than on electricity. Our wider-reaching goal is also to improve the environment's carbon emission levels when charging with electricity.

Materials and Methods: We collected necessary materials for the build-- a go kart, a solar controller, new tires, PVC pipes, wiring and tools (wire strippers, screw drivers, allen wrenches, zip ties, power screw driver, saw, electrical tape, socket wrench, eye protection, drill, Anderson cable, MC4 connector, soldering kit and wire crimper). Then we researched and took notes about how to connect the solar panel to the battery. Next, we built the PVC pipe frame, wired the panel to the battery, and conducted tests to see how long the kart will run on solar power versus battery power.

Results: We did three trials where we tested the battery on full electrical charge versus the solar panel. The solar panel did not last as long as the electrical charger.

Conclusion: After reviewing our results, we think we can make the solar panel charge last longer by adding another solar panel or experimenting with other wiring techniques-- parallel wiring or circuit wiring.

Project # **J1038** Category: **Engineering Applications - Jr**

Student: **Nathan Loza** Grade: **7** G: **M**

School: **Montebello Intermediate School**

Title: **Hydro-Power!**

The sole purpose and objective of my project is to build a scale model of what the potentials are for Eco-Friendly living. Statistics show that carbon emission's produced as a byproduct of electricity generation via coal, make up 59 percent of yearly carbon dioxide emissions in the U.S. which is a whopping 908 million metric tons! a decrease in carbon emissions via hydroelectric generators could help preserve the earth. My project will demonstrate a small hydroelectric water wheel powering mini homes with lights inside. My materials consist of a small motor attached to a 3d printed fan blade, wire that runs to a 2-prong electric connector, one small led, 1 pressure-powered hydroelectric generator, 4 small houses, a drill, and a wood board. A 2-liter bottle, water, Led string lights, tubing, and a nozzle. the water will first be put into the 2-liter bottle and passed through the tube through the fan generator and power the homes it will then pass through the tube into another 2-liter water bottle, it can be passed through the other side and it can go on forever

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Project # **J1039** Category: **Engineering Applications - Jr**

Student: **Kenneth Diaz** Grade: **8** G: **M**

School: **Magnolia Science Academy 6**

Title: **The Rotor Rivalry**

The objective of this project is to compare the speed of a 3D-printed boat using my rotor design (true model) and the standard rotor design (progressive model) that came with the boat's 3D blueprint. A boat’s rotor has three main components: pitch, rake, and diameter. The boat operates using a spring, which turns two large horizontal gears when it is coiled and released. This turns into a smaller vertical gear that is attached to the boat’s rotor. The rotor was designed in Tinkercad and 3D printed using PLA filaments. I sanded all parts to assemble them. I tested the boat in a tub filled with water to see how it would propel a 3D-printed boat forward. I turned the spring for one full rotation and released it to measure the distance and time it traveled through 20 trials for each rotor. I calculated the speed using s= d/t. The progressive model averaged a speed of 1.11 m/s. The true rotor model had an average speed of 1.03 m/s. The highest average speed for the true rotor model was 1.77 m/s. The highest average speed for the progressive rotor model was 1.30 m/s. I hypothesized that the true rotor model would make a 3D-printed boat travel with the greatest average speed. My results indicated that my hypothesis was incorrect. Next time, I would like to see how different gears and coils would affect the direction and the distance that the boat traveled.

Project # **J1040** Category: **Engineering Applications - Jr**

Student: **Sai Tej Chikati** Grade: **6** G: **M**

School: **Oak Hills Elementary**

Title: **The Robotic Helping Hand**

The purpose of this project was to find a solution for the difficulties experienced by elderly and physically handicapped individuals, as well as provide extra strength for military personnel. The proposed solution was a robotic arm that could mimic the user's hand movements with increased power, allowing them to carry out tasks they previously couldn't.
The arm was constructed using the Lego SPIKE Prime kits, software, and programmed with a Python IDE. Three prototypes were created, each with its unique design and features, using LEGO Technic elements from the kits. The prototypes were tested for accuracy, speed, and strength to determine the best solution. The accuracy test evaluated the arm's precision in performing tasks, the speed test measured its ability to pick and place objects quickly, and the strength test assessed its endurance in intensive tasks. A Gyro program (made by me) was also used to determine user comfort as the arm was designed to replicate some of the user's hand movements due to limitations in ports and motor wire length.
Based on the results of the prototype testing, it is concluded that the full-size robotic arm (prototype #3) will address the challenges faced by elderly and physically handicapped individuals, as well as military personnel. The proposed solution (robotic arm) will effectively replicate the user's hand movements with added power, allowing them to perform tasks they previously couldn't. The deployment of the arm in real-life scenarios is expected to greatly improve the quality of life for those it serves.

Project # **J1041** Category: **Engineering Applications - Jr**

Student: **George Petrosian** Grade: **8** G: **M**

School: **St. Gregory A. & M. Hovsepian School**

Title: **Killer swimsuit**

Have you seen anyone who cannot swim because of a disability? The Killer Swimsuit is a fashionable, economical, and effective suit designed to improve swimming speed and effectiveness. The project's aim is to develop a swimming technique that is more effective. The suit facilitates breathing while submerged, moves independently, and generates oxygen for breathing. I first designed a suit that imitates an orca's movements during a sea breach. The suit can also assist those with disabilities in swimming. The supplies I utilized were Neoprene, wire, motors, and electrical tape were all used. As a result, it was able to master the way an orca glides and swims, including how its tail functions. The machines are operated by being wired to my program's movement-causing code. Finally, the entire suit is waterproof, preventing the wires from getting wet and allowing them to move independently. The water is then directed into a solar-powered device that uses a chemical reaction to turn water into oxygen. If humans use my project, it will have a positive impact on those with disabilities. I had made a prototype made of cardboard to test it and then made a living one and tested that one too and seen if it could swim underwater by itself. After creating my machine, I may improve it by acquiring better materials. Also, my next prototype will be improved by being easier to use, stronger, more resistant, and more aesthetically pleasing. The result was that it could swim by itself and get air.

Project # **J1042** Category: **Engineering Applications - Jr**

Student: **Liam OBrient** Grade: **6** G: **M**

School: **Turning Point School**

Title: **A shocking solution to the drought: a foolproof timer circuit for greywater systems**

The objective of this project is to create a timer circuit for greywater systems that always resets the valves back to the sewer after use. This circuit would let users conserve water but prevent them from dumping dangerous cleaning chemicals into the garden. I built my circuit around three sequential 555 timers: the first and the last activate relays which allow AC power to turn the valve each way while the middle waits for a shower or laundry cycle. I built these with solderless breadboards working from simple textbook examples to increasingly complex circuits. I tested several aspects of my final circuit using a multimeter, a variable power supply, a stopwatch, and video recordings. I found that the 555's provided high enough output voltage to trigger the relays and that the timers were not affected by the exact value of capacitors between them, as hypothesized. However, I found that the timers only obeyed the 1.1*R*C formula for times less than 20 seconds, but were longer and less repeatable than expected for timers that ran for minutes to 1 hour for the middle stage. This is likely caused by capacitors leaking charge. These results demonstrate that a circuit like this can work for this application but should perhaps be redesigned in the future to work with timers based on shorter times where the capacitor leakage is not as important.

Project # **J1043** Category: **Engineering Applications - Jr**

Student: **Noah Eisner** Grade: **8** G: **M**

School: **New Roads School**

Title: **Portable Self-Powered Induction Stove**

Current portable stoves are not ideal in a lot of situations. They are heavy and bulky, which makes them very hard for a single person to transport with all their other necessities taking up the space needed. Portable stoves also usually use heavy gas canisters, which are not very portable and can't be refueled in the wilderness. This is why we are creating a much more efficient type of portable stove. The Portable Self-Powered Induction Stove is a great alternative to the antiquated stoves of today. It will run on electricity, supplied by a self-contained battery inside of the stove. It will utilize the extremely efficient heating method called induction heating. Induction heating works by using an electromagnetic coil, called an induction coil, to directly heat the cookware using magnetism. This is extremely efficient because no heat is lost in the transfer of energy. Running out of electricity isn't a problem either, since this stove will have a built-in photovoltaic cell array. In addition to all of the benefits of induction heating and electrical power, the stove will also be very portable. This will make it easily available to refugees, soldiers, explorers, and anyone else who needs a stove. The materials needed to make this stove are an induction circuit, a lithium ion battery, copper wire, photovoltaic cells, 3D printed parts, geological magnets, and a physical interface with an LCD screen.

Project # **J1044** Category: **Engineering Applications - Jr**

Student: **Vinayan Tiruvellore** Grade: **8** G: **M**

School: **Rio Norte Junior High School**

Title: **Self Sufficient Garden: A Green Dream Come True**

In this project, our goal is to be able to create a self sufficient garden, powered by a soil battery and a solar panel. This is a very innovative setup that we can utilize to harness the power of the sun and the soil to water our plants in a cleaner, greener way. The average electric bill in the United States is $117.65 per month. An average California household garden uses 1,000 kWh/yr for irrigation. This project can reduce your electric bill and make your garden completely green without you having to lift a finger.

How can we achieve this? The energy sources will be used to power a pump system that will water the plants. We can collect rainwater and compost and supply them to the plants as well. Our model also shows how to direct and filter water from a home to be repurposed towards plants. The materials this project utilizes are: Soil, electrodes, wires, breadboard/circuit board, elegoo uno r3(Arduino uno), containers, low voltage water pump, valves, soil moisture sensor, multimeter, and a hose?

In the midst of rising climates and pollution, this project is a simple way for people to adopt environmentally friendly practices. Our self sustaining garden is a game changer: It brings a cost effective way to take care of the environment and cut your electricity bill in half simultaneously. By employing similar concepts and technology, there is potential for this to lead to a future that utilizes energy efficient agriculture. Here's to a greener tomorrow!

Project # **J1045** Category: **Engineering Applications - Jr**

Student: **Itzel Narez** Grade: **7** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Determining the Viability of Using Recycled Bottles to Make Trash Cans**

Our project is about testing if thin PET plastic has the same strength as thick PET plastic to see if there is a difference between them even though they are both type 1 plastic. We are determining if Pet plastic, no matter the thickness, has the same strength because if we are going to build a trash can for the public, we want it to be quality material. This way, people will not only be interested in our prototype, but it will be useful as well. We chose to do this project because we are both interested in environmental issues and because about 14 million plastic items go into the ocean every year killing sea creatures and polluting the oceans. We both care about animals and nature so we decided that we wanted to help reduce plastic waste. The objective of our project is to emphasize the idea of reusing plastic because when people look at a trash can they just see colorless, boring, uncreative bins. Therefore, we wanted to make another trash can that looked more exciting so we had the idea of making a trash can out of plastic bottles. The answer that we obtained is that the thicker PET plastic is stronger. The thin PET plastic is much weaker because when we tested out the trashcans, we found out that the most the thin Pet plastic trash can holds is 9 glass bottles and 13 plastic bottles before it starts to crumble. While the trash can made out of thicker PET plastic survived all the tests and stayed together. So the trash can made out of thicker PET plastic can hold 10 glass bottles and 18 plastic bottles and more. Our science fair project did meet our objective because it looks visually interesting and uses plastic bottles which helps the environment. So when people look at our prototype they will look at the water bottles and be more inspired to throw their plastic waste there.

Project # **J1046** Category: **Engineering Applications - Jr**

Student: **Natalie Conde Osorio** Grade: **6** G: **F**

School: **Magnolia Science Academy 6**

Title: **Cue the Signal**

This project was designed to compare radio signals on two different radios. I tested a homemade crystal radio and store bought radio. The crystal radio was made with one cardboard roll, and wires that connected to circuits. To test both signals, I went into my front yard near a metal fence in order to catch a radio signal. I started with the crystal radio, I tested how long the signal lasted in the unit of seconds. Then, I tested the regular radio. I waited for the radio to catch a signal once I received a signal, I timed how long each signal lasted. I wrote down my data for both radios, and compared data to determine which one held the signal the longest. I repeated my trials twice and compared the data. Finally, I checked for any possible mistakes to confirm everything was in proper working order. Once I finished collecting my data, I started moving the location of the crystal radio to see if any other locations had better signals. I found that some areas had very good signals, bad signals, and some in between. Once I was done with the crystal radio, I followed the same steps for the regular radio. I concluded that the crystal radio was able to hold the signal longer than the regular radio. My hypothesis was that the crystal radio works the best and I was correct. Something I would improve is moving somewhere with more space where people are not passing by.

Project # **J1047** Category: **Engineering Applications - Jr**

Student: **Ruben Lavi** Grade: **6** G: **M**

School: **St. Gregory A. & M. Hovsepian School**

Title: **Railroad Trash Vacuum**

This project is about a train that will clean trash around its surroundings. According to a New York Times article that was published in 2022, trash on the railroad is a problem on the Union Pacific tracks in the Lincoln Heights area of Los Angeles. Forty percent of seaborne imports to the U.S. are shipped to Los Angeles or Long Beach. From there, they are put on a train. The train takes the imports to different places and stops on the Union Pacific tracks to change routes. During the stops, thefts occur, and lots of trash is left behind. The problem is so severe that Union Pacific has hired workers to clean the wreckage. A train that picks up trash would be useful during this time. By completing this project we will contribute to clean and healthy air, soil and water in that area. The materials this project includes are wood, brush, and vacuum. The brush traps the trash, and the vacuum sucks it up. The railroad leads to a landfill where the trash is dropped off. Our method is going to be trying out with different materials to see if it works. We would use plastic, metal, and glass. From testing, we have seen that metal works, but we have not tried other materials. Before doing this project, I wasn't sure if it would work, but after doing it multiple times, we know that it works for metal. Further testing will be needed to see if other materials work.

Project # **J1048** Category: **Engineering Applications - Jr**

Student: **Samuel Menashe** Grade: **7** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **Discover The Hover**

The purpose of this project was to create a prototype of a Maglev train, which is a magnetically levitating train, because they are faster, safer, and more environmentally friendly than rail trains. Creating a prototype increases awareness of magnetically levitating trains and helps people understand how they work. A guideway (track) was built from plywood. Neodymium magnets were placed on the bottom of the train to cause levitation and were used to line the bottom and sides of the track to propel the train. Homemade electromagnets were placed on the top of the train to interact with magnets on the track to enable propulsion. The model did levitate, but it did not propel forward. If this project is replicated, one should consider using different types of magnets and different strengths or types of electric currents. Even though this model did not fully function, by improving prototypes and increasing awareness, this technology might be applied in factories, airports, and other industries to reduce their carbon footprint.

Project # **J1049** Category: **Engineering Applications - Jr**

Student: **Severine Welsh** Grade: **7** G: **F**

School: **Portola Highly Gifted Magnet**

Title: **When the Nose Doesn't Know**

A new study was conducted to explore options for an enhanced olfactory training kit for people suffering from post-infectious olfactory dysfunctions (PIODs) due to the COVID-19 virus. This is an urgent issue because although scientists are currently working on surgical and pharmacological solutions, there isn't a quick fix yet, and options for olfactory training kits are limited and not as culturally inclusive as they could be. In 2009 Professor Thomas Hummel proposed four distinct scents for smell training (rose, eucalyptus, clove, and lemon); the vast majority of smell training kits on the market contain only these. I hypothesized that younger people would like and recognize my scents more than Hummels', and I was partially correct; eucalyptus and clove weren't popularly liked and recognized enough to keep in the kit, but rose and lemon were. In my study, nine other scents (cheese pizza, burnt wood, dill, garlic, ginger, ketchup, cinnamon, vanilla, and mint) were tested alongside Hummel's "control" scents on twenty healthy, young noses. Scents were tested for recognition (if participants could tell what the smell was), and likability (if the participants liked the smell or not). Results showed that three of the scents I proposed had the most positive or correct responses of all scents tested. An olfactory training kit representative of my data should include Hummel's rose and lemon along with the additions of cinnamon, vanilla, and mint. Ultimately, this study suggests a wider spread of possibilities for smell training in the future.

Project # **J1050** Category: **Engineering Applications - Jr**

Student: **Maliyah Bass** Grade: **8** G: **F**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **Dealing with Diabetes: The Process Of Developing an Artificial Pancreas**

Consider how exhausting it would be to stick your finger and use a formula to determine whether you need medicine and, if so, how much medicine you require after each meal? An artificial pancreas, or insulin pump that coordinates with a continuous glucose monitor, can automate some of the maintenance and monitoring of blood glucose. The hypothesis for this project is that this artificial pancreas model represents a real artificial pancreas by turning off or off in response to the conductivity which shows how insulin pumps and CGM'S work and respond to blood glucose levels.This procedure requires you to build a fine tuned circuit that quickly and safely adjusts "blood sugar" to the right levels using two different liquids (tap water and distilled water instead of insulin and blood).The experimental results supported my hypothesis by showing me that the artificial pancreas built does mimic a real pancreas and how it works in the human body. The data was analyzed and the conclusion was drawn that the circuit built models an artificial pancreas by turning insulin delivery on and off in response to blood glucose levels getting too high or too low.

Project # **J1051** Category: **Engineering Applications - Jr**

Student: **Nathaniel Carnow** Grade: **8** G: **M**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **Hand Washing Timer**

During these past two years, people have prioritized washing your hands for 20 seconds as a safe practice. It can be hard to track 20 seconds accurately. The CDC recommends that people wash their hands for 20 seconds but many people don't wash their hands for 20 seconds and wash them for less time leaving germs on your hands. My goal was to build a functioning hands washing timer that helps people wash their hands for 20 seconds. I started researching what I need to build something like this. I needed an Arduino board, breadboard, light bulbs, resisters, and jumper wires. To make the lights light up I would need to send power to the breadboard, get a resistor to change the voltage, the light, then to get the power back to the Arduino and do that three more times. My results were better than I expected, I used less than needed jumper cables because I figured out there is a side on the breadboard that can take the electricity out of the bread board. I lit up in the pattern that I wanted it to and the hand washing light stayed on for 20 seconds. People can now wash their hands for 20 seconds without worrying if they washed their hands for 20 seconds.

Project # **J1052** Category: **Engineering Applications - Jr**

Student: **Teagan Carroll** Grade: **8** G: **F**

School: **Holy Angels School**

Title: **Can You Hear Me Now**

For my project, I wanted to create a better ear cleaner. After researching, I found multiple sources that told about how Q-tips only push earwax in and only get a little bit out. Another ear cleaner I found was a curette, which is a tool with a little loop at the end, sort of the shape of a pimple popper. The downside to using a curette was that they might cause pain and discomfort and damage the ear canal. My first design was a combination of the Q-tip and curette, making the curette end not sharp and the Q-tip end to collect wax on the outer part of your ear. I made this using “Model Magic” clay by Crayola. This clay turned out to be too soft and breakable. I created the design again with standard air dry clay by Crayola. This design was too thin and kept breaking, especially the ends since they are heavier than the body. To fix this problem, I decided to make my clay thicker and keep the end the same width as the body. I used a knife to cut into the clay, creating a crease for wax to collect. To test my design, I used a model ear and Vaseline in the canal to model wax. I used my design as I would a Q-tip, inserting it into the ear and using it to collect the wax. The “wax” became trapped in the crease and came out successfully.

Project # **J1101** Category: **Engineering Research - Jr**

Student: **Anita Tierney** Grade: **8** G: **F**

School: **Saint Monica Academy**

Title: **Hydraulics: Air vs. Water**

A hydraulic system is said to be able to lift 100 times as much weight as a pneumatic system can. Hydraulics are supposedly able to give more than 10 times the power of an electric motor. But are hydraulics really that strong? This project will test how much weight a simple hydraulic system can lift compared to a pneumatic system. Our hypothesis is that the hydraulic system will be able to lift 2 lbs. and the pneumatic system will be able to lift .5 lbs. After building and testing a simple hydraulic lift, we found that the hydraulics system could only carry 1.5 lbs., and the pneumatics system could not lift anything at all.

Project # **J1102** Category: **Engineering Research - Jr**

Student: **Nolan Vuong** Grade: **8** G: **M**

School: **Palos Verdes Intermediate School**

Title: **Building Better Bridges.**

Around the world people use bridges to get around. While in some places bridges are beautiful attractions, their main purpose is to provide transportation through the air. The end goal of our project was to see what type of bridge between truss, arch, and beam would be the best and cheapest design.

To test which design was best we built the 3 types of bridges. We used wood painter sticks for the thicker parts of the bridge and popsicle sticks for the supporting parts like the arch or truss. On most parts of the bridge we glued multiple popsicle sticks or paint sticks together using hot glue. All of the bridges would follow a similar paint stick bottom, and popsicle sticks supported for continuity. To hold up the bridge's scrap pieces a wood pole was used. Finally we tested the bridges for stress and warping under weight.

After doing our tests we concluded that the truss bridge was the most efficient and strongest design. Due to the truss design the weight could be better evenly distributed throughout the bridge. Along with truss doing the best, it is also more efficient than an arch bridge, which was second best.

While we already knew that the truss bridge was strong beforehand, This test helped us understand that even through the overall cost of design, the truss bridge was the best choice for a bridge design.

Project # **J1103** Category: **Engineering Research - Jr**

Student: **Benjamin Ramirez** Grade: **6** G: **M**

School: **Pomona Unified School District Junior Division**

Title: **Fantastic Cars**

My project is about fan-powered cars, and if a big fan is faster than a smaller fan. I will show my data and which fan is faster. One small fan is slower because It produces less air. I will also explain how the fan is made and how wind produces electricity. After I will show them how the cars work. The cars will be shown on the board and so will all my information.

Project # **J1104** Category: **Engineering Research - Jr**

Student: **Vivien Shang** Grade: **7** G: **F**

School: **Mirman School**

Title: **A device to eliminate D. citri**

The goal of this project is to create an affordable device to eliminate D. citri. Once D. citri has affected the plant, there is no way to remove the disease itself, but the plant should be removed before it spreads. Although if the cause was eliminated first, which in this case is the D. citri bugs, the problem is solved. The procedure for making this was that it was a basic mosquito trap, but modified so that instead of mosquitos the device attracts D. citri. The structure was made on tinkercad, and then printed on a 3D printer. Next, pieces were scavenged from a mosquito racket to be reorganized and placed on the top of the machine. Equal parts sugar solution consisting of sugar and water was made and placed in a compartment inside the 3D printed machine. The data collected indicated that in most cases flies or ants were attracted however most of the trees were kept in sufficient health. Dying trees showed signs of HLB. In conclusion, there are two benefits of this trap: to benefit the scientific community by informing the ramifications of D. citri and its attraction to these lights with a modified mosquito trap, it makes it easier to stop the disease of HLB. The second benefit of this is that the D. citri bugs will be eliminated and not cause any more problems and possibly spread another disease.

Project # **J1105** Category: **Engineering Research - Jr**

Student: **Andreas Eitel** Grade: **6** G: **M**

School: **Oak Hills Elementary**

Title: **Retrofitting Existing Bridges to Enhance their Earthquake Resistance**

The purpose of this project is to retrofit existing bridges against earthquake damage. Currently, government engineers primarily focus on column and bridge section reinforcement. The proposed solution - adding a thin flexible layer of concrete with strategically arranged cables to cover the roads of bridges. Flexible and sturdy cable arrangement with twists would allow bridges to expand and contract through simulated earthquakes. Instead of bridge columns, use earthquake simulators made of cardboard, rubber bands, and golf balls. Design bridge prototypes by using cardboard molds, 24 gauge galvanized steel wires, scissors to cut wires, and a water and flour mix to simulate concrete. The cable arrangements for bridge prototypes: Bridge #1 – purchased fencing mesh; Bridge #2 – straight wires; Bridge # 3 –wires with twists made by hands.
Test bridges simultaneously by attaching them to the earthquake simulators and recording the data with the Vibration Meter Google App. In total, conduct 5 series of earthquakes of different length and intensity stopping each time as noticeable damage occurred. Bridge #1 lacked flexibility; thus, it broke off the columns. Bridge #2 had large cracks and lost chunks of concrete. Bridge #3 was sturdy and flexible; the twists of the cables stretched and slightly recoiled into the original form.
In conclusion, the use of this newly-designed overlay material (cement with strategically intertwined cables) to pave bridge prototypes added flexibility and led to the ability to withstand up to a 6.9 magnitude earthquake. This work could lead to improvements in current techniques for retrofitting existing bridges.

Project # **J1106** Category: **Engineering Research - Jr**

Student: **David Diaz** Grade: **7** G: **M**

School: **Mark Twain Middle School**

Title: **What Effects Do Different Liquids Have On A Hydraulic Press?**

In this experiment, I am trying to solve what type of liquid would best crush an aluminum can on a hydraulic press between water and mineral oil measured by weight/pounds. In order to do this experiment I will build a homemade hydraulic press using the following materials: Wood, syringes, glue, tubes, and paint. I will start with the first liquid, water, and 20 pounds. Each time the can doesn't crush I will increase it by 20 pounds. Then, I will complete the steps with the second liquid, mineral oil. The results were not what I expected. When I put 20 pounds on the press both liquids weren't able to crush the can. For 40 pounds, both liquids couldn't crush the can. For 60 pounds, water was able to crush the can but the mineral oil wouldn't crush the can. I had to add 20 more pounds for the mineral oil to crush the can. In conclusion, the water was able to crush the can at 60 pounds while mineral oil crushed the can at 80 pounds. My hypothesis was incorrect because I thought mineral oil was going to crush the can rather than water. Instead of mineral oil crushing the can faster my data shows that water did not only need the least amount of pounds to crush the can but also was not slow like the mineral oil. The mineral oil was slower to push down. For this reason, it took more weight to crush the can.

Project # **J1107** Category: **Engineering Research - Jr**

Student: **Julietta Hutt** Grade: **8** G: **F**

School: **Sierra Madre Middle School**

Title: **What Effect Does Speaker Enclosure Size Have on Bass Frequency Response?**

The purpose of this experiment was to find the optimal enclosure size for a woofer driver. My experimental question was "What effect does speaker enclosure size have on bass frequency response?"
To test this, I built a 7" x 8 ½" x 25" speaker enclosure out of medium-density fiberboard with a slidable back panel, which allowed me to change the enclosure's internal volume. With an OmniMicV2 microphone and REW software, I took measurements of the speaker's bass frequency response at six enclosure volumes ranging from 0.06 ft^3 to 0.51 ft^3 by moving the position of the back panel. I took readings of the speaker's frequency response above and below the driver's Compliance Equivalent Volume (Vas), 0.34 ft^3, which is the volume of air that exerts the same force as the driver.
I took and averaged three measurements at each volume. Every measurement was consistently 1.5 - 3 decibels louder than the one before it with a smaller enclosure volume. This continued until the measurement at the driver's Vas, where the bass frequency response was very similar to its frequency response at larger enclosure volumes, showing either little or no improvement.
My hypothesis was that the driver would play louder in a larger enclosure, until the enclosure was equal to or larger than the driver's Vas. This was supported by the results: the speaker's bass frequency response improved every measurement until the Vas, after which there was very little or no improvement.

Project # **J1108** Category: **Engineering Research - Jr**

Student: **Eshal Janjua** Grade: **6** G: **F**

School: **Institute of Knowledge Middle School**

Title: **The Girl Who Harnessed the Wind: Which Blade Design in a Windmill Effectively Produces the Most Electricity?**

Problem:The aim of this project was to determine the wind turbine blade shape design that generates the highest amount of electricity.
Procedure: To begin the project, I built a wind turbine from a kit and tested it for electricity production. I then built five blade shapes, ensuring they were of the same area, and tested each one using a voltmeter. I recorded three numbers for each shape, calculated their averages, and compared the results to determine which shape produced the most wind.
Results: After completing the project, I discovered that the square generated the highest voltage at 2.65 volts, indicating that it was the most efficient shape for generating electricity. Contrary to my hypothesis, the circle produced the least amount of electricity, even though I believed that giving it sides would improve its performance. The blade shape was the independent variable, while the amount of electricity produced was the dependent variable.

Project # **J1109** Category: **Engineering Research - Jr**

Student: **Braden Chou** Grade: **6** G: **M**

School: **Pomona Unified School District Junior Division**

Title: **What Materials Block Wi-Fi?**

We use WiFi for many of our electronic devices, such as smartphones and iPads, but sometimes the signal is weak and slows down the information download to these devices.
In this experiment, I attempted to determine if materials with different densities interfere with WiFi signals differently. I used eleven different materials, including air, foam, cardboard, wood, steel, concrete, glass, and ceramic.
I found that while all materials interfered with the WiFi signal, materials that are more dense interfered with the WiFi signal more than materials that are less dense.

Project # **J1110** Category: **Engineering Research - Jr**

Student: **Liv Gonzalez** Grade: **7** G: **F**

School: **Holy Angels School**

Title: **Box Oven: Tin Foil or Mirrors?**

Our hypothesis is; If the box oven works, then the tin foil oven will work better. We are using two pizza boxes, one lined with tin foil on the top and bottom. The other pizza box has a mirror on the top and navy blue paper on the bottom. We placed two s'mores in each. We researched that the marshmallow melts at 95 degrees fahrenheit and the Hershey chocolate bar melts at 75 degrees fahrenheit. For the procedure, we set a timer for 40 minutes. Every 10 minutes we checked on it and took a picture. We started the experiment at 12:40 p. m. on a Saturday, at 63° Fahrenheit, sunny, and the location of the experiment was in the city of Monrovia. After 10 minutes, the chocolate in the mirror oven was half-way melted and the marshmallows in both ovens were warm. Then, 20 min into the experiment in ovens the chocolate was completely melted and gooey, but the marshmallows were harder than the previous check in. After 30 minutes, we observed that the chocolate spread out more in the tin foil oven than the mirror oven. The marshmallows stayed the same in both. After 40 min, the chocolate spread out even more in each oven. The marshmallows also expanded more in the mirror oven. Finally, after the experiment, we saw that the s'mores in the mirror oven worked better. In conclusion our hypothesis was wrong, the mirror oven worked better than the tin foil oven.

Project # **J1111** Category: **Engineering Research - Jr**

Student: **Ashton Gil** Grade: **8** G: **M**

School: **Holy Angels School**

Title: **RC Plane**

The purpose of this project is to create and fly a DIY remote control plane. The materials needed are an electric speed controller, brushless motor, 2 servos, 1 receiver and transmitter, 3 foam boards, hot glue, 2 push rods, 2 toothpicks, 2 rubber bands, 1 lipo Battery, and tape. Our research involves using a brushless motor connected to an electric speed controller (ESC), which is directly transmitted to a receiver and connected to a lipo battery which gives power for everything. An ESC allows the propeller to spin, and controls the throttle on the controller. We connected two servos, which rotate to move the back wings. A servo is a miniscule mechanical object that rotates to make the plane move in all directions. One of the servos moves up and down while the other moves side to side. The servos are connected to a metal push rod which is connected to both back wings. The next electrical part of the plane is the front propeller connected to a brushless motor which blows air backwards to pull the plane through the air. For the body, we cut a foam rectangular body shape and a large foam wing that will help keep the balance of the plane, and create air resistance to keep it afloat. We also cut out the back wings where the bottom wing is horizontal with a horizontal flap that moves up and down. This flap is connected to the servo and moves with the servo through the push rod. There is a vertical back wing on top of the horizontal wing which has a vertical flap that rotates from side to side. In the first prototype, the main front propeller was connected to the motor backwards creating a backwards push on the plane. The air was pushing the plane down to the ground. In prototype #2, we fixed this by turning the propeller the other way around to create the forward pull we needed. Also in the first prototype, the servos were on the outside of the plane bending the rod connected to the wings and limiting movement to the back wings. We fixed the servos by putting the servos inside of the plane creating less of a bend, which allowed the wings to rotate properly and extended the range of motion. In conclusion, after trial and error the plane was able to fly and move side to side/up and down with ease. This completed our purpose of creating and flying a RC plane from scratch.
Keywords- DIY, ESC, SERVOS, BRUSHLESS MOTOR

Project # **J1112** Category: **Engineering Research - Jr**

Student: **Valentina Galvan-Lora** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **Anti-Stabber**

Abstract: This project was created because of a Rube Goldberg project, where a knife was used for one of the steps. Then curiosity pushed me to become more interested in knife accidents as the reality came to my mind of knife accidents. It led to the thought of wanting to prevent that from happening. Eventually, as I researched more I wanted to prevent one specific cause, stabbing. Since it requires certain technology it was key to use an IR proximity sensor to help with this project. In the end, while completing this project it was essential to learn how to set up sensors with relays and buzzers, with a power supply. That is how my knowledge expanded.

Project # **J1113** Category: **Engineering Research - Jr**

Student: **ISMAEL ABDULMATIN** Grade: **6** G: **M**

School: **New Horizon School**

Title: **Calculating the amount and worth of precious metals in electronic waste (e-waste)**

Electronic waste (e-waste) is the fastest growing kind of waste on the planet. Humans make over 50 million tons of e-waste each year. If e-waste continues to be generated at this same rate, it will grow to 120 million tons by 2050. (UNEP, 2019) E-waste has terrible health consequences on poor countries because rich countries send all their e-waste there and it pollutes soil and groundwater. (Lee, 2013) Because of precious metals in e-waste such as gold, silver, iron, platinum, palladium, zinc, copper, and more, e-waste can generate $62.5 billion USD each year if these metals are salvaged. (ERI, 2020) This is called urban mining. (UNEP, 2019) Urban mining is an effective way to reduce e-waste and the pollution it causes and a way to generate income. The aim of this experiment is to study how much precious metal can be salvaged from e-waste, specifically, laptops. This project will start by explaining e-waste and its impacts. Then, it will look at urban mining to reduce e-waste. Then it will consider what kinds of metals and how much of each can be found in laptops. This project will end with calculations to show how much money can be made from metals salvaged from laptops (I.e., urban mining).

Project # **J1114** Category: **Engineering Research - Jr**

Student: **Justin Baek** Grade: **8** G: **M**

School: **Palos Verdes Intermediate School**

Title: **Using Volcanoes to Generate Energy**

Climate change is a big problem today, and changing our methods of generating energy will be the hardest step in averting this problem. Fossil fuels are very potent energy sources, but their use is unsustainable and pollutes the air with greenhouse gasses. Renewable energy sources are needed to stop climate change and revert the environment to its former health. For this project, I wanted to make a system that would generate electricity from volcanoes.

For this project, I used the Onshape website, which is a 3D CAD website. Using this, I was able to create a 3-dimensional model of my prototype. My prototype was designed to be a tube that is dipped in lava so that the bottom of the tube heats up. This causes the water inside to boil, which turns into vapor and travels up the tube, turning turbines. The water then condenses and falls down the side of the tube.

I was successfully able to create a model of my prototype. Using Onshape, I was able to create a scaled-down model of my project, which was my main goal. I was also able to make a turbine to go along with my design.

This is a good start for inventing new forms of renewable energy to further help the transition into renewable energy. Areas where volcanic activity occurs could use this prototype to trap the heat and use that as an energy source.

Project # **J1115** Category: **Engineering Research - Jr**

Student: **elijah ruiz** Grade: **7** G: **M**

School: **Montebello Intermediate School**

Title: **DIY water bottle light bulb**

Abstract

Objective: The purpose for the experiment “Water Bottle Light Bulb,” is to conserve energy and help people around the world, mainly in poor areas where energy and money may be scarce, who are in need of light. There are many people living in poverty and in areas where energy is not available so the group’s idea will be able to reduce those expensive costs for people who don’t have the luxury of having power in the dark.

Materials and Methods: Water and a capful of bleach (to keep algae from forming) were added to a water bottle, sealing the top of the bottle with tape is a light bulb attached to a solar panel. The experimental bottle is taken outside where the sun is absorbed by the solar panel, which provides the energy to light the bulb and everything beneath it.

Results: The water bottle light bulb lit up in the dark after having been in the sun, it recharged everyday that the sun was out. The experiment showed that because water bends light (goes through/refraction) the light was able to shine brightly throughout, while the bleach in the water helped keep the water clean and clear.

Conclusion: In conclusion, using the sun’s energy to power the solar panel allowing the light bulb to provide free long lasting energy around the world is a very cost efficient way to supply light to those in need, as well as a great way to help the world stay green.

Project # **J1201** Category: **Environmental Management - Jr**

Student: **Arthur Kostikyan** Grade: **8** G: **M**

School: **Sierra Madre Middle School**

Title: **Do different types of water pollution affect algae growth?**

This project is about how algae can have detrimental effects on the environment and planet. When algae are grown in large amounts it can inhibit fish from finding food, thus causing them to move away or die. Algae can also block sunlight to enter through water resulting in suffocation. Algae can be very toxic for humans; it produces large amounts of C02 in the water, which can harm the environment. When consumed by smaller fish it can go up the food chain by affecting larger mammals. The C02 released in the air causes air pollution and affects the ozone layer causing climate change.

My hypothesis is based on research that shows that higher levels of carbon dioxide in the air or water can lead to the rapid growth of algae. Therefore, if carbon dioxide is crucial for photosynthesis in order for the algae to survive and feed, then carbon dioxide will have to be the greatest factor in determining the most growth.

In my experiment, I will compare which conditions allow algae to grow the most and which conditions allow them to grow the least. To test this, I would have to use certain pollutants, such as fertilizer and detergent, that are harmful byproducts present in certain bodies of water and measure their growth. I hypothesize that the pollutant with the highest amount of carbon dioxide will cause the most growth, thus causing the most bacteria and algae to grow. If carbon dioxide is crucial for photosynthesis in order for the algae to survive and feed, then carbon dioxide will have to be the greatest factor in determining the most growth.

The most polluted jar was the one filled with fertilizer. The fertilizer has large amounts of phosphates that enable algae growth with added nutrients by week 3 it was very visible how much algae had grown. Phosphates promote algae growth which is harder to get rid of, even just a little amount of phosphate will increase the growth of algae almost double. Cyanobacteria is a bacteria found in algae which gives it its greenish color. Something that I learned during my project is that phosphates create algae and cyanobacteria growth. In small amounts, cyanobacterium is a natural part of aquatic life. However, in very large amounts such as in the growth of the jar with fertilizer, it can pollute the water and leave it inhabitant.

Project # **J1202** Category: **Environmental Management - Jr**

Student: **Dean Choi** Grade: **8** G: **M**

School: **Ridgecrest Intermediate School**

Title: **Aquifire**

Around the world, wildfires have only increased in the past decade. Wildfires not only pose risk to human and animal living, but also to the water quality upon which all these beings rely. Water is treated in physical or chemical ways. Across the globe and especially in the United States, treatment plants find themselves unequipped to address the growing amounts of wildfire debris from water.

I have constructed a water filtration box which utilizes interchangeable filter paper and activated charcoal inside an enclosed piping network. The purified water would be deposited into a lower chamber, also contained inside the box. This chamber can be accessed simply through removal of the lid. In interests of design, the construction uses ABS and PVC piping inside of a watertight container. Alongside an effective filter, the project design goals were considered: storability, flexibility, scalability, and maintainability. The design strictly filters physical solids but can be modified further, either on an industrial or commercial level.

During trial tests, I had artificially replicated contaminated water through the combination of burnt vegetation and water. Inputting this contaminated water into my build resulted in a slow, but steadily successful removal of an average of 95% of solids. Taken by measuring differences of mass. Inaccuracy comes from the minimum amount of water required for function.

The goals of the project were met. After analyzing debris, I can conclude that about 95% removal of unwanted products. I am satisfied, especially in the areas of storability and flexibility. However, even with such success I find that the greatest improvements can still be made to the speed and convenience of my system.

Project # **J1203** Category: **Environmental Management - Jr**

Student: **Shivani Mohindra** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **How Does the pH Level of Water Affect the Growth of French Marigolds?**

How does the pH level of water on plants affect the height of French Marigolds? The growth was recorded of 3 plants watered with acidic water, 3 with neutral water, and 3 with basic water. Basic water was made by dissolving 1 tsp of baking soda per 1 ½ cup of water. Acidic water is made with 15 drops of lemon juice per 1 ½ cup of water. The main purpose of this project was to explore what other resources are used to water plants. This research will save water and help restore Earth with more plant life. The growth of each plant was recorded by measuring the tallest point of the flower, down to the soil, or the tallest stalk of each plant in inches. The 9 plants all got the same amount of weather in the same area. The results of this experiment were expected in the hypothesis, the neutral and acidic plants were close in growth, yet the acidic plants were slightly shorter than the neutral. The Basic plants wilted within 24 hours and did not survive the time period of 3 weeks.

Project # **J1204** Category: **Environmental Management - Jr**

Student: **Thomas Gregor** Grade: **6** G: **M**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **More Efficient Solar Panels**

Solar panels are a way to generate electricity from the sun. However, they are known to be inefficient as they only absorb 17-20% of the sun's rays. So, the goal of this experiment is to try and reflect extra sunlight back onto a solar panel to help it generate more energy. To test this, we set up a control solar panel and a solar panel surrounded by a reflective space blanket andor mirrors. Then, the energy that was produced by the solar panels was measured by plugging in iPads or a phone and measuring amps, volts, or percentage of charge on the device. While the iPad experiment was inconclusive due to differences in batteries, the use of the phone showed that the space blanket and mirrors reflect additional light from the sun and helped produce more amps from the solar panel.

Project # **J1205** Category: **Environmental Management - Jr**

Student: **Asha Parry** Grade: **7** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Arsenic in Drinking Water: Comparing Arsenic Levels in Different Socioeconomic Neighborhoods of Los Angeles**

Objectives

My objective was to see if the social economic class of a neighborhood affects the quality of its water. To do this, I gathered water samples from Brentwood, Del Rey, and Pico-Union, along with distilled water, and tested the arsenic levels.

Materials and Methods

I used tap water from Brentwood, Del Rey, Pico-Union, and distilled water. I used distilled water as the control group and tap water from Brentwood, Del Rey, and Pico-Union as the experimental groups. I collected water samples from distinct regions of Los Angeles and tested the arsenic levels in the water using Rapid Arsenic Water Quality Test Kit. I followed the provided directions for my procedure. I poured the testing water into a provided bottle, shook it in different reactants, and then put the test strip above the water, through the cap for 10 minutes. After that, I collected and communicated my data.

Results

The results were based on the average of 2 samples from each location. The high-income neighborhood (Brentwood) had the lowest amount of arsenic (averaging at 4 ppb), both Del Rey and distilled water had averages of 5 ppb, and Pico-Union had the highest amount of arsenic, averaging at 8.5 ppb.

Conclusion

In conclusion, the water from high-class neighborhoods (Brentwood) had the lowest amount of traceable arsenic. This supports my hypothesis because I hypothesized that the higher-class neighborhood would have the lowest amount of arsenic. Now I know that social economic class does affect the quality of tap water in LA

Project # **J1206** Category: **Environmental Management - Jr**

Student: **Blaise Smurda** Grade: **6** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **What is the best method of water purification?**

From the first record of the invention of the water filter in 500 BC, to when the first water treatment facility was built in 1804 AD, water purification has been essential for human life. At these facilities, water was treated using charcoal and sand as filters. This method has improved drastically over time. Now, water is treated in five steps that work effectively to purify water by removing harmful particles, germs, and hardness from water. Water can also be purified without a treatment facility. Some common methods include filtration, distillation, boiling, and chemical disinfectants.

In this experiment, these four different methods of water purification were compared to determine which is the most effective. First, dirty pond water was collected and separated into four labeled jars, leaving some to put in a flask for distillation. One sample from each jar was put through a different condition and the water in the flask was distilled. Afterwards, each sample was tested for coliform bacteria. Also, water from each sample was examined under a microscope to establish the number of impurities remaining after these purification methods were performed.

Three methods of water purification removed coliform bacteria; distilling, boiling and use of a chlorine dioxide tablet into water. Putting water through a filter failed to remove bacteria. When the samples were looked at under a microscope, it was observed that distillation removed the highest number of impurities. Overall, distillation ended up working the best of all the purification methods.

Project # **J1207** Category: **Environmental Management - Jr**

Student: **Neelima Panicker** Grade: **7** G: **F**

School: **Hale Charter Academy STEAM Magnet**

Title: **What is the best natural way to remove microplastics from water?**

Although modern technology is being used to solve the global plastic crisis, it won't solve the problem entirely, as it can be very expensive and won't remove everything altogether. Instead, people can use natural resources to remove plastic from water in a non-toxic, inexpensive, and efficient way. The hypothesis for this Science Fair Project is, "If drinking water is polluted by plastic waste and various natural methods are used to remove the plastic, then Aloe Vera gel will work 50% more efficiently at capturing microplastics quickly compared to the other natural solutions because of its ability to stick on any material due to its polysaccharide element." Research on various natural methods to remove plastic revealed that mussels can consume plastic, Aloe Vera can cling to plastic, and magnetite can remove it from water. The necessary materials were collected and the experiments were conducted on December 4th-6th at 4:45 PM. The pictures of the materials for each experiment and the steps of it with captions were taken. Two things being checked in each experiment are how much plastic was there before, how much each experiment collected, and how long it took to complete. The Magnetite experiment was successful because the magnet collected the majority of the microplastics, and only a few pieces were left in the water. It was very quick and finished in 15 minutes. The Aloe Vera Gel Experiment was unsuccessful as the gel was sticking to the spoon and caught a few pieces at first, but after 2-3 trips in the water, it started slipping off. Even switching between different Aloe Vera gels didn't help. It was very time-consuming to try catching the microplastics with Aloe Vera gel and cleaning it up. It took an hour for the whole experiment. This project was successful but moving forward, there would be a plan on how this project would be completed in six months and more emphasis on the writing pieces that are graded heavily.

Project # **J1208** Category: **Environmental Management - Jr**

Student: **Raga Hansika Kotthru** Grade: **8** G: **F**

School: **Hale Charter Academy STEAM Magnet**

Title: **What is the best way to use a Solar Powered water Desalination device?**

Every single organism on this planet needs water to survive, from plants to animals to humans. In spite of the fact that many living organisms require water to survive, 55 million people in the world experience droughts every year, and 40% of the world's population suffers from water shortages. Thus, having a way to produce fresh water is crucial, and the method could be through a solar-powered water desalination device. If a desalination device that has a black construction lined bottom is filled with 500 mL of salt water, then it will produce 2 mL more filtered water than a desalination device with a white construction lined bottom, because of the fact that darker colors like black produce more heat than lighter colors like white. Over a period of four hours, the experiment will examine two types of desalination devices, one lined with black construction paper and one lined with white construction paper. It will compare how both desalination devices produce filtered water. The experiment resulted in the desalination device lined with black construction paper producing about 2 mL more filtered water than the desalination device lined with white construction paper when filled with 500 mL of salt water. Despite the results of the experiment supporting the hypothesis, it was done in early winter, so the experiment was unable to function properly since there wasn't much heat to result in condensation, therefore as much filtered water wasn't produced. Hence the experiment should be conducted during the summer once again.

Project # **J1209** Category: **Environmental Management - Jr**

Student: **Stella Tesoriero** Grade: **8** G: **F**

School: **Saint Martin of Tours Elementary School**

Title: **Drip Irrigation Systems:Which One Works Best?**

My most important research was the website "AGRI FARMING". This website helped me determine the best three drip irrigation systems. It listed the advantages and disadvantages, components and considerations of each drip irrigation system, and all the different types of systems. The website showed how to carefully take care of the drip systems. The most important information it provided was how the drip system conserved water. These systems use 20-50% less water than regular spray systems. They are often free from watering restrictions. To start I made a planter box with planter box lining. I placed soil into the planter box and then I dug four holes in each plant. Then to install the drip lines. Poke three holes into the main hose/tube. Connect the micro drip and spray, and the soaker hose. I learned several things from this experiment. I observed that the plants were growing closely to how I expected them to grow. However I was surprised by how well the one plant without an emitter did just from being exposed to rain. My hypothesis was wrong and I learned that you don't need a lot of water to get the best results. My observations and conclusions support everything I learned in my research. Drip irrigation uses less water, reduces evaporation and run off. I think it provides enough water for most plants, even during droughts. It is oen of the best ways to help save water and still have a beautiful garden.

Project # **J1210** Category: **Environmental Management - Jr**

Student: **Yumna Kazi** Grade: **6** G: **F**

School: **Al-Huda Islamic School**

Title: **Cover It Up! Exploring Which Ground Cover Best Stops Soil Erosion.**

Soil erosion is one of the major environmental problems facing the world today. One of the negative impacts of soil erosion is the removal of nutrient-rich topsoil especially during rain, flood, and wind conditions. My purpose for conducting this experiment was to understand which ground cover best stops soil erosion. For my experiment I cut out a large rectangle from six two-liter plastic bottles and laid them down in a fifteen-degree angle to resemble a hilly surface. I put only soil in one bottle, and I covered the soil on remaining five bottles with mulch, grass, pebbles, fallen leaves and sedum. I placed a cup underneath each bottle's opening to collect eroded soil and drained water. I set this up in my patio, so that way all bottles can get the same amount of sun and environmental conditions. I gave three ounces of water every day to all six bottles, and measured water in milliliters and soil in grams every two days for eighteen days. Based on the data collected from my experiment, I concluded that the bottle with only soil and without any covering lost the most amount of soil. Grass and sedum were the most effective soil coverings. In summary, soil coverings help reduce soil erosion. I discovered that even fallen leaves and pebble coverings can slow the erosion of soil.

Project # **J1211** Category: **Environmental Management - Jr**

Student: **Liam McCabe** Grade: **8** G: **M**

School: **Sierra Madre Middle School**

Title: **Eutrophication**

The question I am trying to answer is “How do human pollutants effect aquatic plants?” I hope I can find proof that plants are being negatively affected by human pollutants in aquatic ecosystems.

To start the project I filled two 10 gallon tanks with clean tap water and added aquatic rocks and 30 Anacharis aquatic plants to each tank. Firstly, I checked the pH, nitrates, and nitrite levels of each tank. Secondly added 2.5 ml of detergent to tank 1. The whole experiment took place over the course of 6 days. Each day I took pictures and noted my observations for each tank.

My graphs for tank 1 are showing that over the passing time, eutrophication has been taking place. The pH, NO2, and the NO3 levels all raised which showed signs that the plants are decomposing. This proves that laundry detergent damages aquatic plants, but does not kill them.

Project # **J1212** Category: **Environmental Management - Jr**

Student: **Samantha Glasgow** Grade: **7** G: **F**

School: **Sierra Vista Junior High School**

Title: **Washing Machines And Their Impact On Oceans.**

Microfibers. People may think that these tiny fibers aren’t very harmful. Well, those people thought wrong. When washing laundry, these fibers can be very dangerous to the ocean. By using some laundry detergent, water, and pieces of fabric, someone can see how much can fall off of a square of fabric simply scrubbing by hand. Imagine how much can fall off and go into the ocean from a whole washing machine. Washing machines are connected to the ocean by plumbing and sewage systems. When a load of laundry is washed, microfibers aren’t filtered out well and most is washed into the ocean. This is one of the largest sources of microplastic pollution (the percentages are pretty high considering the 2.2 million tons of microplastics washed into the ocean from washing machines per year).
This experiment aimed to determine which type of fabric produced the most amount of microfibers. The hypothesis was that cotton would produce the most amount of microfibers.
In this experiment, fabrics of identical surface area were washed by hand to show how much can come off by hand-washing. Comparisons were made based on the use of different brands of detergent. The results indicated that the nylon and denim washed in Woolite detergent yielded the most microfibers. This appears aligned with current studies and research that have shown that nylon and polyester indeed have the most microfiber pollution potential, while the lowest potential for microfiber pollution appears to be polyester, synthetic fabric.

Project # **J1213** Category: **Environmental Management - Jr**

Student: **Ari Armenian** Grade: **7** G: **M**

School: **Chamlian Armenian School**

Title: **Methods of Desalination**

Population growth and climate change are making freshwater scarce. It is important to find effective and easy ways of converting saltwater to freshwater. The purpose of the experiment is to determine which method of removing salt from water is the most effective. I hypothesized that the distillation method will remove more salt from the water than the reverse osmosis method. The independent variables were the methods of desalination through reverse osmosis and distillation. The dependent variable was the salinity of the water after desalination. Saltwater, 35g of salt per 1 liter of distilled water, was used both for the reverse osmosis and distillation methods. The salinity of the water was measured with a refractometer. The distillation method resulted in a salinity level of 0.0997, and the reverse osmosis method resulted in a salinity level of 0.0998. The desalinated water from the distillation method had slightly less salinity. The distillation method was slightly more effective than reverse osmosis and it only used sunlight for energy, being less expensive to conduct. The solar still used for distillation was simple to build and use, making it easier to produce freshwater from saltwater. Future research should continue to explore distillation using solar stills because it can be more accessible and affordable for people around the world.

Project # **J1214** Category: **Environmental Management - Jr**

Student: **Kaihann Hashimi** Grade: **7** G: **M**

School: **New Horizon School**

Title: **Using Orange Peel Polymer for Moisture Conservation and Growth of Snap Peas (Pisum sativum)**

The objective of this experiment was to test the effectiveness of orange polymer on the height of snap pea plants and the moisture levels of soil. It was hypothesized that the orange polymer would yield better results in height and moisture levels. The materials used were 10 pots, snap pea seeds, water, 20 oranges, moisture meter, measuring tape, measuring cups, soil, cooking pot, blender, and coffee grinder. The method used was to first label each pot, then fill them with 360 grams of soil. Next, poke three holes in the soil for each pot and place one seed in each hole, then water the pots every 2 days. Orange polymer was made in two parts. Dry peels, grind them and collect the powder. Use fresh peels, boil them and make it a jelly. Grind both dry and jelly together and place it within the pots chosen to have it. Measure the height of plants and check for moisture every three days. Results showed that plants grown with polymer had an average height of 27.1 cm whereas plants grown without the polymer had an average height of 23.8 cm. The moisture levels were significantly greater in the soil with orange polymer (85%) whereas without polymer (42%). This proved the hypothesis to be correct. In the future, several plants will be tested with different formulations of orange polymer. This experiment is applicable to the current drought in California and helps farmers reuse waste by using peels to grow crops and conserve moisture.

Project # **J1215** Category: **Environmental Management - Jr**

Student: **Melina Ajami** Grade: **8** G: **F**

School: **Palos Verdes Intermediate School**

Title: **Prevention of Carbon Dioxide in Our Atmosphere**

Carbon dioxide found in the air is a huge concern because it leads to pollution in our sky and holes in our ozone layer creating global warming. The goal of my project is to find a simple solution to minimize carbon dioxide in homes. My hypothesis is that we can use plants and chemicals to get rid and create machines to get rid of carbon dioxide.

For my project I tested two different ways on how to reduce our carbon emissions. The first way I experimented with was to make carbon into a salt looking product. I tested this to see how it would happen and if we could possibly make a machine that could convert carbon dioxide.The second idea I tested was how well do plants remove carbon dioxide from the air using a carbon dioxide detector. I tested plants in different areas (shade versus in the sun). I experimented this in order to see how well plants remove carbon dioxide.

Results show that when plants were placed in the sun, plants removed carbon dioxide more efficiently than the plants placed in the shade. Data showed the plants in the sun removed carbon dioxide at a rate of about one gram per 3 days.

My hypothesis was supported because plants do remove carbon dioxide at a rate of 0.0019 grams per day. Next steps of my project would be to turn my machine prototype sketch into a working tool to test the effectiveness.

Project # **J1216** Category: **Environmental Management - Jr**
Student: **Colton Engle** Grade: **6** G: **M**
School: **St. Timothy School**
Title: **Magnet Power**

In my experiment, the goal was to find out how much ferrofluid is needed to pick up the most amount of oil. I would use different amounts of ferrofluid in the oil, then use a neodymium magnet to pick up the oil, and I would measure the oil that was left over. My hypothesis is if more ferrofluid is added to the oil in the water, then the magnet would pick up more oil. I used three Petri dishes in each test. Then, I did one drop, five drops, and ten drops of ferrofluid in each test. I added 14 mLs of colored water in each Petri dish then I added the amount of ferrofluid I was using in that test. One drop of ferrofluid was 2 mL of oil left for all three tests, five drops of ferrofluid was 1.5 mL of oil left for all three tests, and ten drops of ferrofluid was 1.5 mL, 1 mL, and 1.25 mL of oil left. In my results, ten drops of ferrofluid worked best because it had less oil left over from the magnet. In conclusion, my hypothesis is correct and more ferrofluid picks up more oil.

Project # **J1217** Category: **Environmental Management - Jr**
Student: **Jhiliane Ibatuan** Grade: **7** G: **F**
School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**
Title: **The Prevention of Air Pollution: What Effect Does Soil Have on Air Pollution?**

The objective of this project is to find a solution to a problem which many people don't realize has a huge impact on our environment. This problem which has huge impacts on our health and the progression of the world is air pollution. Air pollution has been on the rise for the past couple of years and is only expected to rise more if we do not take action. These pollutants can be found in places from our cars to everyday jobs! I attempted to find a solution to the problem by using soil, a tool which contains a high amount of nitrogen and organic supplements. I would create a polluted environment using plastic bags, aluminum cans, wood, and fire then include pots of soil which are expected to absorb the surrounding particulate matter. From my executed experiment, I found that soil does affect air quality in terms of prevention. I had found that in the three soils I had tested, the Miracle-Go Moisture Control Potting Mix reduced the air quality to where it is no longer harmful to humans. Therefore, soil is a suitable option to reduce air pollution. My solution does not just contribute to a well advised habitat but a unified community. A world with clean air quality means we will have a clean work environment to work in and a lower risk of gaining respiratory diseases. Especially being a productive student today, it is important to work in a clean environment you feel safe in.

Project # **J1218** Category: **Environmental Management - Jr**
Student: **Zohra Alam** Grade: **7** G: **F**
School: **Sierra Vista Junior High School**
Title: **Protecting Plants from Acid Rain**

Acid rain is a growing global threat to the ecosystem, and this project is indented to find ways to protect flora in California. The objective of this study was to observe if spraying a "base solution" over a plant would shelter it from the harmful impact of acid rain. Acids neutralize when in contact with bases, as they are chemical opposites, thus the hypothesis was the research "solution" would protect the plant against significant damage.

This experiment was simple yet effective. Three plants, a makeshift "acid rain" vinegar solution, and the "base" baking soda were used to conduct this experiment. The first plant was sprayed with regular water, which had a pH of 7. The second plant was saturated with the "acid rain" solution. The third plant was coated in baking soda and then sprayed with acid rain to see if it would protect the plant. Although it wasn't a drastic change, the plant with the baking soda was healthier than the plant without. There was less leaf and vein damage, and a couple of the leaves were left with salt on them from when the acid and base met and neutralized.

Overall, the hypothesis was confirmed. The idea of a base protecting plants using this method can definitely be expanded on in the future in many ways, however, this is an intriguing initial step toward understanding how to create a solution to the growing environmental problem of acid rain.

Project # **J1219** Category: **Environmental Management - Jr**

Student: **Leonna Torosyan** Grade: **7** G: **F**

School: **La Canada Preparatory**

Title: **Reduce, Reuse, Recycle**

My science experiment is about the Black Soldier Fly Larvae ("BSFL"). I was able to learn about how the larvae from this fly can quickly turn food waste into protein. First, this will help increase protein available to sustain our human population. Second, this will help reduce food waste in landfills and thereby reduce harmful gasses that contribute to global warming.

My hypothesis is that the Black Soldier Fly Larvae can eat any kind of food waste in less than a week.

I collected food waste from my kitchen and separated it into two plastic bins. The first bin, my control, had only food waste while my second bin had the same kind of food waste and 4,000 pieces of BSFL. After observing both bins and measuring results, I found that the control had started to rot, collect fungus and mold, and began to release odors (methane and carbon dioxide) while the BSFL were able to eliminate the food waste in their bin before the food was able to grow mold and fungus.

I also discovered that, after eating, the plump and protein-filled BSFL can be used to feed chicken and fish farms and that their castings can be used as soil fertilizer for farming.

My project supports the idea that the Black Soldier Fly Larvae can Reduce, Reuse, and Recycle food waste and help stop the release of more harmful gasses into the atmosphere.

Project # **J1220** Category: **Environmental Management - Jr**

Student: **Leona Aiba** Grade: **8** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Natural Resource Filtration**

We need alternative sources of clean water so we can conserve water during droughts. Having your own filter not only leaves us with more drinkable water but helps with other tasks that need clean water. The problem we are solving is which natural resource filters grey water the best. Other scientists have used natural options such as sand and charcoal to filter polluted water (Parker, 2017). In the procedure, plastic bottles will be cut in half to create filters. One filter will be filled with sand, another will be filled with gravel, and the last will have pebbles. Grey water will be filtered through these natural resources and used to water radishes. The independent variable is the different types of filtered water, while the dependent variable is the height of the radish in centimeters. Since the grey water radish grew the most and the tap water radish grew the least, the natural resource filter that makes the radish grow the least will be the best. Our hypothesis was that sand will filter grey water the most. Our hypothesis was proven wrong because at first, the sand filtered the grey water best. However, as we used the same sand, particles built up and the sand lost its potency over time. Overall, the pebbles filtered the grey water best. This is significant because other people can either use sand if it is continuously changed or pebbles for filtration. Since California is currently in a drought, the community can use these natural resources to filter grey water and save drinking water.

Project # **J1221** Category: **Environmental Management - Jr**

Student: **Vem Boynerian** Grade: **7** G: **M**

School: **Chamlian Armenian School**

Title: **Testing Radiation Emitted from Electronics in Certain Conditions**

Humans are exposed to electromagnetic field (EMF) radiation constantly from various sources. The number of EMF emitting everyday objects has increased over time. Often, we are not aware of what object might be exposing our bodies to radiation. It is important for everyone to recognize the daily exposure to non-ionizing radiation from everyday electronic devices.The purpose of this research project was to measure the amount of radiation emitted from everyday electronic devices and appliances at varying distances compared to inert items.

Using a Geiger counter to measure emitted radiation, ten common everyday electronic devices and appliances were tested while in an “on” and “off or standby” position. They were also tested with a radiation blocker and with protection cases when possible. Control items which are inert were tested for comparison. The main finding of this study demonstrated that all the electronics and the appliances tested produced radiation to varying degrees while in the “on” position. Some devices produced much more radiation than others. However, all the items emitted less radiation as the distance from the device increased. Radiation blockers and protection cases resulted in inconsistent changes with emission readings. For people who want to minimize self-exposure to EMF, minimizing use and keeping physical distance while the device is functioning can decrease overall exposure.

Project # **J1222** Category: **Environmental Management - Jr**

Student: **Adiva Rahman** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **Increasing Sustainable Energy**

My project can show that if we could provide artificial light intensity to increase the amount of power in the solar panels. The Solar panels gain power from the sunlight, and Sunlight changes as its motion while it moves from east to west and it changes its angle of light on solar panels. It increases and decreases its light intensity. During the noon, it provides maximum intensity on solar panels. So it gets the most power during the noon, while the sun stays in the middle for a short time. Rest of the day it changes its intensity and we get variable amounts of power. When the sunlight is at an angle, my project proved to work and gain more sustainable energy.

Project # **J1223** Category: **Environmental Management - Jr**

Student: **Elijah Lee** Grade: **7** G: **M**

School: **St. Timothy School**

Title: **SOS- Save Our Soil!**

Soil is a priceless nonrenewable resource that is home to animals, plants, and other important organisms. President Franklin Roosevelt once said, “The nation that destroys its soil, destroys itself.” Soil is essential for living. This project was designed to find a solution to slow down soil erosion. My hypothesis states that having a vegetation ground cover will slow down the rate of soil erosion. In order to test the hypothesis, different ground coverings were used to test for erosion: grass, radish plant, rocks, and mulch. My controlled variable was tested using soil only. To eliminate bias, I used the same amount of water poured and the same elevation for test samples. The same amount of water was poured over each test sample. The quantitative data collected were the amount of water that infiltrated the soil and the time it took the water to go through the system. For the qualitative data, observations were noted in the turbidity of the water samples and the soil deposits collected. After analyzing the data, I can conclude that my hypothesis was correct. The samples with the vegetation covering had the least amount of water pass through and the turbidity was much lower when compared to the other test samples. In addition, a minimal amount of soil deposits were present in the water. According to Scientific American Journal, plant coverings aid in protecting the soil from the effects of raindrops, slowing down the movement of water runoff, which allows any excess surface water to infiltrate the soil. Plants also have extensive root systems to “grab onto” soil and keep it bound together, therefore reducing displacement.

Project # **J1224** Category: **Environmental Management - Jr**

Student: **Jerry Delgado** Grade: **8** G: **M**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **How Solar Powered Chromebook Chargers can Lower Carbon Emissions**

Dodson Middle Schools releases a lot of carbon, which in turn contributes to the growing global issue of global warming. This is where the idea of making a solar powered chromebook came into mind. Kids depend on chromebooks everyday to perform school work, and in order to use them kids must charge them. We thought that If we could find a renewable energy source for kids to charge their chromebooks, it would significantly reduce the carbon footprint of Dodson middle school. Our plan was to build an off-grid solar panel system that mimics those seen on houses, but on a smaller scale. After meeting & discussing with the experts at Jeff Pereira Home Energy in Bakersfield, we were able to plan out how to conduct such an experiment. We used a 12 volt solar panel, a 12 volt lithium battery, “The Wanderer” charge controller, PV Wires, and a Type-C USB cord to complete the system. Our solar panel system generally produced around 15-17 voltages each trial while the battery produced around 13 voltages each trial, and on average the chromebook charged about 20% per hour each trial. Our findings showed that implementing solar energy into Dodson Middle School as a way to charge chromebooks, or other devices if needed, is possible and can work efficiently. We concluded that using a large-scale solar panel system as a renewable energy source would significantly reduce the carbon footprint of Dodson Middle school.

Project # **J1225** Category: **Environmental Management - Jr**

Student: **Noah Figueroa** Grade: **7** G: **M**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **Cleaning Schools and Pools**

The purpose of this engineering project is to provide clean schools, and pools for the community. The community would benefit from clean environments, setting up a good example for future generations. This invention would be better compared to other innovations by having the ability to remove both land and water pollutants. For procedures the materials that are required are LEGO catamaran, move hub, color and distance sensor. Those are the parts that are most crucial to making this project come alive. The catamaran could be constructed based on the instructions included with it. Once the move hub is block coded with the lego powered up app to move forwards, backwards. The sensor is for detecting any object within 10cm. All you need to do for the construction is to put the wheels, and the color sensor. The independent variable is the coding for the move hub because that is the factor that drives the whole bot, the dependent variable is the performance of the functions of the water filters. All that is needed is recycled water bottles and mesh. Originally information was conducted upon teen activists concerning water and land pollution solutions. Some work that engineers created was the BEBOT, a new developing robot cleaning beaches. Creating a bot that filters, collects impurities in water, and on land can create better technology for aiding water and land pollution. Results that are expected for this bot is to successfully filter all bits of trash, micro bacteria in pools, and schools.

Project # **J1226** Category: **Environmental Management - Jr**

Student: **Shayon Roy** Grade: **8** G: **M**

School: **Rosemont Middle School**

Title: **Let's save water**

Water is a very precious material that has to be preserved as much as possible. Even during a time when California is in the third year of a drought in a row. So, our water needs to be conserved in our everyday life. This experiment shows how water can be saved in our daily life. Different types of water fixtures are tested and the one that is most conservative for our everyday life will be selected.
The most common types of water water fixtures for the kitchen, bathroom and different types of nozzles for lawns were bought. These fixtures were tested for the amount of discharged water for five minutes each to see which one in the most efficient for water conservation depending on their needs.
The need to conserve water is ever increasing considering that California's drought has worsened over the past few years. One of the ways that people can conserve water through monitoring the amount of water usage occurring in their homes. Unfortunately large amounts of water are wasted due to inefficient methods of delivery for the water, or by using wrong water fixture, tap, nozzles etc. The objective of this project is to determine the most efficient ways to deliver water by analyzing various factors such as excess water discharged by the fixture and the volume of water discharged within a certain period of timeframe. By analyzing these factors, the efficiency of the most common water fixtures can be determined, allowing us to limit usage the amount of water.

Project # **J1227** Category: **Environmental Management - Jr**

Student: **Camila Mazariegos** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **What Type of Fruit-Based Compost Affects the Growth of a Sweet Alyssum**

For this experiment the goal of what was to be discovered was if there was a certain type of fruit based compost that would benefit the plant chosen more, compared to any other type of fruit based compost. The way that this was determined was by using a weekly check on the potted plants that had been growing. This process proved to work slightly less efficiently than thought. In the end, the results were not in the favor of the estimate placed but the results did exceed the goal that was put in mind. The results did help conclude the question and the goal set was reached, the plan and execution proved slightly faulty as our end result was not what we expected or estimated.

Project # **J1228** Category: **Environmental Management - Jr**

Student: **Summer Kniffin** Grade: **8** G: **F**

School: **Ridgecrest Intermediate School**

Title: **Sand Temperature and Turtle Gender**

Sand Temperature and Turtle Gender

Currently, due to global warming, sand temperatures in tropical regions are skyrocketing, causing an anomaly in sea turtle reproduction. When the sand temperature is above roughly 27 degrees Celsius, the turtles are born female, and if the temperature is below that they are born male. Because the average sand temperature in, for example, Florida is currently above that, there are too many female turtles being born, causing reproduction problems. Should this continue, the species could go extinct. My hypothesis is if the sand around some of the turtle nests were cooled down, there would be a more even ratio of male and female turtles. The goal of my project is to build a shade structure to cool down the sand around turtle nests.

The shade structure frame was made of PVC pipes, and there was Velcro on two of the ends that can connect fabric to the frame. One fabric is a shiny silver fabric, another is a thicker white fabric, one is a thicker black fabric, and one is a burlap material. Each fabric was tested using 4 heat lamps over a bin of sand and left for 1 hour.

The silver fabric did not reflect the light as predicted, and hardly kept out any of the heat. After an hour, the temperature only fell 2 degrees. The burlap did not let warm air escape while still providing shade as originally intended, but instead let in more heat and the internal temperature rose 4 degrees in only 15 minutes.

Overall, results of this experiment will help the turtle species stay alive and thriving. The objectives of were met with success and understanding the results of this experiment can help field scientists to ensure a more even ratio of male to female turtles.

Project # **J1229** Category: **Environmental Management - Jr**

Student: **Yuvanah Vignesh** Grade: **7** G: **F**

School: **Rosemont Middle School**

Title: **Increasing the life span of solar panels**

Solar panels contain toxic materials like selenium, lead and cadmium that can cause environmental pollution. Many solar panels are dumped in landfills at the end of their life cycle. According to a 2022 article in the LA times, only 1 in 10 panels are being recycled. This results in the groundwater being contaminated by the toxic elements present in solar panels. By the end of 2030, 8 million tons of solar panel waste will end up in the landfill globally if alternate solutions are not made. Recycling solar panels is easier said than done. It requires time, money, and special equipment, which are the reasons solar panels are not being recycled on a larger scale.

In our project we have explored the options of how a solar panel's longevity/efficiency can be improved in solar farms or how solar panels can be reused after its lifecycle or how alternate materials make the recycling process more efficient.

Project # **J1230** Category: **Environmental Management - Jr**

Student: **Arman Sharif** Grade: **8** G: **M**

School: **Institute of Knowledge Middle School**

Title: **Caution: Worms at Work! An Investigation in the Use of Vermiculture (G. mellonella and T. molitor) in the Biodegradation of Polystyrene**

Problem: In this project, my goal was to use vermiculture (G. mellonella and T. molitor) in the biodegradation of polystyrene (styrofoam). Since styrofoam cannot be recycled, it must be disposed of in regular trash bins and ultimately ends up in landfills.

Procedure: The experiment compared the growth of 50 waxworms and 50 mealworms in containers with dirt, and a control container with only dirt. A piece of styrofoam that weighed 75 grams and measured 49.5 cm squared was added to each container. The styrofoam was measured and weighed every 3 days to observe any changes.

Results: The results of the experiment showed that the mealworms had a higher rate of decomposition of the styrofoam compared to the waxworms. This is evident by the significant progress in the breakdown of the styrofoam.

Conclusion: The results of this experiment contradict the initial hypothesis, as it was expected that the wax worms would have a greater impact on the decomposition of the styrofoam in soil. In fact, mealworms were most efficient in breaking down the styrofoam.

Project # **J1231** Category: **Environmental Management - Jr**

Student: **Amy Jackson** Grade: **7** G: **F**

School: **Sierra Vista Junior High School**

Title: **Worms, Worms are Everywhere : A study of Solutions To our Planets Plastic Problems.**

Science is everywhere and our oceans need our help. Ocean pollution is a real problem that science can help to solve. Research shows that there are over 300 million tons of plastic found in the ocean annually, and plastic makes up 80% of all marine debris. People have difficulty comprehending this, but the purpose of this study is to investigate solutions to our plastic problems. In this experiment, two species of worms were studied: wax worms (Galleria mellonella), and super worms (Zophobas morio). Each species was placed in containers with the majority of their available food source either plastic, styrofoam, or organic worm feed. A comparison of the mass of food consumed was measured. The hypothesis was that the wax worms would consume the most plastic overall. The results when comparing the consumption of plastics across each species of the worm were fascinating. After analyzing the data, the hypothesis was incorrect. Super worms were in fact the larger consumer of plastic and both types of worms preferred plastic bag material over styrofoam. Subsequently, the dehydrated remains of naturally deceased worms that consumed plastic of any kind, were added to sealed closed system jars, each containing aquatic plants (amazon sword) to determine if the remains might have any lingering toxicity compared to worms that consumed only organic meal. However, after 72 hrs there was no significant difference. Ultimately, this study revealed fascinating information related to both species of worm, and with additional research the potential uses of both species are astounding.

Project # **J1232** Category: **Environmental Management - Jr**

Student: **Angeleslie Vergel de Dios** Grade: **8** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **SFS Water Filter**

Water is one of the many resources vital for any humans survival and about 71% of Earth's surface is covered with water. However, only 3% of this is has been shown safe for human consumption. Many other systems currently exist to desalinate water, however many of them are quite costly, and are unavailable to other countries, and some even create more pollution. Solar energy however is very accessible. So, a cheap device that utilizes the sun to create a desalination device was created. This device was built using only simple materials available in homes. The first part of the filter was built by layering sand and pebbles on mesh, and the base for desalination was created by insulating a plastic 12in x 6in x 3.5 bin, with bottle opening attached and a 1in divider between the base. A layer of metal aluminum with a window cut out for glass was then layered on top. The first part is used to eliminate larger physical particles, while the main base is used to desalinate. After testing our best solution, a device using nothing but materials found within our homes was created and used to filter water within a couple hours. This simple device can be made by anyone and creates clean water with no cost.

Project # **J1233** Category: **Environmental Management - Jr**

Student: **James Kinsella** Grade: **6** G: **M**

School: **New Roads School**

Title: **Desalinating water**

My project is trying to filter out salt water by using multiple layers of filter. Here are the layers: Number one is ion exchange reason to take out contaminants from the water and replace them with ions that you want. The second filter is activated carbon to take out organic chemicals. The third one is reverse osmosis film so with some pressure from a pump, will take out the small dissolved salt particles in the water. Water will go through each of these layers which are stacked on top of each other. Then there will be a holding chamber that the clean water goes into what you can then test for PH and dissolved solids. Data is still being collected.

Project # **J1234** Category: **Environmental Management - Jr**

Student: **Jonathan Svilik** Grade: **8** G: **M**

School: **The Science Academy STEM Magnet**

Title: **Water Works: A Solar Desalination Chamber**

The purpose of this project is to test if it's possible to desalinate water and collect it as fresh water. It is being done to experiment with solar water desalination and how it works. The reader should care about this topic because it could potentially be the answer to providing water to those in need, because this process means water that is not fresh and turns it to fresh water, with no electricity or power needed. The independent variable is the amount of dirt in the desalination chamber. The dependent variable is the pH of the collected water in the collection chamber. The constants are the amount of heat applied to the water, the amount of dirt in the water, and the amount of water, and the desalination chamber. The initial amount of water in the chamber was measured with a scale, and the pH was measured with pH strips. In the end, the water was successfully separated from the dirt and had a normal pH. The results supported the hypothesis, showing that the build worked and water could filter out from dirt.

Project # **J1235** Category: **Environmental Management - Jr**

Student: **Prateek Dorepally** Grade: **7** G: **M**

School: **Hale Charter Academy STEAM Magnet**

Title: **Is Water Powered Energy the Future of Fuel?**

Carbon emissions have become a modern plague that everyone is trying to find a cure for, while a feasible solution has been available for decades. Electrolysis is the process of splitting water into its gaseous components by running an electric current through, which generates HHO gas, or hydroxy gas. An electrolyte may have to be added. This project was conceived because the world needed to know whether HHO was a viable solution compared to gasoline, a common carbon based fuel. It was hypothesized that if HHO gas is used instead of carbon based fuels, then all pollution and climate change will stop and drop 100% because HHO is a clean burning fuel. The experiment was performed by building a HHO generator that would get power from a car battery, which acted as the electric current and generated the gas. Then the gas thus collected was used for the tests. The tests consisted of burning each fuel to see which one is more quicker or efficient, observing the damage done to their containers for safety, and analyzing the emissions they produced. Based on the data from the experiments, HHO may be better in terms of emissions and efficiency, but not in terms of safety, because it is a volatile gas. The HHO burned much quicker than the gasoline (0.0064 seconds compared to 0.42 seconds). And showed no harmful emissions. On the safety test however, the damage to the vessel was quick and extremely deforming. Gasolines damage was also great, but extremely slow compared to HHO. Overall, what was hypothesized was only partially correct because the safety concerns and the energy cost of making the the gas were not taken into account. There were many hindrances in execution of this project, capital was one of them. In hindsight, It would've made sense to change the design of the generator by excluding the bubbler as it was not adding any value; having a clear blueprint with extensive research behind would have simplified the project.

Project # **J1236** Category: **Environmental Management - Jr**

Student: **Samuel Abraham** Grade: **8** G: **M**

School: **Ridgecrest Intermediate School**

Title: **Simple Water Desalination**

Abstract

Water is one of the essentials that humans need to live. 60% of our body is made of it. That led humans to the question: Water covers 70% of the Earth, but we have water shortages. So naturally, we turned to filtration; however, most large-scale water filtration is either inefficient, expensive, or both. So, is the secret ingredient using as much as natural power as possible? The objective of this project is to engineer an efficient and cost-effective way to desalinate water. My goals are to make this experiment prove that natural methods of desalination are more effective than artificial methods

For this experiment, I used a magnifying glass dome and put a plastic bowl inside of it. To flow the water inside, I drilled holes inside the plastic bowl and put PVC pipes containing saltwater flowing into the plastic bowl. That way the water flows inside, and theoretically, on a sunny day, the water should evaporate. The most important detail in this experiment was the design of the collection system. The magnifying glass dome was bigger than the plastic bowl, so the evaporated water flowed down into a collection system that I built. After 3 hours of sunny weather, the water was filtered without any leaks. The water flowed down to the collection system, and the water was collected. I added 3 tablespoons of water and retrieved 2.64.

The process supported my hypothesis that using more natural methods of desalination are more efficient and cost-effective than using artificial methods.

Project # **J1237** Category: **Environmental Management - Jr**

Student: **Claire Crane** Grade: **6** G: **F**

School: **Walter Reed Middle School**

Title: **Greywater: YAYwater or NAYwater?**

The goal of my science fair project was to determine if getting a greywater system would be harmful to plantlife. My hypothesis was that the chemicals in soapy water would kill plants watered with greywater. To see if my hypothesis was correct, I bought 6 Yellow Penny Jump-up flowers and planted them in 3 pots, 2 sprouts to each pot. For three weeks, I watered them with waste water from the shower, waste water from the dishwasher, and filtered water. Every other day I measured their growth. The plant watered with greywater from the shower wilted quickly, but the plant watered with greywater from the dishwasher thrived. By looking at the slopes of their growth, I determined that the plant watered with dishwasher greywater had the highest rate of growth, while the plant watered with shower greywater grew the least. The control plant resided in between the two. My hypothesis was mostly correct because the soap did harm the plant watered with shower greywater, but it was not enough to stop the plant watered with dishwasher greywater from thriving. From my experiment, I can conclude that a greywater system would have a positive effect on plants if the greywater is coming from the dishwasher, but not from the shower.

Project # **J1238** Category: **Environmental Management - Jr**

Student: **Daniel Kim** Grade: **8** G: **M**

School: **Incarnation Parish School**

Title: **Making your own water filter**

The purpose of this project is to create a water filter that experiments with different materials and see which material filters dirty water best when used alone or combined. My hypothesis is that charcoal will filter the water best since many water filters often use activated charcoal as an efficient resource for purifying the water. The procedure is to get an empty bottle and put a type of material in it by itself or mixed with others. The second step is to pour dirty water in the material and wait for it to be filtered. The last step is to see which material has purified the water best. In the experiment, it was shown that combining all materials together was the best way of filtering water and activated charcoal is the best material for filtering water with only one material. The rock filter was the worst material for filtering water since it did not provide much of a difference from the dirty water before being filtered. The sand filter appeared to have the most difference from the beginning since the water was much more cleaner before, but as time went on the water became dirtier in the end.

Project # **J1301** Category: **Materials Science - Jr**

Student: **Evan Martinez** Grade: **7** G: **M**

School: **Mark Twain Middle School**

Title: **The Best Drinking Cup**

The goal of this experiment is to find what material can serve hot liquids for it to stay warm for the longest. Which of the three materials styrofoam, glass, and plastic maintain a 100-degree Fahrenheit cup of water hottest the longest? To find a answer, we got the three cups and timed them for five minutes. They each had a thermometer and 100 degree Fahrenheit water. At the end, we inputted the data on google sheets, and proceeded to do this 10 times. Between glass, plastic, and styrofoam, styrofoam worked the best to maintain a 100-degree Fahrenheit liquid with an average temperature after five minutes of 95.6 Fahrenheit, compared to glass and plastic, which had 94.7 and 93.3 respectively. Styrofoam is the best insulator because the air pockets trap the heat from escaping. This data proves our hypothesis correct because styrofoam had the highest average temperature after 5 minutes.

Project # **J1302** Category: **Materials Science - Jr**

Student: **Zoe Silberstein** Grade: **6** G: **F**

School: **Temple Beth Am Pressman Academy**

Title: **Which Brand of Bottled Water is "Purest"**

My scientific experiment is which brand of bottled water is the "purest". I think this is important because water impurity can affect you with many health issues. Some of the diseases are: bacterial disease, viral disease, parasitic disease and reproductive issues. Bad water can also affect our plants and animals. In some extreme cases poor water can lead to death. In 2015 1.8 billion people died from impure water. I used testing strips to test Dasani, Voss, Arrowhead and Fiji water. These testing strips look for pH, hardness, hydrogen sulfide, iron, copper, lead, manganese, total chlorine, mercury, nitrate, nitrite, sulfate, zinc, fluoride, sodium chloride and total alkalinity. When I tested these four brands of water I found out that out of the four Dasani and Arrowhead have equal levels of contaminants. Dasani water is very hard hence the sodium chloride included in the water. Arrowhead has high sulfate and zinc. Arrowhead has a good amount of Alkalinity but Dasani has none meaning it won't buffer acids as well Arrowhead. My hypothesis was that Dasani would have the highest levels of contaminants but in the end Dasani and Arrowhead have equal amounts of contamination. My hypothesis was half correct.

Project # **J1303** Category: **Materials Science - Jr**

Student: **Corey Dehlinger** Grade: **8** G: **F**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **How Does the Type of Material Affect the Distance of an Object?**

This project is focusing on Material Science, and gives the information of how specific materials travel more distance than others. My science fair project revolves around the question, "how do materials affect distance?" From the given materials, my hypothesis is that plastic travels the farthest. For this experiment, I used a small ramp and set it on another surface. I tested with the materials wood, metal, cotton, plastic, and stone. I also measured the time it took for each object to travel. First, I tested out wood, which traveled 16.45 inches at 0.65 seconds. Then, I tested out metal, which traveled 15.7 inches at 0.67 seconds. Then, I tested out cotton, which traveled 10.1 inches at 0.92 seconds. Then, I tested out plastic, which traveled 34.85 inches at 1.17 seconds. With the data gathered, I assumed that plastic traveled the most distance out of all the materials. However, my hypothesis was wrong, because stone traveled 65.35 inches in 2.15 seconds. My experiment showed that cotton traveled the least distance, and stone traveled the most distance. My objectives were met, but my hypothesis was incorrect.

Project # **J1304** Category: **Materials Science - Jr**

Student: **Nishita Bhakta** Grade: **8** G: **F**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **How Does The Sun Affect Paint?**

My project aims to show how the sun's UV rays affect the exterior paint drying process on walls and various items. The paint on a wall or other surface can be damaged by the sun's UV rays such as through cracking, peeling, blistering, chalking, etc. The paint on the wooden board WILL be harmed by the UV rays, in my opinion.I first went out and purchased two wooden boards, a sample jar of red exterior paint, and a paintbrush in order to do this experiment. I applied the same amount of paint to both boards at the same time. I placed one board outside, where it was in direct sunlight, and placed the other board in the shade of my garage. Each board took a total of 25 hours to dry completely. I checked on both boards to see how they were doing once the drying process was done. The board, which was drying in the sunlight, looked completely normal and had none of the bad effects. Although the other board that dried in the shade seemed to be drying just as normally, it did take a lot longer to dry than the other board. Both boards looked very similar.This experiment has proven that not all paint can blister, bubble, or chalk when drying in the sun. In conclusion, the paint was NOT damaged by the sun's UV rays.

Project # **J1305** Category: **Materials Science - Jr**

Student: **Orion Gainsforth** Grade: **8** G: **M**

School: **Delphi Academy of Los Angeles**

Title: **How do I fold thee? Let me count the ways!**

Objective:
I wanted to test how many times I could fold paper. My hypotheses were thinning the Z dimension of a tissue but keeping the other dimensions gives more folds, the different directions you fold a piece of paper has an impact on the number of folds you can make, Materials in the paper can change the number of times you can fold it. Example: Blank Paper is thicker than tissue so it's harder to fold.

Materials and Methods:
I used tissue paper, cellophane, printer paper, aluminum foil, parchment paper, a ruler, a micrometer, a notebook and a pen. I tested my hypotheses to find out how many times I could fold a piece of paper. In the project I tested 3 times to measure my measurements to make sure I got an accurate answer and converted between the metric system and imperial system.

Results:
My original hypothesis was wrong. So, I created two new hypotheses. Aluminum foil and Cellophane had the most folds compared to the tissue, parchment and printer paper.

Conclusion/Discussion:
You can fold paper more times than seven, just increase the size. Using a different material, you can fold more times with the same size of the original paper. I found out that, if you fold a paper in different directions, you can get more folds. This project is useful for me and others because it shows how different materials can change the strength of objects.

Project # **J1306** Category: **Materials Science - Jr**

Student: **Tvisha Premjith** Grade: **6** G: **F**

School: **Oak Hills Elementary**

Title: **How does color affect heating by light absorption**

The purpose of this experiment was to measure how much heat is produced by the absorption of light by different colors.

The experiment was conducted using thermometers, water, 8 different colored papers, a glass cup, a timer, and a heat lamp. A colored paper was wrapped around the cup and 45 ml of water was poured into the cup. The cup was placed 4 cm away from the heat lamp. The temperature of the water (start temperature) was measured and noted. The heat lamp was switched on and the end temperature was measured after 30 mins. The difference between the end temperature and start temperature gives the temperature increase in water. The experiment was repeated by wrapping the cup with other color papers. The data and observations were recorded in a data log book. Three trials of the entire experiment using 8 different color papers were conducted and the data was logged.

It was observed that temperature differences in water when covered with lighter colors were around 15°F or lower, while darker colors were around 16°F or higher.

In conclusion, this experiment demonstrated that dark colors absorb more heat than light colors as the water temperature increases more when an equal quantity of water is heated for the same period of time with the same source of light.

Learnings from this experiment

Wear lighter colored clothes in summer and dark colored clothes in winter.
In places where it is hot, buy light colored vehicles instead of dark colored vehicles.

Project # **J1307** Category: **Materials Science - Jr**

Student: **Troy Song** Grade: **7** G: **M**

School: **Walter Reed Middle School**

Title: **Atmospheric Energy**

This project aimed to determine the best material to get the most energy output from a corona motor, and the input energy was DC electricity representing atmospheric energy. My hypothesis is If the material is more conductive then there would be higher efficiency and more energy output because more electrons are being stored and used. I used different types of sheets including bronze, copper, aluminum, and tin. I replaced the fins of a homemade corona motor with the materials. I ran the motor for 1 minute and calculated the RPMs. The results were that the most conductive materials outputted the most energy or, in this case, had a higher RPM. In conclusion, I found that if the material is more conductive, more energy output will be produced.

Project # **J1308** Category: **Materials Science - Jr**

Student: **Crystal Goei** Grade: **7** G: **F**

School: **Holy Angels School**

Title: **Water Filled Balloon vs. Air Filled Balloon, Which is stronger?**

For my science fair project my project is about “Air filled balloon vs Water filled balloon, Which is stronger?” My hypothesis is that a balloon filled with water is stronger. The materials that I used are 10 and 5 pound weights, 2 balloons, air, water, string, balloon pump, 4 bricks and a light wooden table. First I started with 2 balloons, 1 filled with water and the other with air. I will use a string to make both balloons the same size. Next I put the air balloon on the ground and put a light wooden table upside down on top of the balloon. I will use the 4 bricks to press on each side of the table to make sure the table won’t lean to the side. I slowly add the weights on top of the table, untll it pops. Next I repeat all the steps again, but with the water filled balloon. The balloon with the most weights on that doesn’t pop wins. The science behind all of this is that Air is incompressible, which means it can’t be squished to make space for air. Water is compressible, so you can squish it and add more air.
The air filled balloon wins holding 115 pounds of weights before popping and the water filled balloon lasted with 105 pounds of weights before popping. The air filled balloons win by 10 pounds! Therefore air filled balloons are stronger than water filled balloons making my hypothesis wrong.

Project # **J1309** Category: **Materials Science - Jr**

Student: **Natalie Adeva** Grade: **8** G: **F**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **Real Gold?**

I've always wanted to see if the gold on my necklaces were real even though they cost less than $100. The reason I made this project is to see if my cheap necklaces are more than they are worth. It always sparked my curiosity to see $15 “gold” necklaces react in a certain way if you put bleach or vinegar on them. The reason I did this is that when researching how to see if the gold on your necklace is reliable you would put white vinegar on it although that's one of the many methods. My necklaces have always looked like gold even though they weren't but what if they were? I hypothesize that the gold necklaces would change color. For this procedure, I would need 3 gold necklaces, filled, and plated, and also 1 cheap one from amazon, as well as white vinegar. I then would fill up a cup with the white vinegar and add all 3 necklaces to the mixture. I set up 3 times which are 15, 30, and 1 hour to check them for my graph. After 1 hour I checked up on all my necklaces and proceeded to wash and dry them. One of the necklaces was fine and the other one peeled. As a result of adding the first variable and the second variable, the “gold” plating peeled off. This experiment revealed that not all gold is reliable. You can use other methods to tell as well if your jewelry is real.

Project # **J1310** Category: **Materials Science - Jr**

Student: **Lucinda Lee** Grade: **6** G: **F**

School: **Walter Reed Middle School**

Title: **Insulate It!**

In my experiment, I wanted to identify a suitable insulation material that wasn't harmful to the environment. My hypothesis was that if styrofoam, rubber, and shredded paper were used as insulators, the rubber would probably work best because it’s the densest. I set up three boxes that were all the same size and lined them with an insulating material. I put the boxes outside and recorded the temperature of each during the week. I noticed that rubber was the most effective insulator based on the temperatures I recorded because it was the warmest at night and the coolest during the daytime. I also noticed that shredded paper was the least humid insulator of the three. In conclusion, my hypothesis was correct, because rubber was the most effective insulator of the three.

Project # **J1311** Category: **Materials Science - Jr**

Student: **Luke Girardi** Grade: **7** G: **M**

School: **Portola Highly Gifted Magnet**

Title: **What Liquid Reflects the Most Light**

WHAT LIQUID REFLECTS THE MOST LIGHT? Luke Girardi and Mrs. Ruth Gramajo (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

This study examined the question of how various properties of liquids affect light reflection. The experiment tested which liquid reflects the most light with the hypothesis that more opaque liquids and ones darker in color would be less reflective and would absorb more light. Various liquids of different colors, sugar contents, and levels of opacity were placed under a flashlight in a dark room. The amount of light they reflected was measured with a light meter. Each liquid was tested five times. The most opaque liquid reflected the most light, followed by the liquids with the highest sugar contents. The results suggest that the chemical formation of the molecules and sugar content make the denser liquids more easily reflect light.

Project # **J1312** Category: **Materials Science - Jr**

Student: **Emmalynn Mounivong** Grade: **8** G: **F**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **Glowstick Mania**

This project was to figure out how different temperatures could change the outlook of a glow stick. Putting a glow stick inside a fridge will slow down the chemical reaction, which will cause it to last longer than putting one in room temperature. I didn’t know what would happen if I put a glow stick in boiling hot water, but I wanted to try so I could have more outcomes. The glow stick was in the freezer so it could become cool. Then, I would crack it then leave it inside. Then, I set down the glow stick into my boiling water. I left it in for a while and then waited for my results. For room temperature I just cracked it and set my house to about 68 degrees. While adding it into the cold freezer I noticed that the chemical reaction was slow. It caused the glow stick to have a long lasting light. But when it was taken out of the freezer, and slowly adapted to the temperature, it started to decrease in brightness. When the glow stick went into hot water, I noticed that the chemical reaction was very quick. The glow stick appeared brighter. The glow stick took about 2 minutes to start showing results. The glow stick that went into the freezer lasted for about 30 hours while the average glow stick lasted about 10 hours. I learned that cool temperatures slow a chemical reaction and warm speeds up a chemical reaction.

Project # **J1313** Category: **Materials Science - Jr**

Student: **Luca Jarjoura** Grade: **7** G: **M**

School: **New Roads School**

Title: **Science of Water Filtration**

My project is a test of how alum and other materials affect water in certain ways. Some materials we are using are, alum, activated charcoal, grade 642 filter water, cups with small holes. Many of these things haven't worked but we have learned a lot, like even after washing activated charcoal multiple times it will still cause distilled water's ph to rise. Our original goal was to see if alum will affect contaminated water, we thought that using the alum would cause the particles to become heavier causing these particles to stay in the cup when filtered. The results were mixed some things worked like the turbidity changing for the better but there were failures like us realizing that the alum changed some of the waters properties so we couldn't get accurate measurements.

Project # **J1314** Category: **Materials Science - Jr**

Student: **Antonio Navarro** Grade: **7** G: **M**

School: **St. Timothy School**

Title: **Radiation Shield**

Radiation exposure from one's cell phone has been a problem for some time. The literature has identified potential outcomes of cell phone radiation exposure such as brain or central nervous system cancers (FDA, 2022; NCI, 2022). Constructing a phone case that shields one from this radiation is one possible solution. But first an investigation is needed to identify what material is the most effective in blocking this radiation. The current study examined various types of materials to determine their effectiveness in blocking cell phone radiation. Materials examined were conductors (copper, aluminum, steel, faraday bag), semiconductor (Silicon), and insulators (plastic, styrofoam, glass).

A pretest was conducted with 4 different cell phones (iPhone 7 Plus, iPhone 8 Plus, iPhone 12 Pro Max, iPhone 13 Pro) to determine which phone would have the highest level of electromagnetic (EMF) radiation. The iPhone 13 Pro emitted the most electromagnetic radiation.

For the final experiment, the iPhone 13 Pro was placed inside a container constructed of each type material. EMF Radiation levels were measured outside each container with the Acoustimeter across 3 test trials and then averaged together for comparison. Findings supported the first hypothesis that conductor materials would be the most effective in blocking EMT radiation compared to the semiconductor and insulator materials. An exception was observed with one type of insulator material (plastic), which did better than the semiconductor material. However, the second hypothesis that the faraday bag would be the most effective than the other conductor materials was not supported by the results.

Project # **J1315** Category: **Materials Science - Jr**

Student: **James Ting** Grade: **8** G: **M**

School: **St. Timothy School**

Title: **Saving Spoiled Shorelines**

This experiment tests whether natural sorbents can be used as effective replacements for booms (barriers placed on the water to block oil) or chemical sorbents to block near-shore oil spills. Current oil spill cleanup methods can be harmful to the environment or not very efficient. According to MDPI (a publisher of public accessible scientific journals), "River oil spills are generally more frequent and pose greater environmental and public health risk than coastal and offshore oil spills." I tested milkweed floss, coco coir, and a patented super absorbent polymer (aka Oil Solutions Powder) against a physical barrier boom (aka cork). I made packets out of each of the materials using tea bags, put 400 ml of water into a foil baking pan, and put the packet in the center of the pan. I then pressed the sides of the pan to form a seal around the packet, preventing oil from leaking through the sides. I then slowly started adding oil. Milkweed floss both blocked and soaked up more oil than the cork and the other sorbents. The powder was the second most effective, the coconut coir was the third most effective, and the cork was the least effective. The cork only blocked some oil but absorbed no oil. Milkweed floss proved to be the best barrier material.

Project # **J1316** Category: **Materials Science - Jr**

Student: **Amielle Jubilee Niere** Grade: **8** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Measuring The Quality Of Different Fabrics**

This project is about the durability of different fabrics. It serves to inform the general public of what fabrics are more easily damaged when washed in a machine, therefore useful when shopping for items involving fabric that needs to be washed. It can save time and money. The fabric was washed in different temperatures, and a flashlight was shone through. The amount of light shone through the fabric was measured using an app called Lux Light Meter. The final data shows that for the most part, the light shone through the fabric was less after the wash than before being washed. This tells us that the fabric became more dense, and possibly shrank. Further research and testing will be needed to validate the gathered data.

Project # **J1317** Category: **Materials Science - Jr**

Student: **Micah Clauson** Grade: **8** G: **M**

School: **Sierra Madre Middle School**

Title: **Which type of insulation works best in homes**

The problem I am trying to solve is to see if the different types of insulation affect the interior temperature over time. Out of all the different insulation types, one type of insulation will maintain the temperature the longest.
To answer my experimental question, “What type of insulation works the best?,” I built six 6”x6”x6” wooden boxes, chose five different insulation materials, and used dry ice cubes to test which type of insulation works best. Then I recorded the temperature on a hourly basis to see which insulation material maintained the dry ice cube the longest.
Based on the charts and graphs, the mylar insulation worked the best out of all of the insulation materials because the temperature in the box was consistent the longest. My hypothesis that the denim insulation was going to work the best was not supported

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Project # **J1318** Category: **Materials Science - Jr**

Student: **Ilia Ghatei** Grade: **8** G: **M**

School: **Hale Charter Academy STEAM Magnet**

Title: **Improving urban life by 24.67%. Stronger/safer roads and buildings by just adding a simple material to concrete mixture.**

Concrete’s necessity to society propels one to consider ways to not only improve the very foundation of cities and buildings, but also possibly prevent damaging accidents concerning buildings and concrete from happening again. Finding a supplemental material that can maximize the strength of concrete can severely improve urban life and make cities safer. If 4% of a concrete mixture is replaced with hydrated lime, then the resistance of the concrete will increase by 30% compared to the normal concrete, because hydrated lime reacts with carbon dioxide from the air in order to harden (carbonation) the mixture making the concrete tougher. In every concrete block (but the control) 4% of the concrete mixture was replaced with a supplemental material which was either sand, gravel, hydrated lime, steel (rebars), or silica sand. All concrete blocks were the same volume. After seven days, the strength of the concrete was measured using a rebound hammer. Results showed that hydrated lime increases the strength of concrete by 24.67% (largest improvement in strength). Other materials also improved the strength which in order from highest to lowest after hydrated lime are steel (rebars, 13.77% improvement), silica sand (9.66% improvement), sand (8.22% improvement), and then gravel (7.61% improvement). Everything went according to plan in this experiment, resulting in reliable data. However, if this experiment was to be done again, measuring the concrete’s strength again after 14 or 28 days could possibly improve this data, though this does not make the findings unreliable.

Project # **J1319** Category: **Materials Science - Jr**

Student: **Isabella Gonzalez** Grade: **7** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **Determining which Metals or Alloys are Most Corrosion Resistant to Saltwater**

Today, we overuse the fresh drinking water on Earth even if we know that there is very little fresh drinking water on our planet. In order to solve this problem, 5 different metals will be tested for cheapness and resistance to saltwater corrosion. To test these metals, 1 washer of each of the metals will be submerged in containers filled with saltwater and the other washer of each will be placed on a table for 7 days straight After 3 days into the experiment, there were no signs of corrosion in both the washers in the salt water and the washers on the table. However, my research suggests that stainless steel would be the best corrosion-resistant metal out of the five. After doing an experiment that lasted 30 days, I observed and ranked each metal based on how much corrosion or discoloration the washer had. After that, I ranked the prices of each metal and multiplied the price rankings by 1 and the corrosion resistance rankings by 2. Finally, I added the 2 products to find the overall number of points each metal had. Since Stainless Steel had the least number of points, it would be the best material to use for a pipe that carries salt water. For an additional way of testing other than visual examination, I simulated the electrical resistance testing by getting the electrical resistance of each metal washer before and after they corrode.

Project # **J1401** Category: **Mathematics & Computer Sciences - Jr**

Student: **Evelyn Gelman** Grade: **8** G: **F**

School: **Hale Charter Academy STEAM Magnet**

Title: **How Accurate Is Artificial Intelligence?**

This experiment reveals a practical application of artificial intelligence and tests the ability of artificial intelligence to recognize emotions and how well it can do that compared to humans. With this tool, the world of artificial intelligence can progress and become more adaptable and useful. If multiple depictions of expressions are shown to an artificial intelligence program and humans, then the artificial will differentiate between the emotions with an accuracy of at least 85% because it is able to deduce which emotion is which by identifying the patterns of the data inputted. However, humans will be able to do the same at a higher accuracy of at least 90%. To figure out the accuracy, gather data on how precisely humans recognize emotions. Then, an artificial intelligence program, such as Teachable Machine, must do the same. Once this is done, compare the accuracy results. This experiment revealed that humans, in fact, can distinguish between different emotions much more accurately than artificial intelligence can. This is proven when the data shows that AI has an accuracy of 81.1% while humans had an accuracy of 97%. Though the experiment did not entirely support the hypothesis, it went generally according to plan. For example, humans still ended up being more accurate, yet artificial intelligence had lower accuracy than predicted. Perhaps more tests could refine the results and create more precise data.

Project # **J1402** Category: **Mathematics & Computer Sciences - Jr**

Student: **Henry Huang** Grade: **8** G: **M**

School: **Ridgecrest Intermediate School**

Title: **Training AI To Play Tennis**

Artificial intelligence will be the next great leap for mankind, and it will influence all of our lives. My objective was to create an artificial intelligence neural network that is capable of learning to play the sport Tennis through deep reinforcement learning.

First a tennis game environment in Unity was created. Using an artificial intelligence neural network, agents would train against a hard coded program, as well as against themselves through Self-Play. The results of training were recorded, what went well, and what could be improved upon. After implementing the improvements, the process was repeated. Some hyperparameters would purposefully be changed to see how the agents reacted and how the overall end product would be affected.

In the end, the neural networks that performed the best were the ones that trained the longest. An interesting result that was observed was that you could bias the agent to do certain things more often by giving it different rewards for doing certain actions. For example, you could bias the agent to always hit down the line if you gave it a reward every time it did so.

The agents could play against each other reasonably well, with a few mistakes here and there. It would be interesting to see this idea implemented into virtual reality so that athletes could practice their technique against different types of agents, like one that never misses, or one that always hits flat, aggressive shots.

Project # **J1403** Category: **Mathematics & Computer Sciences - Jr**

Student: **Pranav Arunachalam** Grade: **7** G: **M**

School: **Rosemont Middle School**

Title: **Pneumonia and Covid Detection on CXR Images using Deep Learning**

Globally, Pneumonia causes more deaths among children each year than any other infectious disease. In 2018, 1.5 million people in the USA were diagnosed with Pneumonia in an emergency department 40,000 died and most were adults. Currently, the most common way to diagnose Pneumonia is through using Chest X-ray. Around the world, there is a lack of radiologists, x-ray technicians or doctors to diagnose. Last year, the Radiological Society of North America (RSNA) acknowledged the shortage of Radiologists. The demand for medical imaging is increasing but there aren't enough radiologists, technicians and physicians. In recent years machine learning has shown potential for medical diagnosis and has become very efficient and reliable. I have enhanced a Convolutional Neural Network (CNN) based machine learning model to detect Pneumonia with higher accuracy. I have developed a user-friendly web site that any doctor can access to get immediate, accurate results.
The main challenge I had during my research was finding Chest X-Ray datasets for Pneumonia. Without proper datasets, training a model will be very difficult. There were only three Pneumonia Chest X-Ray datasets that were repeatedly used for research purposes and most of those datasets were very old. Those datasets didn't represent all ages, mostly lacking pediatric patients so I have developed a process where patients can consent to provide their anonymized x-rays. This will benefit the medical community to create a safe repository of medical datasets which will aid in accurate predicting and diagnosis that will save time, money, and lives.

Project # **J1404** Category: **Mathematics & Computer Sciences - Jr**

Student: **Youcef Hafid** Grade: **8** G: **M**

School: **Al-Huda Islamic School**

Title: **Identifying Dog Breeds**

When people adopt a pet through a pound or shelter, they often don't have information on the animal's origin or breed. Having this information allows the pet owner to ensure that the animal receives the best nutrition, exercise and medical care specific to their breed.
For my project this year, I worked on creating an app that can identify dog breeds. I used the programs Swift Playground and Roboflow to create my app. I chose five dog breeds and uploaded 50 pictures from various angles of each breed. The pictures included a variety of images including different sizes and colors that were then augmented to make sure the app would be accurate under varying conditions.
After building the app and testing it extensively, I found that it had over 95.9% accuracy identifying the dog breed each time I uploaded a dog photo. The app was less accurate when using newborn photos of the dogs. The app can detect the dog's breed for the 5 types I trained on with 95.9% accuracy.
The dog breed detector is an application (app) that can identify the dog's breed with 95.9% accuracy. This app currently identifies 5 breeds of dogs; Golden Retriever, German Shepherd, Rottweiler, Husky, and Doberman. In the future, this app will be able to identify the breed for any type of dog.

Project # **J1405** Category: **Mathematics & Computer Sciences - Jr**

Student: **Aditya Velusamy** Grade: **8** G: **M**

School: **Sierra Madre Middle School**

Title: **What is the most efficient YOLOv5 AI model when detecting vehicles?**

YOLOv5 is a real-time object detection system that has recently been used in various applications, including self-driving cars. In the study, the researcher set out to evaluate different YOLOv5 models for vehicle detection and compare their performance in terms of accuracy and training time.
To do this, a Jupyter Notebook was created to organize and implement the analysis. The notebook was then run to train the models and retrieve all the data gathered from the training of each model. Finally, the researcher analyzed the data to identify patterns, trends, and insights that helped them understand the performance of the different YOLOv5 models for vehicle detection and draw conclusions about the most efficient model.
The evaluation results showed that the nano model had the highest efficiency, with a score of 117. The small model scored 120, the medium scored 165, the large scored 223, and the extra large scored 389. Based on these results, the researcher concludes that the nano model is the most efficient YOLOv5 AI model for vehicle detection among the models tested. The nano model is able to achieve high accuracy while maintaining a fast training time, making it the most suitable model for real-time applications such as self-driving cars.

Project # **J1406** Category: **Mathematics & Computer Sciences - Jr**

Student: **Viggo Magunna** Grade: **8** G: **M**

School: **New Roads School**

Title: **The limits of AI's human voice recognition**

I first asked myself the question of can AI tell the difference in ripeness of fruit.I answered this question using the AI created by google called teachable machines. I bought a bunch of different strawberries of all ripeness stages from unripe to overripe and dried out.I uploaded the pictures to the AI and trained it. What I quickly noticed was that the AI wasn't really looking at the strawberry and more at the background.To solve this problem I made the background completely white to make it all the same, but in the end the shadows were picked up by the AI and as a result the project had way to many flows. I then changed my mind and went to a different question of: How well the AI can tell the difference in emotion when saying phrases. I did this by having multiple people to read different words and upload them to the AI. The people read the words in different emotions:Happy, sad, and Angry. And then uploaded the voices and trained the Ai. The goal for the project is to see if the AI can pick up the difference between emotions and also if people talk to if it can recognize what they are feeling without acting.

Project # **J1407** Category: **Mathematics & Computer Sciences - Jr**

Student: **Tianqi Wu** Grade: **8** G: **M**

School: **Palos Verdes Intermediate School**

Title: **Testing Neural Networks**

In my project, I tested several types of neural networks for image recognition with the MNIST (Modified National Institute of Standards and Technology) dataset. My goal was to see which sizes of networks, training methods, activation functions, and more would affect the accuracy of a neural network and the time taken to train it. Would larger networks be more accurate, or will smaller networks reach a certain amount of accuracy in the same given time? Will any activation function be better than others? These are the types of questions I hope to answer with my research.

My project uses the python programming language and the MNIST dataset to code and train the neural network. I also used NumPy for the activation function and matrix multiplication. After completing the code for the neural network, I tested assorted sizes of networks with several types of training methods and activation functions. After that, I put together these results to see what combinations of network sizes, training methods, and activation functions would allow me to reach the highest accuracy rates with the shortest amount of time.

I have found that assorted sizes and methods to train neural networks have resulted in different rates of accuracy. Larger sizes of neural networks, such as a size of 784x100x100x10 have been able to reach accuracy rates of over 80%, but smaller ones, such as a size of 784x25x25x25x25x10 peaks at a maximum accuracy rate of 60%-70%.

My results have been like what I have hypothesized towards the beginning of my experiment. For example, I have found that larger neural networks can be more accurate than smaller ones but take more time to train. These results may be helpful to future projects concerning neural networks which will allow time to be saved from testing a multitude of network sizes, different activation functions, and training methods to see which ones are the best for a specific type of neural network.

Project # **J1408** Category: **Mathematics & Computer Sciences - Jr**

Student: **Minghao Guo** Grade: **7** G: **M**

School: **Portola Highly Gifted Magnet**

Title: **Development of a Smart Traffic Light Algorithm for Traffic Control**

DEVELOPMENT OF A SMART TRAFFIC LIGHT ALGORITHM FOR TRAFFIC CONTROL. Minghao Guo. Mrs. Ruth Gramajo (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

The purpose of this project is to create an artificial intelligence (AI) traffic light algorithm that leads to efficient traffic controls at intersections. Current traffic light control methods are not designed based on real-time traffic data at each individual intersection and thus are not able to respond timely to changes in car volume at intersections . It is anticipated that machine learning algorithms will perform better because they respond to real time traffic rather than using predetermined timing of the traffic lights. Here, I developed a machine learning algorithm that is capable of efficiently controlling traffic at multiple types of intersections. Real traffic data were recorded at three different types of intersections in two cities and simulated traffic data were generated based on the real traffic data. The simulated traffic data were then used to test the machine learning algorithm. The efficiency of the traffic light control by the algorithm was compared to predetermined light controls. The machine learning algorithm reduced congestion by 32.7% to 65.2% for vehicles while also not slowing down pedestrians compared to the predetermined light controls in reducing traffic congestions. In conclusion, a reinforced machine learning approach by artificial intelligence can help reduce traffic congestion in cities.

Project # **J1409** Category: **Mathematics & Computer Sciences - Jr**

Student: **Daniel Hong** Grade: **8** G: **M**

School: **Palos Verdes Intermediate School**

Title: **Vex Robotics Autonomous Code**

Vex Robotics Autonomous Code

Robotics play an important role in technology because it's the future of humanity. The objective of my project is to code is to improve its capabilities in scoring so that my Vex robot will be able to win in robotic competitions. In doing this project, the results have the ability to show how function robots can be and that boundaries can be pushed for what robots can do. This connects to society by how competitive the market is or any type of game.

?For my project, I used the robot I created, a computer with the VexCode V5 app (a coding app) and a download cord. To create a good autonomous movement, the best method to use is either trial and error or gps (a line strip that shows robot position). I used the sensors in the robot's motors to convert turns into inches to get consistent driving and a sensor which detects degrees for turning.

?I have been able to create an autonomous code that makes the robot score 4 discs and do 2 rollers which 40 points. The goals of my project were successful. By creating this autonomous code this means a robot can start performing well at competitions.

?The results let me achieve my objective by telling me what errors have been made through the coding process or physical problems that need to be fixed. Once all errors are fixed, I am able to finally get my code to be consistent and reliable.

Project # **J1410** Category: **Mathematics & Computer Sciences - Jr**

Student: **Anderson Gomez** Grade: **6** G: **M**

School: **Magnolia Science Academy 6**

Title: **Speeding Surface Area!**

The purpose of my project was to see which amount of surface area in a car design would travel the furthest distance. I built 4 different design cars using cardboard boxes cut into the different designs of cars without any roofs and measured the surface area of each one. The surface area of each car was 2336.5cm^2 for car 1,2091.5cm^2 for car 2, 3806.25cm^2 for car 3, and 3887cm^2 for the cube car. I made a rubber band launcher for the cars that were made out of 1 wooden pole cut in half, 2 rubber bands, and a wooden plank with two holes to hold the poles in the plank. Every time I launched one of the four cars across the room, I measured how far the car traveled using centimeters with yardsticks. I hypothesized that the cars with the least surface area would travel the furthest distance when released from the rubber band launcher. I tested all four cars for a total of 10 trials per car. Car 2 which had the least surface area traveled the furthest distance with an average of 109.7 centimeters which supported my hypothesis that Car 2 would travel the furthest because there would be less surface for the air to resist movement and cause the car to stop. Next time, I would like to see if other different car shapes with different surface areas would travel as far as the ones in this project.

Project # **J1501** Category: **Microbiology - Jr**

Student: **Alex Charette** Grade: **8** G: **M**

School: **Hale Charter Academy STEAM Magnet**

Title: **Does a toothbrush cap really limit bacteria growth on a toothbrush head?**

This project started out by using two store bought toothbrushes, one toothbrush cap, and a human subject. To make the project have as many identicalities as possible, the toothpaste was the same, the storage of toothbrushes was the same, the petri dishes and swabs were the same, and the human subject was the same so that the microbes would come from the same source and from the same food/particles in the mouth. Every morning and night, the toothbrushes were applied the same amount and type of toothpaste, rinsed underwater for the same amount of time, and were brushed in the same mouth for the same amount of time. One toothbrush was then put on a toothbrush cap and the other was exposed to air. They were kept in the same place at the same exact spot and this repeated for 1 week. After the gathering of bacteria on the toothbrushes, The toothbrushes were both swabbed with the same type of culture swab, (different ones but same brand/type) for the same amount of time. Once swabbed, the swabs were then dabbed on the same type of petri dish. The petri dishes were both labeled which was which and set in a dark cabinet, in the same place, for one week. Once a week had passed, they were both examined with data imputed into a journal, and left for 1 month. After 1 month had passed, they were both examined again for the final time and the observations were recorded into a journal and board. The petri dishes, swabs, and toothbrushes were all disposed of in bio-hazard bags and given to the school science teacher to dispose of them due to school protocol. All surfaces were cleaned with 10% bleach and sanitized properly.

Project # **J1502** Category: **Microbiology - Jr**

Student: **Conor Durcan** Grade: **7** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **Testing Bacteria Levels in Different Water Environments**

Water is found in a variety of locations in the environment including the ocean, rivers, streams, lakes, and water reservoirs. Water covers 70% of the earth and is a vital part of all life. Unfortunately, only 1% of that water is available for direct human use. Water is a vital part of our lives, and around the world, many people need ready access to clean water. Depending on the location water can contain coliform bacteria that can include dangerous pathogens. If consumed the pathogens in the water can make someone sick or possibly die. Although there have been major improvements around the world, due to geographical disparities approximately 2 billion people still did not use safely managed drinking water in 2020. In addition, many developing nations also lack access to basic sanitation. This includes around 2.6 billion people who lack access to sanitation, which includes the ability to have water for washing and disposal of waste. Although many countries have the infrastructure in place to filter and clean contaminants from the water supply, there are many including third-world countries that do not. We will show how filtered water will have the least amount of bacteria, and will ultimately be the safest water to consume, wash and prepare food.

Project # **J1503** Category: **Microbiology - Jr**

Student: **farah Sandoval** Grade: **7** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **You cannot B. Cereus: Bacteria growth at school**

Objectives

My objective was to see how much bacteria will grow from surfaces at my school. I did this to determine if students and faculty are at risk of infection, by culturing samples from 5 different locations.

Materials and Methods

My experiment tested five different locations: the bathroom, the costume closet, the frozen yogurt handle, a desk, and a doorknob, with the control group being a cleaned desk. I swabbed each location four times, and cultured each separately on a Petri dish for 48 hours. They were cultured on campus in an incubator, then I calculated the average.

Results

The costume closet grew the most bacteria averaging 20.3. Although, the costume closet Petri dishes grew something that was not bacteria and was not included in the average. The group that grew the second most bacteria is the froyo handle, which averaged 5.5 colonies. Third place was the desk, which averaged 2.75 colonies. The fourth was the doorknob, which averaged 0.5 colonies. Last, was the bathroom, averaging 0.25 colonies.

Conclusion

In conclusion, students and faculty are partly at risk, because while the costume closet grew a lot of bacteria, it is rarely used. I hypothesized that the costume closet would grow the most because it is rarely cleaned and has time to collect bacteria. The groups that grew the least were the spaces used most often. Now I know that spaces used not often are just as likely if not more to grow bacteria.

Project # **J1504** Category: **Microbiology - Jr**

Student: **Mirsolih Agzamov** Grade: **7** G: **M**

School: **New Horizon School**

Title: **The Effect of Different Temperatures on Yeast Fermentation**

The objective of this experiment was to find the effect of different temperatures on yeast fermentation. The hypothesis was that if yeast is dissolved in room temperature water (22 Celsius), warm water (37 Celsius) and hot water (47 Celsius), then the dough with yeast in hot water will rise the highest. Materials used were yeast, flour, sugar, thermometer, and 5 500ml beakers. The method was to make the dough with yeast at different temperatures. Then fill the beakers to 150ml line with the dough and record it. Let the dough rise at room temperature. After 1 hour record the height of the dough in the logbook. The same method was repeated 14 more times for each temperature. This project is important because it would give the maximum amount of dough for bakers to use. Results indicated that the hypothesis was proved to be correct. The dough made with hot water rose an average of 4.53 cm, warm water (0.46 cm), and room temperature (0 .093 cm). The original plan was to measure just the height of the dough balls. One problem that occurred was that the dough balls started expanding sideways, so the experiment was done again using the beakers. In the future, yeast will be tested at different temperatures and dough will be made from almond flour, coconut flour, and tapioca flour. The amount of sugar used will also be varied to see if it affects the rising of dough.

Project # **J1505** Category: **Microbiology - Jr**

Student: **Suhaa Hamdan** Grade: **8** G: **F**

School: **Al-Huda Islamic School**

Title: **Bee Gone! A Study on the Antibacterial Properties of Bee Propolis.**

Bee propolis contains more than 200 different ingredients of which almost 75 have some pharmacological or biological significance. The most important are: resin (50%) , wax (30%), vitamins, essential oils (10%), pollen (5%), minerals, oligo-elements, flavonoids, and herbal balm. In this project we tested whether bee propolis could prevent or slow down bacterial growth. We used 6 agar dishes for this experiment. We swabbed bacteria from our school cafeteria tables using cotton swabs then swabbed the bacteria onto the agar dishes. We added bee propolis to 3 agar dishes while the other 3 didn't have any bee propolis. We cultured the agar dishes for 10 days. On day 10 we noticed that both of the agar dishes had bacterial colonies, The agar dishes with bee propolis had an average of 2 colonies for the three trial, while the agar dishes without bee propolis had the average of 1.67 bacterial colonies. In the controlled experiment, even though the bacterial colonies were less in number, the average size of the bacterial growth was higher at 5.33 mm versus 5mm for the average bacterial growth with bee propolis. Our hypothesis was not clearly supported. Even though the bee propolis stopped the growth of bacteria in one trial, the averages showed that the bee propolis culture had a higher average of bacterial growth. While research has proven that bee propolis kills bacteria, our experimental average did not reflect that.

Project # **J1506** Category: **Microbiology - Jr**

Student: **Sena Hokugo** Grade: **7** G: **F**

School: **The Science Academy STEM Magnet**

Title: **Which Hand-Cleaning Products Are Most Effective When Trying to Remove Germs From the Hands?**

The objective of this experiment is to see which product is most effective at removing bacteria from the hands. Five products which include antibacterial soap, regular hand soap, hand sanitizer, sanitizing hand wipes, and LAUSD school soap, were chosen in this experiment. The project hypothesizes that regular hand soap will clean the hands more thoroughly than any other products selected. Hands were put in soil and agitated for a certain amount of time. Glo Germ was then rubbed on the hands and rinsed with water. Photos of the hands were then taken in the dark under a UV light. Hands were then cleaned with each product individually, and photos were taken again. The data was uploaded to ImageJ software and split according to color channels. The red channel was isolated to indicate and represent bacteria on the hands. The independent variables are the products used, and the control is rinsing hands with water. The dependent variable in the project is how much of the germs each product removed. The constants in the experiment are the duration of time the hands are immersed in soil and washed, how long the Glo Germ (a solution that shows how much product is left post-wash) is rubbed on the hands, and how many drops of Glo Germ is used. The results indicate that the hypothesis was not supported for regular hand soap being the best product to remove the most germs. Sanitizing hand wipes proved to be the most effective cleaning agent used.

Project # **J1507** Category: **Microbiology - Jr**

Student: **Allison O'Boyle** Grade: **7** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Is it Safe to Swim?**

Objectives

High ocean bacteria levels are produced through storm runoff. I tested to see if an enclosed beach or open beach was impacted more by storm runoff. In addition, how many days after a storm you should wait until the water is safe to swim in again (0 days, 1 day, 3 days, and 5 days after a storm).

Methods

I tested Mothers Beach (enclosed) and Annenberg Beach (open) on days 0, 1, 3, and 5 after a storm. I collected the water using sterile screw cap tubes. The water was swabbed onto petri dishes using sterile swabs and then put into an incubator for 2 days. I counted the colonies in each petri dish.

Results

Mothers and Annenberg beach had 0 colonies on day 0. On day 1, Mothers had an average of 10 while Annenberg had an average of 0. On day 3, the average of Mothers was 1.5 colonies, and Annenberg had 3.25 colonies. On day 5, Mothers average had 4.75 and Annenberg had 0.

Conclusion

The enclosed beach on day 1, 3, and 5 all had higher averages than the open beach. This is due to poor circulation. The 3 day rule did not work for the enclosed beach as it had bacteria on day five. In the future, after a storm at an enclosed beach I suggest waiting longer than 5 days to go swimming. At an open beach the 3 day rule works as a measured time marker for safe swimming.

Project # **J1508** Category: **Microbiology - Jr**

Student: **Madeleine Martinez Park** Grade: **7** G: **F**

School: **Portola Highly Gifted Magnet**

Title: **Can Noctiluca Scintillans Be Used To Make An Affordable, Eco-Friendly, Non-Electric Lamp?**

CAN NOCTILUCA SCINTILLANS BE USED TO MAKE AN AFFORDABLE, ECO-FRIENDLY, NON-ELECTRIC LAMP? Madeleine Martinez Park, Mrs. Ruth Gramajo (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

The purpose of this experiment was to create a cheaper and more accessible light source other than the expensive solar panel. The reason for choosing this experiment was to help the 775 million people who have no access to electricity or a light source in their homes. My hypothesis was that if the noctiluca scintillans are bright enough while being agitated, then they can be used to make an affordable, eco-friendly lamp. After culturing the noctiluca scintillans, I measured the amount of light they emitted. Three trials were run, one for a Heron's fountain, another for a modified Bhaskara's wheel with ¼ full bottles, and a modified Bhaskara's wheel with ½ full bottles. The results of the three trials showed which of the lamp models were the most successful for keeping the liquid moving and agitating the dinoflagellates for the longest period of time. It was the wheel with ¼ full bottles which lasted longest. The results indicate that my hypothesis that if the noctiluca scintillans are bright enough, they can be used to make an affordable, eco-friendly lamp could be correct if we use one liter of dinoflagellates, but also incorrect because the lamp models did not stay moving anywhere close to the desired time of 30 minutes.

Project # **J1509** Category: **Microbiology - Jr**

Student: **Jiya Patel** Grade: **8** G: **F**

School: **Portola Highly Gifted Magnet**

Title: **Comparing the Antimicrobial Effects of Amoxicillin, Penicillin and Vancomycin to Forms of Natural Medicine on E-coli Bacteria.**

COMPARING THE ANTIMICROBIAL EFFECTS OF AMOXICILLIN, PENICILLIN, AND VANCOMYCIN TO FORMS OF NATURAL MEDICINE ON E-COLI BACTERIA. Jiya Patel
(Mr. David Schmidt) Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.
The purpose of this project is to understand the difference in effects of regular antibiotics and natural medicine in order to help underdeveloped countries and non--wealthy people. Antibiotic resistance is at an all time high, so it's time to start figuring out other forms of antibiotics. If the turmeric, honey, and ginger is tested on the e-coli bacteria, than it will have a greater effect on the bacteria than penicillin or amoxicillin. In order to perform this project I worked in a lab and started by creating my petri dishes using the Kirby Bauer technique, then applying all the e-coli bacteria. After applying the culture I placed my antibiotic sensitivity disk in the dish and then added all the natural herbs and antibiotics in using different methods. I then placed it into the incubator and on day 1, day 2, and day 3, and measured the zone of inhibition on each petri dish and analyzed the results. The hypothesis correct and wrong simultaneously. For each established and synthesized “antibiotic” the mean of the zone of inhibition steadily grew, with the top performers being Amoxicillin, Penicillin, Turmeric, and Garlic, while Honey, Vancomycin, and Ginger fell short. From the top performers, turmeric grew at a higher and consistent rate than Amoxicillin and garlic did the same compared to Penicillin. Which is why it's imperative and important to notice that when natural selection completes its organic duties, the medical field will need to discover alternative solutions, some proudly incorporating turmeric and garlic.

Project # **J1510** Category: **Microbiology - Jr**

Student: **Noor Ahmad** Grade: **6** G: **F**

School: **Al-Huda Islamic School**

Title: **Identifying the Limits to the Growth of Bacteria under Various Temperatures.**

Bacteria grows best under warm temperatures. Very cold or very hot temperature prevents the growth or even kills bacteria. Most bacteria are not harmful. A very small percentage of bacteria can cause harm. This project examined the limits to the growth of bacteria under various temperatures.
It was hypothesized that bacteria will grow best under 37 degrees Celsius. To test this, 9 agar dishes were swabbed with samples from the school bathroom floor. Three trials were set for each temperature. Three agar dishes were cultured under room temperature at 21 degrees Celsius, three were cultured in the fridge at a 5 degrees Celsius and the last three were cultured in an incubator at 37 degrees Celsius. All the agar dishes were sealed and labeled, and observed every two days for ten days for number and diameter of bacterial colonies.
The results showed that the bacteria cultured in the incubator at 37 degrees Celsius had the most bacterial colonies at an average of 4.67 colonies, and the largest average diameter at 23.33mm. All three agar dishes cultured in the fridge at 5 degrees Celsius for ten days had zero bacterial growth.
The control, which was the bacteria cultured at room temperature, 21 degrees Celsius, had an average growth of 3.67 bacterial colonies, and an average diameter of 5mm.
The hypothesis was supported! Bacteria cultured under 5 degrees Celsius did not grow at all and bacteria cultured under 37 degrees Celsius grew the most.

Project # **J1601** Category: **Pharmacology - Jr**

Student: **Makana Vega** Grade: **8** G: **F**

School: **Miraleste Intermediate School**

Title: **The Affect of Solubility on Painkillers**

Many individuals struggle with everyday pains such as migraines, joint inflammation, or back and neck pains. However, many people who use painkillers are unaware of how long it actually takes the drug to dissolve in their stomach and start acting. It is believed that non-enteric-coated tablets would dissolve faster than pills with the EC coating or gel capsules. The goal is to see which kind of painkiller dissolves the fastest and, hence, starts acting the fastest.

Six brand-name painkillers were tested in 100 mL of lemon juice. Five pills from each brand were individually tested and timed. The lemon juice was put in a standard Mason jar. The jar was placed in a pot that contained boiling water. The pill was only put in once the lemon juice reached 38?.

As a result, the enteric-coated tablets took an average of 1 minute and 23 seconds. The non-coated tablets took an average of 1 minute and 56 seconds. Lastly, the gel capsules took an average of 3 minutes and 16 seconds. These results show that each type of painkiller takes different times to dissolve and start acting, and some types act faster than others.

My observations and outcomes provided solid evidence to support my hypothesis.
It would be interesting to conduct the same trial with various brand names for the same type

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Project # **J1602** Category: **Pharmacology - Jr**

Student: **Yasmine Labesh** Grade: **8** G: **F**

School: **Islamic Center of Claremont School (ICCS)**

Title: **Which Cramp Medication Dissolves the Fastest in White Vinegar?**

The purpose of my project is to find out which period cramp medication dissolves the fastest with white vinegar (which will take the place of stomach acid). My goal is to find the most reliable period cramp medication which will have the best chance of working the fastest compared to many others. My hypothesis is that ibuprofen will be the medication that will dissolve the fastest in white vinegar, because Ibuprofen slows down prostaglandin production. Less prostaglandin means less uterine shedding, leading to fewer cramps and less bleeding. My first step is to add Ibuprofen in white vinegar and water and compare it to how fast it dissolves in those different types of liquids as well as compared to other drugs. One of the assumptions is that the top best period cramp medications are Ibuprofen and Aleve/Naproxen which were the top two best cramp medications as in the most reliable and the fastest working. I had tested the two medications with both water and vinegar. In total there were four tests that had been run. My hypothesis was correct, which was the ibuprofen dissolving the fastest, especially in vinegar. My future implication is that when looking for the best and fastest cramp medication, ibuprofen is the best there is.

Project # **J1603** Category: **Pharmacology - Jr**

Student: **Sophia Buckmaster** Grade: **8** G: **F**

School: **Holy Angels School**

Title: **Does Name Brand Matter?**

If I dissolve two name-brand painkillers, and two generic painkillers, then the name-brand killers should dissolve faster. Acetaminophen - an analgesic drug used to relieve mild or chronic pain and to reduce fever, often as an alternative to aspirin. Proprietary names include Tylenol. Ibuprofen - a synthetic compound used widely as an analgesic and anti-inflammatory drug.I conducted my experiment by setting up a camera that shows four different mini-cups that ?? 1 tbsp of vinegar, which would mimic the stomach acid, and then place the four different pills, which were the following: Advil, (generic) Ibuprofen, Tylenol, and (generic) Acetaminophen in the cups. I set up a stop watch and put a timer so that every five minutes I would stir the contents and make my observations.
Within 5 minutes of placing the pills in vinegar, the Tylenol had fully dissolved in the vinegar, while all the other pills only lost their top coats. At the 10 minute mark, the three remaining pills had started to wear down, yet none had started to lose shape. When the stopwatch has hit 15 minutes, the generic Ibuprofen had finally dissolved, while the Advil and Acetaminophen were still only beginning to dissolve. Fast forward to 25 minutes, all 4 pills had fully dissolved in the solution and were then left to make observations.
My research shows that name brand can matter on the dissolution rates, but pain relief effectiveness was not part of the study or not tested. My research has proven that Tylenol dissolves faster than generic Acetaminophen, and generic Ibuprofen is dissolved faster than Advil. I recommend using Tylenol if you want faster dissolution rates, and generic Ibuprofen for faster results.

Project # **J1604** Category: **Pharmacology - Jr**

Student: **Hana Cho** Grade: **8** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Effect of common antibiotics (Penicillin, ampicillin, and neomycin) on gram-positive (Bacillus subtilis) and gram-negative (E. coli) bacteria**

Objectives
My objective was to see if gram-positive and gram-negative bacteria would respond differently to various types of antibiotics. This will provide information on which common antibiotic to take when dealing with an illness caused by gram-positive or gram-negative bacteria.

Materials and Methods
To do this, I swabbed 10 petri dishes with E. coli (gram-negative), 10 petri dishes with Bacillus subtilis (gram-positive), and 10 petri dishes were left sterile. I then placed one of each antibiotic disc (penicillin, ampicillin, and neomycin) on each petri dish and incubated them. After two days, I measured the Zone of Inhibition (ZOI) in millimeters.

Results
My results from my group of Bacillus subtilis found that ampicillin was the most effective antibiotic against it, with the average ZOI being 6.72 mm and neomycin being the least effective, with the average ZOI being 5.76 mm. The average ZOI of the group with penicillin was 5.91 mm. My data from my control group found that there was no growth in any of the petri dishes. However, the data from my group of petri dishes containing E. coli was inconclusive because of experimental error.

Conclusion
My results were inconclusive and therefore disproved my hypothesis, which was that the petri dishes containing Bacillus subtilis will have a larger zone of inhibition. My petri dishes containing E. coli should have had significant ZOIs, but they did not because of an error I made, making my results inconclusive.

Project # **J1605** Category: **Pharmacology - Jr**

Student: **Talia Boghossian** Grade: **7** G: **F**

School: **Chamlian Armenian School**

Title: **Can Resveratrol and Drosophila Melanogaster Help Us Live Healthier and Longer?**

This study aimed to investigate whether Resveratrol may lengthen fruit fly lifespan and improve their health. I performed an experiment in which I added Resveratrol at several levels, comparing this to the survival of flies in distilled water without Resveratrol. The containers with 30 mg/L, 15 mg/L, and 4 mg/L labels for the first, second, and third trials, accordingly. dissolved Resveratrol in one liter of distilled water in the amounts of 30 mg, 15 mg, and 4 mg to produce the initial diluted solutions. After preparing the solutions, I infused each solution with 8 grams of Drosophila meal. The solution was added to each container using a syringe in a 20 mL dose. For two weeks, I counted the dead flies every three days and documented the information. The average number of flies that survived at 30 mg/L was 45; at 15 mg/L, it was 33.7; at 4 mg/L and in distilled water devoid of Resveratrol was 22.3. The information supported my theory that Resveratrol can extend life. I also learned that, although it has not been proven, it may assist in treating some human health issues.

Project # **J1606** Category: **Pharmacology - Jr**

Student: **Arhum Mirza** Grade: **8** G: **M**

School: **Institute of Knowledge Middle School**

Title: **Defeat the Unseen: Developing a Pathway to Help the Blind Navigate**

OBJECTIVE: Within America alone 13.3 million individuals suffer from legal blindness and visual damage (EI). According to the WHO, children with early onset vision impairment can suffer from “delayed motor, language, emotional, social and cognitive development” (WHO). School-going children with visual impairment also display lower levels of academic achievement (WHO). Adults with visual impairment showcase lower participation and productivity in the workforce, increased mental health issues, and social isolation and difficulty going about daily life functions, particularly walking, which is the focus of this project.
MATERIALS/METHODS: This project used Arduino Uno R3 boards, ultrasonic sensors, rectifier diodes, NMOS transistors, jumper wires, vibrating mini motor discs, breadboards, and a construction vest. Using Tinkercad to sketch out a successful circuit with its components and by programming the Arduino boards, four identical devices were created. Each was placed in a vest pocket and tested in fifteen trials with a blindfold on to determine the success of the motors with five trials for a wall, five for a door, and five for a table.
RESULTS: All sensors worked and alerted the wearer for the wall and door in each of their five trials but in the table trials only the bottom two vibrated while the two chest-level sensors did not detect anything and thus, didn’t vibrate.
CONCLUSION: It could be inferred from these findings that the use of ultrasonic sensors and vibrating motors as a way to alert the visually impaired of approaching objects is successful and can be adapted for increased practicality.
Please note: Abstract will be updated on the date of the fair.

Project # **J1607** Category: **Pharmacology - Jr**
Student: **Yaser Syed** Grade: **7** G: **M**
School: **New Horizon School**
Title: **Comparing the Dissolution Rate of Tylenol**

The purpose of this experiment was to find out whether the Tylenol caplets, tablets, or gelcaps will dissolve faster in the stomach. The hypothesis was if Tylenol caplets, tablets, and gelcaps are dissolved in water, water with digestive enzymes, and soda, then the tablets will dissolve the fastest in the water, water with digestive enzymes (Zenwise), and soda. The materials used were different types of Tylenols, water, soda, and digestive enzymes. The method was to dissolve each type of Tylenol in water, soda, and water with enzymes. Each variable was tested ten times. The time taken to dissolve completely was recorded. In water, the average time taken to dissolve caplets was the fastest (125.9 seconds) followed by tablets (169 seconds), and then gelcaps (169.1 seconds). In soda, the average time taken to dissolve gelcaps was the fastest (179 seconds) followed by caplets (202 seconds), and then tablets (337.3 seconds). In the water with enzymes, the average time taken to dissolve caplets was the fastest (184.7 seconds) followed by gelcaps (196.4 seconds), and then tablets (262.7 seconds). Tylenol caplets dissolved the fastest in water and water with digestive enzymes. Gelcaps dissolved the fastest in soda thereby proving the hypothesis to be incorrect. There could have been errors in recording the time taken to fully dissolve. In the future, different medications in a variety of enzymes (bromelain, papain) will be tested. This project is extremely useful to people because caplets dissolve the fastest and will provide quick relief from pain.

Project # **J1608** Category: **Pharmacology - Jr**
Student: **Charlotte Kamdar** Grade: **8** G: **F**
School: **Archer School for Girls - Junior Division**
Title: **Saffron VS Cancer: How Saffron affects the Regeneration of Neoblasts in Planaria**

Objectives
My objective was to determine if saffron had an impact on the neoblasts' ability to regrow in planaria. I compared the regrowth of a control group of planaria to a group of planaria fed saffron to achieve this. I divided the planaria into two different experimental groups to test if the timing of saffron being added to the diet of planaria affects the regrowth.

Materials and Methods
My experiment used 30 planaria and 5 grams of saffron. There were three groups of ten planaria each. The first batch of 10 planaria, known as the control group, received nothing but their regular diet of egg yolks. The experimental A group was the second, and they only received saffron and egg yolk after being cut. Saffron was given to Experimental B both before and after being cut, along with egg yolk.

Results
The findings are not entirely clear, and the planned level of precision in the measurement differences was not entirely achieved. However, there was a result that supported my hypothesis—the control group grew longer than the experimental groups. The control group regrew to a size of 0.5 cm whereas Experimental Group 2 regrew slowest with an average size of 0.3 cm.

Conclusion
In conclusion, the data supports my hypothesis that the control group would grow longer than both control groups. The results could have been more precise but the results did provide a decent change between groups. Now I am aware that saffron will slightly slow planaria growth.

Project # **J1609** Category: **Pharmacology - Jr**

Student: **Samuel Paik-Heintz** Grade: **8** G: **M**

School: **Mark Twain Middle School**

Title: **The Viability of Bacteriophage Treatment for E. Coli**

The objective of our experiment was to study the viability of bacteriophage treatment for E. Coli infections. We prepared 5 trays of MacConkey agar. We measured and put 1 ml of the living E. Coli K-12 strain in each tray. We measured and put 0 ml of T4 RNA in the first tray, 1 ml of T4 in the second tray, 2 ml of T4 RNA in the third tray, 3 ml of T4 RNA in the fourth tray, and 4 ml of T4 RNA in the last tray. Using an infrared thermometer, we recorded the temperature of each agar plate every 10 minutes for 3 hours. It has been shown that E. Coli produces 2.16 milliwatts over the course of 60 minutes. We hypothesized that, if we decrease the amount of T4 bacteriophage RNA in milliliters, then the number of E. Coli cells and the temperature in an area will increase. Because each milliwatt the E. Coli produces affects the temperature minutely, we predicted the temperature difference between two consecutive petri dishes would be at most 0.5 degrees celsius. After the first 60 minutes, the petri dish with the 0 ml of T4 RNA remained at the highest temperature by a margin of 0.4 Celsius for the remaining 120 minutes of the experiment. Thus, our hypothesis was correct. Throughout the experiment, we wore PPE, including gloves and N95 masks. Additionally, we disposed of the E. Coli using the district pickup of hazardous materials.

Project # **J1610** Category: **Pharmacology - Jr**

Student: **Abigail Moeller** Grade: **8** G: **F**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **pH with Pills**

Ibuprofen pills are shown dissolving at different rates, the purpose of this project is to show how quickly the tablets or capsules can dissolve. Pills dissolve overtime in liquids, I wanted to know how I can affect them. My hypothesis was asking if the pH in a liquid affects the way the pills of choice will dissolve. I had 10 cups with 5 different liquids to add to each. The pills were split up evenly, 1 per cup, meaning there was 5 of each type of ibuprofen, capsules and tablets. The cups liquids include, glass cleaner (pH 11), bottled water (pH 7), grape juice (pH 5), vinegar (pH 4), and lemon juice (pH 3). I recorded 66 minutes on my stopwatch and wrote down all the data I saw as I watched the pills dissolve. The experiment’s results show how my hypothesis was correct, pills will dissolve differently depending on what the level of pH is in the liquid. The data shown has proven to us that ibuprofen capsules start dissolving later than the tablets, but you get all of the medicine quicker once it cracks open. Rather than the tablet needing to fully dissolve.

Project # **J1611** Category: **Pharmacology - Jr**

Student: **Ella Tulloch** Grade: **8** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Battling with Broccoli: The effects of sulforaphane on oxidative stress in C.elegans**

Objectives

My objective was to see if sulforaphane (found in cruciferous vegetables) can decrease the effects of hydrogen peroxide induced oxidative stress in c.elegans. Oxidative stress has many harmful effects on our health, such as increased risk of cancer and heart disease. I wanted to see if sulforaphane can decrease that.

Methods

To test this I gave c.elegans sulforaphane dosages of 0, 200 ?M, and 400 ?M of sulforaphane, which was applied to an LB broth inoculated with their OP50 E.coli food source. I treated the C. elegans with this broth for 2 days before inducing oxidative stress by applying 1mM of H2O2 directly to their habitat. I measured the survival rate of the c.elegans after 30 min, 4h, 8h, and 24h of having oxidative stress induced.

Results

I found that the higher doses of sulforaphane decreased the death rate of the c.elegans. In my group with 400 ?M (1.06g) of sulforaphane, on average 2.4 C.elegans died, while 23.6 C.elegans died on average in my group with only H2O2. In my group with 200?M (0.53g) of sulforaphane, 7.5 C.elegans died on average. From this data you can see that the death rate gets lower, as the sulforaphane dose gets higher.

Conclusion

In conclusion, the highest dose of sulforaphane decreased the effects of oxidative stress the most. This proves my hypothesis correct because I hypothesized that the higher doses of sulforaphane would lead to an increased survival rate.

Project # **J1701** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Nikolas Navarro** Grade: **8** G: **M**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Rocket Aerodynamics**

Aerodynamics is the main concern when it comes to launching rockets as it is the main thing dragging the rocket from going higher. The aerospace industry is here because of aerodynamics and the constraints with it. I learned from many different websites that aerodynamics is important to the launching of the rockets. This showed me that I should try to get more aerodynamic designs for the rockets to make the rockets use less fuel.This graph shows us that the more speed you gain, the more air resistance in the air. The graph sources is EngineeringToolBox, (2004). Drag Coefficient. [online] Available at: https://www.engineeringtoolbox.com/drag-coefficient-d_627.html [Accessed 16/12/2022].The sources I used to make the wind tunnel was "How to make a wind tunnel by James Abt007 on Instructables (2014) I used this to see what they did for their wind tunnel. Then According to "Build your own inexpensive wind tunnel by apogee Peak Of Flight (Jan 10, 2010) I also used this to design my wind tunnel seeing what they used for their intake.

Project # **J1702** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Anthony Bangayan** Grade: **8** G: **M**

School: **Chaminade Middle School**

Title: **Nerf Blasting Barrels: Do Nerf Barrels Actually Work?**

The reason I started this experiment is because I have this hobby of shooting a nerf blaster whenever I feel bored. As I was firing it, I noticed that it seemed like the nerf blaster was more inaccurate when it had the barrel on. But that makes no sense! So, I then decided to do this experiment in the first place. I used the Delta Trooper for this experiment. I alternated between rounds of 12 nerf darts with the barrel on, then with the barrel off 8 times. To reduce experimental error. I put the nerf blaster on a stand, and leveled the nerf blaster after every shot and readjusted the stand if it was noticeably off the target. Now for the actual data, when we fired it with the barrel on, it would hit the target on average 3.5 times per magazine with a standard deviation around 1.73. On the contrary, with the barrel off, it would hit on average 8.25 times per magazine with a standard deviation of 4.33! This proves that my hypothesis is correct. Now the reason for this is because the nerf blaster simply doesn't generate enough force for the barrel to work. Real ones generate a force much, much greater than nerf blasters which is why for real ones, a longer barrel does increase range and accuracy. What happens in the nerf blaster is that the darts hit the barrel while they are shot out of the nerf blaster.

Project # **J1703** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Janelle Elias** Grade: **6** G: **F**

School: **Magnolia Science Academy 6**

Title: **Flight C**

The objective of my project was to test which type of paper airplane can fly the furthest with the heaviest amount of cargo weight. Each plane had a different design and was made out of a cardstock paper in order to support and stabilize them in flight. The original models for the paper airplanes and paper cargo boxes were to be made with construction paper. The cardstock paper allowed my paper airplanes to fly for a longer period of time and carry the cargo without noticeable difficulties. To make the three paper airplanes and their designs, I used three different origami methods. The size of the paper was in A4 paper for all three airplanes. I learned to fold my paper into 3-D boxes as well. I also filled the cargo boxes with bracelets and pebbles. I used paper clips to help Planes B and C to provide more support. After testing my paper airplanes for 3 different trials, I concluded that Plane C flew the furthest for a total of 5.615 meters while carrying the most amount of cargo. My data supported my hypothesis, which stated that Plane C would be the plane that can carry the most weight cargo. This is because Plane C has special features such as paper clips and an extra box of empty cargo to enhance the sturdiness and stability to hold the cargo. If I were to retest my experiment, I would try using different types of paper to fold the plane.

Project # **J1704** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Aditi Mahajan** Grade: **8** G: **F**

School: **Portola Highly Gifted Magnet**

Title: **How Does the Diameter of an Artery and Plaque Build-up Affect the Rate of Blood Flow in an Artery?**

HOW DOES THE DIAMETER OF AN ARTERY & PLAQUE BUILD-UP AFFECT THE RATE OF BLOOD FLOW IN AN ARTERY? Aditi Mahajan. Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

The purpose of this experiment is to find out how much of a difference plaque and the inner diameter of your arteries make on your health. Through this experiment, the question of how diameter and plaque build-up in an artery affects us will be answered. There were six hypotheses in this experiment. The first two stated that if the diameter of an artery is reduced, less liquid will come out, and if the diameter of an artery is increased, more liquid will come out. The last four state that if gum (representing plaque) is placed in certain tubes, less liquid will flow out of the tubes. This was tested by using a model connected to different tubes of different inner diameters and recording how much liquid flows out of the tube in 10 seconds. Plaque's effect on our arteries was also tested by using gum to partially block the tubes. The results showed that plaque's drastic and negative impact on our health and blood flow, supporting all of the hypotheses tested.

Project # **J1705** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Grecia Bonilla** Grade: **6** G: **F**

School: **Pomona Unified School District Junior Division**

Title: **Parachute Drop Bomb**

Objective

The experiment was to see which parachute fabric from nylon, dacron, silk, canvas, and cotton would slow down a parachute the most. It was expected that dacron would slow down the parachute the most.

Materials and Methods

We used nylon, dacron, canvas, silk, and cotton fabric, string, a metal cube, a basket, and a timer. We got all the fabric and cut it into 25 inch circles. Then, we attached 16 strings to the circles (making them parachutes) and tied a basket with a metal cube in it to the string. We then dropped the parachutes off a balcony 10 times with each parachute, timed how long it took for each parachute to fall and hit the ground, and calculated the averages.

Results

Nylon got an average of 1.335 seconds, dacron got an average of 1.358 seconds, canvas got an average of 1.004 seconds, silk got an average of 1.571 seconds, and cotton got an average of 1.491 seconds.

Conclusion

Silk has the slowest average time and with that we can conclude that silk slows down a parachute the most.

Project # **J1706** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Namya Mehra** Grade: **8** G: **F**

School: **Sierra Madre Middle School**

Title: **How Do Air Pressure and Speed Impact the Collision of Two Objects?**

How do the speed of the fluid and the area the fluid travels through affect the Bernoulli principle? A demonstration of the Bernoulli principle is given by increasing the wind between two objects, which creates an imbalance of pressure, which causes the objects to collide. But what happens when you vary the distance between the cans or the speed of airflow between the cans?

First, two cans were hung next to each other. Then a fan/hair dryer propelled air between the two cans. More distance was added between the cans, with the speed constant each time, and the speed of the hair dryer was modified, with the distance remaining constant. Each time a variable was changed, the amount of time it took for the cans to collide was recorded. Then the times were compared.

After testing they found that at 13 cm the cans collided the fastest and at 12 cm the cans were slower, both measured with the same speed. This means that at 13 cm the air pressure lowered to an adequate amount faster, and in the 12 cm distance the air pressure took more time to be reduced. The low speed caused the collision to occur faster, but the high speed had only slightly slower results.

Project # **J1707** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Lev Marmer** Grade: **6** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **The Grand Splash**

We were trying to come up with an experiment that was simple and practical, but still interesting and unique. We decided on the experimental question “If I poke a hole in a full water balloon, will the temperature of the water affect how fast it comes out?” However, we ran into a number of problems, so we changed it to a simpler experimental question: “If I turn a full bottle of water upside down, will the temperature have a noticeable effect on the speed that the water comes out?” We thought that the cold water would fall slightly faster than the hot water, because it is heavier.

We used a simple method. First, we measured the temperature of tap water. Then, we poured about 2.5 cups of water into a bottle. Then, we turned the bottle upside down and measured the amount of time it took for the bottle to empty. We did these things four more times, changed the temperature, did the whole thing again, changed the temperature again, and did the whole thing one more time.

We noticed that on average, the hot water (110ºf) fell slightly slower than the medium - temperature water (63ºf), which fell slightly slower than the cold water (50ºf).

Our hypothesis was supported. Even though we ran into a lot of problems along the way, our final results were exactly as expected. In the future, people could use a more accurate method of measuring temperature, releasing the water, and/or timing the water.

Project # **J1708** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Kc Pagaduan** Grade: **8** G: **F**

School: **Ross Academy of Creative and Media Arts Middle School**

Title: **Tornado in a Box**

How much dry ice is required to create an accurate tornado look-alike? Tornadoes form when humid air collides with cold, dry air. Substituting the humid air as warm water and the cold, dry air as dry ice can create a tornado model in a box. I hypothesize that a one to one ratio of dry ice to warm water would create a tornado in the box. The independent variable was the amount of dry ice used to create the tornado. The dependent variable was if a tornado formed or not. The amounts of dry ice that were used were ½ cup, 1 cup, and 2 cups. A tornado box or a vertical wind tunnel was made to conduct the experiment. Dry ice was added to a bowl, followed by warm water and then the fan was turned on at the top of the box to create a wind current. Observations to determine if a tornado formed were done in about 2 minutes. The tornado with one cup of dry ice creates the most accurate tornado compared to ½ cup and 2 cups of dry ice. From my results in the experiment, I can conclude that my hypothesis was correct, the measurements do not have to both be one cup, but using a one to one ratio would make it the most accurate looking to a real tornado. I learned that no matter how much dry ice you put in, in the end it will still look like a tornado.

Project # **J1709** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Maximus Piersol** Grade: **7** G: **M**

School: **Hale Charter Academy STEAM Magnet**

Title: **What is the Effect of Weather On The Stall Point of a Wing?**

Stalling is one of the most common causes of a plane crash. To increase a plane's elevation, the flaps are tilted to generate lift. However, too much tilt will cause the plane to stall. This stall can be fatal, which gives reason to study this topic. If air temperature increases by 15 degrees Fahrenheit, then the angle in which the wing stalls will decrease by 25 percent, and if air humidity increases by 10 percent, then the angle in which the wing stalls will increase by 25 percent because more air density results in more lift on a wing. To carry out this experiment, a foam wing was placed inside a cardboard tunnel. A fan was placed at one end of the tunnel, and a scale was attached to the wing to measure lift. Baseline measurements were taken at varying initial wing angles to measure lift and stall point. The same measurements were taken with (1) the tunnel at a raised temperature and (2) the tunnel with raised humidity. The results showed that humidity and heat did not significantly affect the stall point of the wing. In each test, the wing averaged to stall around 15 degrees but slightly varied between each trial. This small change could have easily been caused by a small variation in the wind speed or initial wing angle. Several wind tunnels were built to ensure accurate results. This increased the amount of time spent as well as the knowledge on the topic of stalling. All in all, the project was successful in proving the hypothesis wrong.

Project # **J1710** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Natalie Lopez-Martinez** Grade: **7** G: **F**

School: **Magnolia Science Academy 6**

Title: **Hydraulic Lifts**

The objective for this project was to test which type of liquid would raise a 100g mass the highest using the hydraulic lift with 12cc, 35cc, and 60cc syringes. I used water and oil as hydraulic fluids to compare the height raised on the lifts. 12cc used as my primary syringe. The materials I used were a ruler, a 30 cm piece of pipe, 1 cup of peanut oil, 3 wall plates (4.5 x 2.75 inch), and a vise. I glued each different size syringe to a separate wall plate with epoxy. To test the lift with the vise, I inserted water into the primary syringe, which then went through the pipe into my secondary syringe. I recorded how high each of the secondary syringes would raise with water after pushing the primary syringe (12cc) into the pipe. Each syringe was tested with the 100g weight 4 times. I repeated these steps again, using oil as my hydraulic fluid. Based on my data after 32 trials, I concluded that oil provides the highest hydraulic lift in comparison to water. I calculated the average of each syringe for both fluids. The average height raised for the water hydraulics was 10. 33 ml and the average height raised for oil hydraulics was 10.5 ml. This data supported my hypothesis since oils have the properties of lubricity, which indicates slipperiness. If I were to conduct this project again, I would test using other liquids with thicker consistency such as syrups.

Project # **J1711** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Leo Powell** Grade: **6** G: **M**

School: **Walter Reed Middle School**

Title: **Music: Making Waves in Science**

My inquiry question was "How does the genre of music you play affect how water around it moves?" I submerged a speaker in a cooler full of water, and played 6 different songs. I measured the diameter of the waves when each song was playing. Hip Hop and Reggae had the largest diameter out of all the genres. These two genres had lots of bass and drums, which leads me to believe that the lower sounding instrument caused there to be big waves. With this information about lower sounding instruments, my hypothesis is shown to be correct.

Project # **J1712** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Owen Yeh** Grade: **8** G: **M**

School: **Ridgecrest Intermediate School**

Title: **Comparing Paper Airplane Designs for the Best Aerodynamics**

Aerodynamics is used everywhere with cars, planes, and even rockets. With the current design hitting its limits, vastly different designs of aerodynamics are needed to go faster and stay stable. Using designs of 5 very different paper airplane designs, the goal of my project was to test the airflow patterns of the plane in a homemade wind tunnel and compare the results to how far and fast they fly when thrown. After finding the best design, I created 5 more designs with updated tweaks based on feedback from my initial testing.

The wind tunnel is made out of cardboard with a testing box that is 10in by 10in big. The flow straightener is made with empty paper toilet rolls. The smoke used to visualize the airflow was created by a solution of glycerin and distilled water that was heated up by candles. A fan blows air through the contraction section into the flow straightener and then to the testing box where it simulates the airflow of the plane.

Out of the 5 designs, the paper airplane that was shaped like a dart performed the best. The smaller surface area made the plane to have less air resistance, allowing it to fly with a smaller force acting against it. This makes the plane able to soar through the air at incredible speeds. It flew a total distance of about 37 feet at a speed of about 25 ft/sec.

This experiment allowed me to learn more about aerodynamics and how wind tunnels help determine the best design. This is important for understanding how we can develop faster planes and rockets.

Project # **J1713** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Ethan Gallegos** Grade: **6** G: **M**

School: **Pomona Unified School District Junior Division**

Title: **Air Resistance Fabrics**

For my science project, I wanted to test 6 different fabrics to see which one has the best air resistance so what i first did I went to a fabric store and bought six different types of fabrics and some string after that I cut the fabrics to a good measurement after using a hole puncher and then I put string thru the holes after that I tied the string to a lego person and then dropped it and used a stopwatch to see how long it stayed in the air.

Project # **J1714** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Zach Matise** Grade: **8** G: **M**

School: **St. Timothy School**

Title: **Set Sail: Which Weirdly Shaped Sail Will Be the Best?**

The objective of my project was to determine the most efficient sail shape for a catamaran boat. If I develop a more efficient sail, it could save money on both fuel and time. I tested my different sails using a Raingutter Regatta track, a mini catamaran boat, and a fan to simulate wind. The sail types I tested were: square, wide pocket, narrow pocket, circle, and triangle. The pocket sail type is a new invention I created.

After setting up the track, I tested each sail type on the boat. I timed how long it took to reach the end of the track and recorded the data. The circular sail was the fastest and most consistent with an average time of 7.16 seconds. The narrow pocket followed with an average time of 7.57 seconds followed by the triangular sail, the square sail, and the wide pocket sail, respectively.

My hypothesis that the narrow pocket would be the best was incorrect. After further observation, the circle was the best because of the lack of dead zones or spillage of air. Dead zones are points of inefficiency where air is not being used to its fullest and impacts the pocket sails. The triangle sale was impacted by spillage as air spilled off the edges of the sail not propelling the boat forward efficiently. In the future, it would be interesting to expand on this experiment by adjusting the sizing of sails to see how it would affect the results.

Project # **J1715** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Adam Naseer** Grade: **7** G: **M**

School: **Institute of Knowledge Middle School**

Title: **Heaving the Limit: Designing Boats to Bear the Load - An Investigation into the Key Factors that Support Maximum Cargo Weight**

Question: Which design factors maximize weight-bearing capacity?
Procedure: I constructed several boats of varying volumes, loaded each with cargo, and measured the weight in grams until the boat sank. I then recorded the weight of the cargo each boat carried before sinking to determine the boat with the highest weight capacity.
According to the study, the buoyancy of a boat is directly related to its volume. This means that a boat with a larger volume will displace more water, which creates an upward force called buoyancy. In other words, the more volume a boat has, the greater its ability to float.
Based on this principle, a flat-bottomed boat with high volume and low weight would be able to support the most weight. This is because a flat bottom provides more surface area for the boat to float on, while high volume allows it to displace more water, resulting in greater buoyancy. Additionally, a boat with less weight will put less strain on the buoyancy force, making it easier to stay afloat.
Overall, these findings suggest that the design and weight of a boat are critical factors in determining its buoyancy and ability to support weight. A flat-bottomed boat with high volume and low weight would be the most suitable choice for carrying heavy loads or transporting goods.

Project # **J1716** Category: **Physics - Aerodynamics/Hydrodynamics - Jr**

Student: **Iago Parry** Grade: **6** G: **M**

School: **New Roads School**

Title: **Parachutes to the Rescue: Investigating the relationship between area of parachute, payload mass and terminal velocity**

I will drop different sizes of parachutes with different weights using a water bottle that I can fill up to add weight. I will try to make an equation to figure out how large the parachute needs to be depending on the height it is dropped from to be able to land an egg that has some cushioning without it cracking.

Project # **J1801** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Elle Hong** Grade: **6** G: **F**

School: **Walter Reed Middle School**

Title: **Attraction Action!**

I wanted to figure out if an object could affect how two magnets attract. My experiment is that you put a magnet touching a block of cardboard and slide another magnet towards the cardboard until the magnets attract. When they attract you add another centimeter to the cardboard and repeat. For zero, one, and two centimeters of cardboard the magnets attracted 5 centimeters away, for three and four centimeters of cardboard away they attracted 5.5 centimeters away, five and six they attracted 6 centimeters away. For the seventh centimeter of cardboard they attracted 7 centimeters away. My hypothesis was not correct because the results changed throughout the experiment.

Project # **J1802** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Emmanuel Morales** Grade: **8** G: **M**

School: **Magnolia Science Academy 6**

Title: **Protection Against an RFID Reader**

My objective for my experiment was to figure out which material is best for blocking off an RFID reader's signal. I placed two bricks on a piece of cardboard, so my workplace wouldn't get scratched by the bricks. Then I taped the RFID reader onto a brick, and a proximity card was taped to another brick. Next, I installed Notepad++ on my computer and connected the RFID reader to the computer using a USB. The materials that I tested were an RFID-blocking wallet, copper foil, aluminum foil, and a metal sheet. Each material was tested on how far it could block the RFID reader's electromagnetic signals from reading the proximity card. Each material was tested with the distances of 1.5 inches, 1 inch, and 0.5 inches. My results were the same for all three distances because each material protected the card from being read except without protection. I hypothesize that the RFID-blocking wallet would be the best material for blocking out the RFID reader's signal which was proven by my results. The reason behind my hypothesis was that the wallet was made of carbon fiber, and carbon fiber can absorb the signals that would reduce them, and not read the proximity card. If I were to do this experiment again, I would use a different RFID reader that is more powerful and use other materials as well. Some mistake I might have made was using a proximity card instead of an RFID tag as I concluded the experiment.

Project # **J1803** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Elenka Odorczuk** Grade: **6** G: **F**

School: **Pomona Unified School District Junior Division**

Title: **Electric Energy from Household Items**

My project uses different household items to produce electricity. I compare electricity created by potato battery, small wind turbine and hydro turbine powered by expansion of gas from cola triggered by elevated drop of Mentos candies. I have compared different flavors of Mentos and elevation levels of drop to amount of voltage and amperage produced.

Project # **J1804** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Peter Shanoian** Grade: **7** G: **M**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **Simple Electric Motor: Which is the best power source?**

This simple electric motor is able to spin the copper wire with a magnet sitting on top. You are able to change certain variables like the battery. I did this to see which battery can power this electric motor the best. Another reason I chose this is to see and learn how the battery power the wire motor from a somewhat simple experiment. I will check how much electricity will be produced by seeing how long the copper wire will spin for. Lastly I will check the results from the C battery, D battery, and AA Battery.

Project # **J1805** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Kamala Karimova** Grade: **6** G: **F**

School: **New Horizon School**

Title: **Which Fruit Conducts the Most Voltage?**

This experiment focuses on which fruit can conduct the most voltage. The objective of this experiment was to find out what fruit can conduct voltage best. The hypothesis was that lemons would produce the highest voltage out of the three fruits tested. The materials used were three types of fruit, apples, potatoes, and lemons, a zinc and copper electrode, a multimeter, and a live wire that comes with the multimeter. The procedure was to first prepare the fruits for the experiment, stick the copper and zinc electrodes into one fruit, grab live wires and stick them in the fruit. Then, the fruits connect to the multimeter to test how much voltage will be produced. The procedure was repeated 3 times for each fruit and recorded in the data table. The data showed that lemon had the most voltage. The lemon produced an average of 0.27 volts, the apple produced an average of 0.1 volts, and the potato produced an average of 0.17 volts. In fact, if someone added the apple and potato voltage it would equal to the voltage the lemon produced. The lemon got the most voltage because it is a citrus fruit, and citrus produces more energy thus proving the hypothesis to be correct. This experiment is useful because of alternative energy sources instead of fossil fuels.

Project # **J1806** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Yasmeen Hawa** Grade: **7** G: **F**

School: **Islamic Center of Claremont School (ICCS)**

Title: **Magnetic Fruit**

My goal is to figure out why a fruit is affected by a magnet. What I'll need is, two apples, two kiwis, two grapes, a pair of chopsticks, three long pieces of string, a magnet, and anything that can hold the experiment up. I'll start by making something to hold the experiment up by making a "T" shape with two long tubes. Then what I need to do is hang my two fruits up on my contraption and place a magnet close to the fruit. This procedure may not work immediately, but after a few tries, you just might get it right. After a bit of research, I figured out that the movement of the fruit is because of a phenomenon called diamagnetism, for the apples and grapes, and ferromagnetism for the kiwi. Diamagnetic materials are those materials that are freely magnetized when placed in the magnetic field. Ferromagnetism is where a certain electricity strongly attracts others. I figured out from this project that my apples, grapes, and kiwis are all ferromagnetic materials, and not a diamagnetic magnetic material. I also figured out that my hypothesis is wrong, the fruits are not affected by static electricity, instead it follows the plant because of "ferromagnetism".

Project # **J1807** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Ori Bard** Grade: **7** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **A New Angle on Solar Energy**

Solar Panels generate energy when exposed to sunlight through the photovoltaic effect, a physical and chemical phenomenon in which the photons from the sun are converted into electrons that are safe to use for everyday life. Will solar panels generate more electricity when exposed directly to sunlight than when exposed indirectly, at an angle? I hypothesize that solar panels will generate more energy when exposed to sunlight directly perpendicularly. Through multiple trials in and varied units of measurement across three different angles; 180 degrees (flat), 45 degrees, and 90 degrees (direct), of a flashlight hitting a solar panel, I have found that solar panels do in fact generate more energy when exposed to sunlight directly, aligning with my hypothesis. Interestingly, when measured in amps, a larger unit of measurement, when exposed at a flat angle, the energy generated is, in relation to when measured in volts, much lower compared to the other angles.

Project # **J1808** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Jason Sandoval** Grade: **8** G: **M**

School: **Bell Gardens Intermediate School**

Title: **Lights Off!**

Our project is a mix between engineering and experiment, as my group built a light bulb from scratch using different materials and then compared it to an L.E.D light bulb. We got the idea from viewing similar projects, but wanted to see if it was a viable substitute. The project is built from a pie pan that is used as a base, a 3 inch toilet paper roll planted in the middle to hold alligator clips that are held by electrical tape. The alligator clips are taped onto the roll with two heads of the clips sticking out to hold a piece of lead preferably size 0.7. After that, a glass beaker will be placed on top to stop smoke from being released .The longer ends of the alligator clips are connected to 8 D-batteries, connected by 7 pieces of electrical tape 6 inches each. When powering it, the alligator clips will touch the opposite ends of the line: one taking a positive charge and another taking a negative charge, which heats up the lead and in turn creates a light. When getting the charge of the light bulb, we added the volts of a D-battery (1.5) to get the volt intake. Issues encountered while working with the project was the burnout of the lead which needed replacement each test or every two short tests. Another issue was the battery connection, as the electrical tape would loosen up and it would require pressure to get a connection.

Project # **J1809** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Sophia Martin** Grade: **7** G: **F**

School: **Chamlian Armenian School**

Title: **Comparison of Electromagnetic Fields Emitted from Various Objects**

Objective:
This project's objective is to compare the levels of Electromagnetic Fields (EMFs) emitted by various appliances and power lines.

Materials & Methods:
The following are the materials I used: an EMF meter, oven, cordless phone, microwave, toaster oven, coffee maker, cell phone, laptop, wireless router, refrigerator, high and low voltage power lines, and a tape measure. A meter was used to measure the levels of EMF. Measurements were taken directly in front of the appliances, 12 inches away, and 24 inches away. For the power lines, the estimated height of the conductor was calculated. Measurements were taken directly underneath, at twice the distance, and at 3 times the distance. All measurements were taken 3 times.

Results:
Of all the appliances, the microwave emitted the most EMF, measuring at least 100 milligauss (mG) at 0 inches, 23.7 mG at 12 inches and 5.9 mG at 24 inches. The refrigerator emitted the least EMF, measuring 0.7 mG at 0 inches, 0.2 mG at 12 inches and 0.1 mG at 24 inches.

Conclusion:
My hypothesis that the oven would emit the most EMF because it is a larger appliance, and the cordless phone would emit the least EMF because it is an older appliance were not supported by the results. The part of the hypothesis that was supported was that the EMF levels would decrease when the distance from the appliance/source increased. Further testing should include taking into account the wattage and voltage of the various appliances.

Project # **J1810** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Eduardo Diaz** Grade: **6** G: **M**

School: **Magnolia Science Academy 6**

Title: **1,2,3...SCATTER!**

The objective of this experiment is to test which shape of aluminum pieces, cylinder or right angle, will scatter the least amount of light from a flashlight inside a box. The first step is to get two different 3D pieces made out of aluminum. In the experiment, I placed different shapes inside a box and turned on a flashlight. I would then read how much light would reflect back from the shape using a lux meter for 3 trials. If the light scattered to the sides of the box, the black paper is placed so that it can absorb light, so it will prevent the light from bouncing back and hitting the aluminum pieces. If the lights on the sides hit the aluminum shapes, it can possibly reflect it back to the lux meter sensor causing my results to be flawed. My data indicated that the right angle piece reflected the least amount of light averaging 52 lux and the cylinder piece reflected an average of 65 lux out of 3 trials. The cylinder piece had more light scattered because it had a greater surface area, which caused a lot of light to reflect off it. My results supported my hypothesis because I claimed that the right angle would reflect the least amount of light due to the smaller surface area. If I had to make this project again I would increase the number of trials to 20 trials and would use a different light source other than a flashlight.

Project # **J1811** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Arsha Farkhondeh** Grade: **7** G: **M**

School: **Hale Charter Academy STEAM Magnet**

Title: **How to Generate More Electricity?**

This project studies the topics of electricity, magnetism, electromagnetism, and electromagnetic induction. It teaches how electricity is produced and how to produce more. This can help people power devices to help in the real world. If there are six magnets with alternating poles and six layers of wire, then the LED will light up the most because it makes the strongest current. In the procedure wire gets winded around two iron cores, one with six layers and one with two layers, then the field lines get measured with iron filings. After that a generator is built with magnets on a shaft with a “U” shaped coil around it and when spun it will light up the LED, the generator gets tested with both coils, six magnets and two magnets, and with alternating and similar poles. After testing, alternating poles got an average of 2.25 more than similar poles and six magnets got an average of 3.25 more than two magnets, also six layers of wire got more seconds than two layers. The configuration with the most seconds is six layers and six magnets with alternating poles and the lowest is two layers and two magnets with similar poles. The project was successful and almost everything went according to plan except when the coil would sometimes get stuck to the magnets during testing and the shaft was a little hard to turn. One thing that should be changed is how to turn the shaft to make it easier.

Project # **J1812** Category: **Physics - Electricity & Magnetism - Jr**

Student: **Joseph Cru** Grade: **7** G: **M**

School: **Holy Angels School**

Title: **Testing the conductivity of diffrent liquids**

Abstract:My research question/problem is that I want to find out if water is conductive if I put different substances into the water. My Hypothesis is that all of the water I test will be conductive. I first started off the project by gathering a 9 volt battery, metal wire, electrical tape, 4 plastic bowls, water(distilled and tap). I wrapped the wires around the positive and negative heads of the battery and then strapped it down with electrical tape. I then put 90 ml of distilled water into 4 separate bowls and in 1 bowl put 90 ml of tap water into 1 separate bowl. I filled the 3 bowls with distilled water 5 ml of baking soda,salt, and sugar each. After setting that all up I took the 2 wires and put it into the tap water first and no reaction. Next I put the wires into the bowl with distilled water and sugar and no reaction.The reason there was no reaction in this is because sugar is a covalent compound not an ionic compound.The difference between covalent and ionic compounds is ionic compounds dissociate into ions when put into water which allows electricity to travel through it but covalent compounds don't allow that because they don't split into ions. .After I put the wires into the bowl with distilled water and baking soda and it had a reaction. The reason it had the reaction with the bowl of distilled water and baking soda is because the water has an ionic compound dissolved in it and therefore the compound allows the water to conduct electricity.The current of electricity causes the hydrogen and oxygen molecules to split from each other and cause bubbles to form ,and the bubbles in turn rise to the surface. I next tried the distilled water with nothing in it and no reaction.I then next tried the distilled water with salt in it and it had the same reaction as the baking soda with it bubbling. In conclusion anything that's an ionic compound is conductive and anything that's a covalent compound can't conduct electricity.

Project # **J1901** Category: **Physics - General - Jr**

Student: **Walker Ehrich** Grade: **6** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **To bounce or not to Bounce**

While doing this experiment I had to research many things. The first thing I researched was the industry of golf where I learned about the process of making golf balls and how there is a golf ball that is right for everyone. Next I learned about the history of golf and how the Haskell Ball paved the way for future golf balls. Then I researched the science that affects golf balls. I learned about compression, dimples, elasticity, gravity, etc… The procedure for this project is fairly simple. I would gather five different brands of golf balls in groups of three and number them. Then I performed the drop test and recorded the results. Next I conducted two different launch tests. The first test I only pulled back the club a little. The second test I pulled it back a lot. Then the results were recorded. The results of the drop test had no clear relation to the ball launch. Each brand would have about the same bounce height but the launch distance would be very spread out. A good example of this is with the Titliest golf ball. Titleist had the farthest traveling golf ball and the shortest traveling golf ball. In conclusion, the player, weather, and landscape affects the ball more than bounce height.

Project # **J1902** Category: **Physics - General - Jr**

Student: **Megan Murphy** Grade: **7** G: **F**

School: **Holy Angels School**

Title: **What color absorbs the most light and convert it to heat?**

Colors absorb heat by absorbing light. Since light is energy it naturally produces heat. UCSB Science Line says that “When an object appears a certain color when illuminated by white light it means that it is reflecting light of that color and absorbing all other colors.” Light is made of all the colors in the rainbow so when a color absorbs light, the color reflects the color in the light it matches. Color absorbs light when” atoms or compounds absorb light of the proper frequency, their electrons are excited to higher energy levels.” says chem.purdue.edu.
My hypothesis was that I believed that black would absorb the most heat and white the least.
I painted mason jars black, white, blue, red, and left one clear as the control.
After 4 hours, black absorbed the most heat at 77.2. Blue next at 75.7. Then red at 75.6. White was fourth at 72.7. And clear absorbed the least amount of heat at 72.0.

I can conclude that Black absorbs the most heat and clear absorbs the least.

Project # **J1903** Category: **Physics - General - Jr**

Student: **Lyric Rivera** Grade: **6** G: **M**

School: **Pomona Unified School District Junior Division**

Title: **LEGO Drop Experimant**

My experiment was a very enjoyable process with many twists and turns. First I typed up all my research and looked for all my research on gravity, LEGO plastic types, and LEGO color types. To conduct it I first built up the first shape and planned for the drop. After I got a notebook, a pencil, my pieces, and a high place then I climbed up to drop them. I dropped the rectangular prism first which actually happened to be the largest of all of them. Then I dropped the rest which were a rectangle, triangular prism, triangle, circle, and a sphere. As I dropped them I had my sister position herself on the left side and take pictures of them when they hit the ground. After a drop I would come down from my dropping spot to jot notes and build the next shape. To ensure that no shape had an unfair advantage I reused all of the same pieces from the previous shape. My pieces were very basic simplistic ones such as 1x2, 1x3, 2x2, 2x3, 2x4, 2x6, 1 single 2x8, and 1 single 2x10. I chose these easy to find pieces so that way if you follow my procedure you can do this experiment as well. Next I gathered my results and used them to write other parts of this project disproving my hypothesis and determining which in LEGO is stronger, a 2D shape or a 3D one.

Project # **J1904** Category: **Physics - General - Jr**

Student: **Emma Dishoyan** Grade: **7** G: **F**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **What Ever Floats My Boat**

My project is about creating different types of boats from aluminum and adding pennies to the boats to see which one will be able to hold the most amount of pennies. In this project I measured the mass of the pennies, the bottom surface area of the boats and was able to calculate the buoyant forces.

Project # **J1905** Category: **Physics - General - Jr**

Student: **Ashalina Bholat** Grade: **8** G: **F**

School: **Al-Huda Islamic School**

Title: **It's Free, Free Falling! Does the Mass of an Object Affect the Speed by Which it Falls?**

The question in this experiment was: Will two objects of similar surface area and a different mass free fall at the same rate from different heights? It was hypothesized that if an object was heavier, then it would fall at a faster rate. The steps taken to answer this question were as follows: from a set height, two objects with different masses and similar surface area were dropped to the floor. The height was changed ten times and the results were recorded with a stop watch on a video for each object. The time it took the objects to fall was recorded for the ten trials. The results showed that the distance traveled is directly proportional to the square of the time spent falling. The average calculated acceleration of the heavier object, at 8.822m/s^2, and the lighter object, at 8.320m/s^2 were close to 9.81m/s^2, which is the gravitational acceleration of Earth. The higher the distance for the books to fall, the faster they end up moving. Because of the constant acceleration produced by the force of gravity, the velocity of an object will become increasingly faster. The hypothesis was proven incorrect because after doing the experiment it was observed that both objects with different masses fell at approximately the same rate. All falling objects free fall at the same rate regardless of their mass because they experience the same gravitational field strength of 9.8 Newtons.

Project # **J1906** Category: **Physics - General - Jr**

Student: **Aude Ste-Croix Hamazaki** Grade: **6** G: **F**

School: **Oak Hills Elementary**

Title: **s-ICE-mulator**

The purpose of this project is to simulate the melting of glaciers in order to estimate remaining time before complete meltdown. Pictures taken over decades show the slow disappearance of these ice formations and possible catastrophic consequences. This simulation would allow to explore different scenarios within a computer and guide environmental decisions.

This simulation was created using a Microsoft's Excel spreadsheet, allowing the rapid prototyping of formulas and logic, the visualization of thermal distributions and the automation of repetitive tasks. The spreadsheet organized in a grid pattern of cells allowing to calculate the future temperature of an ice cell by using its current and neighboring temperatures. The operation was repeated until all cells had reached water melting point. The simulator was correlated with experimental ice cube melt data in order calibrate parameters and test its ability to predict melt time and shape.

After experimenting with various ice shapes, thickness and water temperatures, the simulator showed potential to represent ice melting shape faithfully but failed to predict time accurately. Imperfect real life ice specimens and perfect virtual ice made it difficult to calibrate the simulation. Thermal imaging also showed that the assumption of conduction only could have over-simplified the problem as convection was observed. Numerical factors and computation time also played a role in result accuracy.

In conclusion, the ice melting simulator could help understand melting glaciers. It can display the shape at different intervals and calculate roughly the time required to completely melt ice.

Project # **J1907** Category: **Physics - General - Jr**

Student: **Evan Grady** Grade: **6** G: **M**

School: **St. Timothy School**

Title: **Temperatures impact on how far a ball travels**

This project was designed to understand the effect outdoor temperature has on the distance a ball travels. I relied on a football and soccer ball for my experiment. This information could help programs like Next Gen powered by Amazon Web Services. Next Gen is a program that tracks player stats and weather conditions. This correlation between outside temperature and distance a ball traveled could help Next Gen make more accurate predictions. I went to a field near my house with my materials and performed my experiment 3 times with each ball under 3 different temperature conditions. I did my best to kick / throw the ball with the same force each time. I learned that the outside temperature does indeed affect the distance the ball travels. Interestingly, the difference between how far the ball travels at 26.6°C and 10.0°C was very large, but the difference between 18.3°C and 10.0°C was much smaller. This proves my hypothesis was correct as it does go farther in warm weather.

Project # **J1908** Category: **Physics - General - Jr**

Student: **Karen Ter-Arsenyan** Grade: **6** G: **M**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **What makes ice melt faster**

If you live in a place that gets snowy in the winter, you have probably seen trucks spreading sand and salt on the streets after a snowfall to help remove snow/ice from the road. Have you ever wondered how this works? This basic science project can give you some ideas about this.

Project # **J1909** Category: **Physics - General - Jr**

Student: **Joseph Agustin** Grade: **6** G: **M**

School: **Magnolia Science Academy 6**

Title: **Catapult Power**

The objective of this project was to test which type of ball would travel the furthest when launched from a catapult using a rubber band. The first step was to get three balls made of different materials. I used an origami paper to fold the paper ball, crumbled a sheet of 20 cm long aluminum foil into a ball, and purchased a ping pong ball. I tested 20 trials for each type of ball using the catapult. The average distance traveled for the aluminum foil ball was 122 cm, 110 cm for the ping pong ball, and 44 cm for the paper ball. My hypothesis was supported by my data because the aluminum foil ball traveled the furthest distance, whereas the paper ball traveled the shortest distance. The reason why I think aluminum foil went the furthest was because it had the smallest amount of volume out of the three balls. I hypothesized that aluminum foil would launch the furthest of the three balls when launched from the catapult. My data showed that my hypothesis was correct. This is because paper weighs the least of all three but it did not go that far. This was due to having air inside the ball so it probably made the paper ball resist when it was launched from the catapult. If I were able to do this project again I would use different material balls to test it out. I would also try using a wider rubber band to launch the balls.

Project # **J1910** Category: **Physics - General - Jr**

Student: **Charles Huang** Grade: **8** G: **M**

School: **Portola Highly Gifted Magnet**

Title: **The Relativistic Kinematics of Muon Decay: A Measurement of Muon Lifetime and Speed**

Muons are fundamental particles that can be utilized using muography techniques to compose images of structures for study as well as detect nuclear waste. Since muon lifetime is an important constant when executing the techniques, my experiment measures muon lifetime at rest as well as observes changes in muon lifetime through various mediums. Tungsten, lead, paper, and wood were tested throughout the experiment, and my hypothesis was that tungsten, which was capable of completely stopping the muon, would result in the shortest lifetime, while paper would result in the longest. My experimental setup utilized a calorimeter detector composed of a tungsten scintillator and a PMT, as well as a veto detector composed of a plastic scintillator and a PMT. These detectors were stacked on top of each other respectively, and the time difference between the striking signal and decay signal from the muon was recorded with the bottom detector. After collecting 500 events, the resulting mean lifetime was about 2.1 microseconds. For the lifetime measurement in various mediums, muon speed was calculated, and the lifetime found based on the Lorentz transformation. The two detectors were spaced 81 centimeters apart, and 35 centimeters of each medium was used. The most probable of 100 times of flight was used to calculate speed, which in turn was used to calculate muon lifetime. The mean lifetime in lead, paper, and wood all yielded the same value of about 2.98 microseconds, while the lifetime in tungsten remained the shortest, partially supporting my hypothesis.

Project # **J1911** Category: **Physics - General - Jr**

Student: **Raadiya Sabah** Grade: **7** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **Automatic Street Light**

The project that I chose to do was an automatic street light. This is important because it helps promote safety, it helps the environment. I It will help people feel more safe in their area and it will reduce the risk of accidents and crime. There is no additional cost for power. The engineering problem it will solve is that it will reduce the amount of manual work and cost and it will automate the system which will light by itself when needed. The most important material needed for this project were LED lights, wires, resistors, transistors, and the circuit diagram was an important tool for its functioning. I created a circuit diagram to begin with and that circuit diagram included the LDR which powered the LED lights to turn on. My independent variable was the LDR and my dependent variable was my LED lights. I researched how the city lights in the rural areas and urban areas are operated and noticed that some of the rural areas are very dark and feel unsafe to drive at night. The criteria I used was that the lights should be able to automatically turn on in the dark without any manual labor. It should cost less than regular street lights. The significance it would have on our society is that people will feel more safe and the area will feel more comfortable and welcoming. This will also be cost efficient.

Project # **J1912** Category: **Physics - General - Jr**

Student: **Anabelle Viljoen** Grade: **8** G: **F**

School: **Ridgecrest Intermediate School**

Title: **Analyzing the Refraction and Reflection of Light**

Analyzing the refraction and reflection of light is essential because it helps us understand the world around us. Light-related devices allow us to better keep track of our world. The goal of our project is to study the properties of light to find methods to improve optic-related technology.

Our research was split into four experiments. First, we tested light refracting through a prism with the goal of separating individual colors. Secondly, we recreated the double-slit experiment using a piece of hair to act as the double slits. Third, we measured the reflected angles of rays of light being shone into a mirror. Lastly, we tested the effects of concave/convex lenses on light.

We found that we were able to separate individual colors in the rainbow by using two differently angled prisms. After performing the double-slit experiment, we found that the laser refracted into a horizontal, dotted line where the light was most concentrated in the center. We also found that the incident and reflected rays were supplementary. Lastly, we found that the convex and thinner meniscus lenses concentrated the light, while the concave and thicker meniscus lenses dispersed the light. However, using both kinds of lenses had no effect on the light.

We were able to expand our knowledge on the properties of light through our experiment. We hope that we can use this knowledge to enhance modern-day optical technology. Our next step is to find ways to improve upon current myopia treatment techniques.

Project # **J2001** Category: **Plant Biology & Physiology - Jr**

Student: **Alex Ghazarian** Grade: **7** G: **M**

School: **Chamlian Armenian School**

Title: **Antimicrobials and Radish Growth**

The population of the Earth is growing rapidly, and there is a real possibility that food and resources will run out with overpopulation. A significant source of food are plants both for human and animal consumption. Methods to increase and/or improve the growth of such plants can help supply more food to the population of the Earth.

The composition of the soil is rather complex and includes not only non-living material but also living organisms including bacteria, viruses, fungi, and protozoans. Much research has been done on antibiotics and their effects on the growth of different plants. But not much data is available on other antimicrobial agents.

We decided to study the effects of antimicrobials on plant growth, using four common antimicrobial pills (antibiotic amoxicillin, antiviral valacyclovir, antifungal fluconazole, and antiprotozoal metronidazole) on radish growth. We chose radishes since their growth cycle is approximately 4-6 weeks and they are relatively easy to obtain and plant. We crushed each pill, mixed it with fifty milliliters of water and added it to pots containing six radish seeds every three days. After thirty days, we removed the radishes and weighed them each on a scale in grams, and determined the average weight of each group.

Our conclusion was rather interesting and partially contradicted our original hypothesis. We had thought that antibiotics would cause the greatest growth, followed by antiprotozoals, antivirals, and lastly antifungals. However, our data showed that antivirals caused the greatest growth followed by antibiotics, while antifungals suppressed growth and antiprotozoals prevented any growth. It seems that viruses may play a much bigger role in causing disease and death in plants, while fungi and protozoa may have a symbiotic relationship with plant growth. Much more research needs to be done to replicate these findings and expand to other plants. We can only hope that our research can help create more resources for our future generations.

Project # **J2002** Category: **Plant Biology & Physiology - Jr**

Student: **Emily Alejandro** Grade: **7** G: **F**

School: **Holy Angels School**

Title: **Does Artificial Light Affect the Growth of Plants?**

Light is an essential part of life, especially for plants. Photosynthesis is the reaction used by plants to produce sugar and oxygen from carbon dioxide and water. Light provides energy, so photosynthesis occurs. Plant organelles, like chloroplast, need light because it uses energy from the sun to produce food. I questioned, does colored light impact plant growth? I assembled an experiment with mung beans under 3 conditions. The first set was placed under red. The second, under white, and third, placed indoors by the window. While the plants grew, I watered and checked them every 2 to 5 days. I noted each plant's height in centimeters and counted how many leaves each had. The sprouts under the red light grew tall and had many leaves. Under the white light, all were averaged height but had many leaves. Lastly, the plants exposed to window light grew slower than the rest. The plants under red ranged from 10 to 25 centimeters and averaged 21 centimeters. The sprouts beneath the white ranged 4 to 20 cm tall, with an average of 13 cm. Finally, the plants by the window ranged from 0 to 2 centimeters and averaged 4 cm. I predicted that if plants are exposed to artificial light for a month, then plants can grow as equal as plants exposed to natural sunlight. However, based on my data, I learned the most reliable condition. I found that the plants under red grew the most compared to white light and the window, though both artificial lights have higher efficiency than the window.

Project # **J2003** Category: **Plant Biology & Physiology - Jr**

Student: **Gaia Bhavsar** Grade: **8** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Fueled by algae: Determining which type of algae produces the most oil that can be used for biodiesel to power modes of transportation**

Objectives

My goal was to determine which type of algae (Ulothrix, Tribonema and Chlorella vulgaris) produces the most biofuel. Biofuel is a more environmentally friendly way to power automobiles; therefore, it is essential to find the best algae for its production.

Materials and Methods

I grew three algae species (Tribonema, Ulothrix, and Chlorella vulgaris) within three flasks each holding 100 mL of water, 100 mL of algae grow, and 3mL of the designated algal culture. Over two weeks, I used a spectrometer to test the transmittance of each algae every three days. After two weeks, I extracted the algae using a coffee filter and let it dry. However, the algae dried, becoming stuck to the coffee filters and no longer usable. My experiment had to finish here. My intention was to collect the algae, combine it with acetone and isopropanol, then distill it to make algal oil.

Results

Ulothrix produced the most algae (11.90% and 0.2g), whereas Chlorella Vulgaris produced the least (59.28% and 0.1g). Tribonema came in
the center (51.56% and 0.2g). In the future, I'll need to grow the algae for a longer length of time in order to collect a sufficient quantity and use a different extraction procedure.

Conclusion

Due to complications, I was unable to determine which type of algae produced the most oil, but I was able to discover which type of algae produces the most mass for biofuel production. Ulothrix is the most ideal algae for biofuel production.

Project # **J2004** Category: **Plant Biology & Physiology - Jr**

Student: **Emely Chavez** Grade: **7** G: **F**

School: **Montebello Intermediate School**

Title: **Water Control**

Objective : The experiment the project is about is different days to water the 3 plants and see which survives and the growth. This project's objective is to discover different ways to conserve water during tough times with water.(ex: droughts)

Materials and Methods : Three money plants each one has a different watering schedule. Plant one will have a watering schedule of Mondays and Fridays. Plant Two will be watered everyday of the week. Plant three will be watered on Saturday and Sunday only. Each plant will be watered the same amount of water which is 6 ounces of water. Each plant will be watered between the times of 4 - 6 pm. The plants will be measured at the beginning of the week and the end of the week (Mondays and Sundays).

Results : Plant 2 had the best results which is the one that had the schedule to be watered every other day of the week. Plant 3 had the worst results compared to the others.

Conclusions : Plant 2 had the best outcome from the rest of the plants.

Project # **J2005** Category: **Plant Biology & Physiology - Jr**

Student: **Malak Hawa** Grade: **7** G: **F**

School: **Islamic Center of Claremont School (ICCS)**

Title: **Which Caffeine will Grow the Plant the Tallest and the Fastest?**

The purpose of this experiment is to see if caffeine will help plants grow taller and quicker. I will be testing this experiment by using American coffee, British tea, Dr. Pepper, and water to water the plants and observe how they grow. I will conduct this experiment using five trials. My hypothesis is that the liquids that contain more caffeine (coffee and tea) will allow the plant to grow taller and quicker. My experiment shows that the coffee and tea did help the plant grow healthier. However, on the last trial, the plant that was watered with Dr. Pepper grew the tallest. This could be because of the extra sunlight it received. Therefore, my hypothesis turned out to be partially correct, and I was able to find out if caffeine really does help plants grow more efficiently than water. In conclusion, my experiment shows that the coffee and tea did help the plant grow healthier. However, on the last trial, the plant that was watered with Dr.Pepper grew the tallest. This could be because of the extra sunlight it received. Therefore, my hypothesis turned out to be partially correct, and I was able to find out if caffeine really does help plants grow more efficiently than water. Next time I will try microwaved water against regular water.

Project # **J2006** Category: **Plant Biology & Physiology - Jr**

Student: **Paige Amerine** Grade: **8** G: **F**

School: **Holy Angels School**

Title: **The Colorful Pothos**

In my experiment I hypothesized that colored light would give off harmful rays that would kill plants. I predicted that white light, the control variable, would be most beneficial to plants; purple light would be the second most helpful; green light would be the least beneficial. Throughout the eighteen days of experimenting, I left three Pothos plants under three different color lights: White, purple, and green. I exposed them to light for about twelve to thirteen and a half hours a day. I watered them the same amount each night too. Through research I discovered that white light is made up of all the colors of light - that is why it appears white to the human eye - and that it would reap the benefits of all colors of light. White light is best for plants. I also discovered that purple light is just a combination of red and blue light, both of which are very good for flowering and stock growth in plants. This led me to the prediction that purple light would be the second most helpful to the plant. While researching the effects of green light, I came across many contradictions. The University of South Carolina states that green light is not absorbed into a plant and is reflected, that is why a plant appears green to the human eye. On the other hand, Fluence Science Articles state that green light actually penetrates the leaf's surface deeper than any other color. This leads to the light driving photosynthesis in chloroplasts deeper into the bottom of the leaf, more effectively than other colors. My experiment proved Fleunce correct when the plant under the green light outgrew the plant under the purple light by 1 in. My experiment proves that white light will always be the best for growing plants; green light is always a good option; purple light is the least beneficial. To keep your plants healthy, use a white or dark green light, and angle the light from above.

Project # **J2007** Category: **Plant Biology & Physiology - Jr**

Student: **Oliva Matheny** Grade: **8** G: **F**

School: **St. Timothy School**

Title: **How does your garden grow?**

With climate change and population growth at the forefront of topics today, food security is of utmost importance worldwide. Hydroponically-grown food can be grown indoors without soil, limiting crop destruction due to weather, pests and drought. With this popular shift in food-growth methods, I wanted to explore if traditional soil gardening vs. hydroponics affected nutrient levels in vegetables. My hypothesis: plants grown hydroponically with nutrients will have the most nutritive value. Using a refractometer, a tool farmers use to measure sugar content in crops, I sampled five different growing methods. Using Basil and Spinach, I grew six samples: 1. Hydroponically Fertilized, 2. Hydroponically Unfertilized, 3, Indoor Soil, Fertilized, 4. Indoor Soil, Unfertilized, 5. Outdoor Soil Fertilized. I used four Hydroponic kits: two for hydroponic growth, and two housed soil pots. Each machine used identical amounts of sunlight and were placed in my garage at the same temperature. The fifth sample was planted outside in the garden, so light, water and temperature were dependent on nature. The measurement of a refractometer is called the Brix % and my findings surprised me. The soil samples showed more nutrition than the hydroponics, and surprisingly, unfertilized hydroponic plants showed higher nutrients per drop than fertilized hydroponics. Fertilized hydroponic plants required less water, and grew faster than any other sample. The leaves were more vibrant, yet the Brix number was lower. My conclusion is that soil contains more nutrients, but the hydroponic method is still nutritious and valuable because it yields more food faster.

Project # **J2008** Category: **Plant Biology & Physiology - Jr**

Student: **Satyajith Payasam** Grade: **6** G: **M**

School: **Dunsmore Elementary School**

Title: **Do Different Genres of Music Affect Plant Growth?**

My science experiment is about growing plants with different music instruments. This involves exposing plants to different types of music, such as classical, rock, and hip-hop.I will be observing the impact of each of the plant's growth and development. The hypothesis is that different types of music affect plant growth differently, and the experiment could be designed to test this hypothesis. The experiment will be conducted in a controlled environment to eliminate other factors that may impact plant growth, such as temperature, light, and humidity. The results can then be analyzed to determine the impact of each type of music on plant growth and whether the hypothesis is supported or not.

Project # **J2009** Category: **Plant Biology & Physiology - Jr**

Student: **Savanna Dizon** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **How does compost affect the growth of Glycine Max**

The purpose of this experiment is to find out which type of compost works the best for soybeans. This topic was chosen to help people who grow soybeans find out which compost is the most effective and beneficial. The first compost that was chosen was made out of decaying fruit which is called fruit compost, the second compost that was chosen was made out of dead leaves which is called dead leaf compost, the third and final compost that was chosen was made out of chicken bones and eggshells which both have calcium so it’s called calcium compost. The plan was to track the growth of all the soybeans growing with all of the different composts to see if the hypothesis is correct or not.

Project # **J2010** Category: **Plant Biology & Physiology - Jr**

Student: **Claire Desrosiers** Grade: **7** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **The effect of sunscreen on different types of freshwater plants**

Objectives

My objective was to see how sunscreen would affect freshwater plants in their normal habitat. I tested this by adding sunscreen to a tank full of freshwater plants.

Materials and Methods

In my experiment I used 4 different types of freshwater plants; Anubia, Amazon Sword, Kleiner Bar, Narrow Leaf plants. I used 2 tanks,300 mL of Coppertone kids sunscreen and pebbles. First, I put the pebbles in the tank, then filled the tank with water. Next, I put the plants in and added the sunscreen to the experimental group once. The experiment lasted 12 days and I specifically measured one leaf in centimeters from each plant to identify the sunscreen effect and I kept track of the correct leaf by loosely tying a string to it.

Results

The results were based on the height of each of the four plant leafs (cm) over the span of 12 days. Overall, all the experimental groups' leaves lengths shrunk : Anubia: 46-40 cm/Narrow leaf 45-39 cm/Kleiner bar 37 -32 cm/Amazon Sword: 31-23 cm. The control group stayed healthy and the length was: Anubia: 29 -29/Narrow leaf 36-36/Kleiner bar 35-35/ Amazon sword:58-58.

Conclusion

In conclusion, sunscreen can be harmful to freshwater plants. My hypothesis was testing what would happen: If you pour 150 ml of sunscreen into a tank with freshwater plants, then the plants would be dried out. My hypothesis was supported and now I know that we need another way to protect our skin from the sun.

Project # **J2011** Category: **Plant Biology & Physiology - Jr**

Student: **Maral Shahnazarian** Grade: **7** G: **F**

School: **Chamlian Armenian School**

Title: **The Effect Of Food Residuals On Grass**

My project is about growing grass with various frequently used home residuals that are used as fertilizer, such as eggshells, coffee beans, and disintegrated banana peel. The purpose of my project is to find which fertilizer is most preeminent for grass growth. My hypothesis is that the eggshell fertilizer will grow the grass fastest. I will conduct my experiment by taking three 13-7 pots and filling each of them in the same type of soil (Edna's Pottery Soil). Even out ½ cup of grass seeds into each of the pots. Add ½ cup of disintegrated banana peel, ½ cup of coffee ground, and ½ cup of egg shells into separate pots. Labeling each pot with the appropriate fertilizer. Water each of the pots with 3 cups of water daily and reapply the fertilizer every three days. Recording the growth once every three days using a ruler (in millimeters). Find out the best fertilizer by inspecting the length of the grass. After conducting the experiment I discovered that the banana peel fertilizer is the best fertilizer for grass because the grass being fertilized by the banana peel grew significantly healthier and taller than the grass being fertilized by the coffee bean and eggshell. The results of my project were that the eggshell grew 55 mm, the coffee bean grew 40 mm, and the banana peel reached 80.

Project # **J2012** Category: **Plant Biology & Physiology - Jr**

Student: **Natalie Khatchadourian** Grade: **8** G: **F**

School: **C. & E. Merdinian Armenian Evangelical School**

Title: **DNA extraction from strawberries**

All living organisms have cells, and inside those cells is DNA. How or why do scientists extract the DNA from the organism’s cells in order to analyze and study it? In this experiment I will be making my own DNA extraction kit from household chemical items and I will be using it to extract the DNA from strawberries.

Project # **J2013** Category: **Plant Biology & Physiology - Jr**

Student: **Nathan Nguyen** Grade: **7** G: **M**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Soil Filtration Against Acidic Mixture**

Throughout a gardener's experience, soil has displayed its significant impact on the growing plant. And so, when choosing a soil, it is important to check for which soil fits all requirements, including whether it can withstand pH levels at a high extent. In understanding what soil is most resistant to acid, gardeners would be able to grow plants more safely and in good condition. Thus, making the scientific question: How do three different types of soil affect their ability to filter a handmade acidic mixture? To conceptualize the experiment, proceed to the following: gather materials, follow instructions, record data and results, and repeat for a total of 3 times / trials. However, within the end our hypothesis was rejected and in turn, the soil which filtered the acidic mixture most efficiently was the regular soil.

Project # **J2014** Category: **Plant Biology & Physiology - Jr**

Student: **Ness Rosner** Grade: **8** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **Fantastic Fertlizers**

First I added five different fertilizers, and one without fertilizer, into pots with soil. Then I put three seeds into each pot and put all of them next to each other in my front yard. I watered them and gave them each a lot of sun. Then I waited until I saw the first plant grow, measured it and took pictures, and repeated this until the first plant got to five centimeters.

Project # **J2015** Category: **Plant Biology & Physiology - Jr**

Student: **Nikolai Robin** Grade: **6** G: **M**

School: **Walter Reed Middle School**

Title: **From Gravel to Moss: What hydroponic growth stone grows tomato plants best?**

In this project, I compared eight different types of hydroponic growth media to one another to see which one is definitively the best. Hydroponics is the process of growing plants without the use of soil. In my project, I set up small cups with the growth media and the tomato plant seeds and placed them in a water tank with a pump and special growing lights facing downward. My hypothesis is if all plants have the same access to water and nutrients, then clay pebbles will grow the tomato plant the best because the pebbles have a good air-to-water ratio and they are relatively hollow. They are also the perfect size for growing as the seeds won't fall through but will get enough water, and their roots will be able to grow freely while still being secure. I chose this topic because I believe that hydroponics has the potential to change the world. According to the US Navy, hydroponic farming can grow up to 140 times more crops per square foot for 90% less water. I specifically chose growth media as my topic as there isn't a definitive answer to which of them is best for growing plants. The artificial sponge grew the tomato seeds the best, but the takeaway from this experiment should be that clay pebbles are the best as they are the highest-ranking natural growth media, and an artificial sponge is not something that can be cheaply mass-produced for large hydroponic farms.

Project # **J2016** Category: **Plant Biology & Physiology - Jr**

Student: **Samantha Tsan** Grade: **8** G: **F**

School: **Holy Angels School**

Title: **Algae Growth**

I tested the growth of algae because I had an algae problem in my pool last summer and wondered why it wasn't dying despite all the efforts to abate it. I started to research types of algae commonly found in pools and the closest version to the one in my pool. The algae found in pools is green algae, and the one in my pool is green algae that's yellow, showing that it's affected by the chemicals, but alive. I wanted to simulate what my pool experiences from the summer to now, which currently has less algae.
I tested the algae in four environments. I had the control in average temperatures and lighting, another one with cold temperatures and average sunlight, one in the light with an average temperature, and the last one in the dark with average temperatures. I simulated the temperature of the day and the seasons. So, the hot jar was a cooler temperature at night to simulate the weather during the night, and simulated the summer with the hotter temperature. The cold jar simulated the winter, the light jar simulated the summer. The dark jar also simulated winter. My hypothesis is that the lighter/hotter jar would have more growth than the colder/darker jar, from photosynthesis.
The results after 2 weeks were that the heated one grew the most, then light, cold, and dark. This proves my hypothesis. Therefore, heat and light grows algae most from sunlight and heat from summer.

Project # **J2017** Category: **Plant Biology & Physiology - Jr**

Student: **Samuel Sun** Grade: **8** G: **M**

School: **Palos Verdes Intermediate School**

Title: **Plant Health with Household Products**

Plants are enjoyed by many people for growing food, growing fruits, and being a hobby to take care of. However, just like humans, plants are affected by household products and many other factors. The objective of my experiment is to water plants with different sources of hydration using Tide and Seventh Generation Laundry Detergent, Dawn and Mrs. Meyer's Dish Soap, Plant Pots, Radish Plants, and water. I hypothesize that the plant watered without a product-based form of water will grow better, as it will not have contact with chemicals, and other things which will deteriorate the plant's health.

To accomplish this, I used the following methods: I watered one of the radish plants with a product-based solution, while the other was watered with tap water from a faucet. By testing and checking the plants every week for a total of 4 weeks, changes in plant health, color, behavior, appearance, touch, and growth were recorded
Results showed that the plants I experimented with have been affected negatively by the presence of house products in their hydration mixture. The leaves of the plant watered with this product-based solution within 1 week began showing health issues including yellow-dried leaves, a drooping stem, and crumpled appearance. While the plant watered with a tap-water based solution has grown to be a strong and healthy plant.

The experimentation and process supported my hypothesis that it is best to avoid any products when watering plants. Humans can be harmed by the things they use every day, and that we should strive to find alternatives to unhealthy products.

Project # **J2018** Category: **Plant Biology & Physiology - Jr**

Student: **Fatimah Alameddine** Grade: **6** G: **F**

School: **Institute of Knowledge Middle School**

Title: **Plants in Peril: Examining the Effects of Global Warming on California's Flora**

Problem: While scientists have warned that many delicate plant species may face extinction or reduction in numbers by 2100 due to global warming, the fate of hardy cactus plants remains uncertain. This project aims to investigate the ability of cacti to withstand the effects of the changing climate.
Procedure: During my trials, I simultaneously conducted experiments using three heating lamps. The lamps had one, three, and five light bars respectively, and each lamp was used to grow three plants as a backup in case of disease or other issues.
Results: I hypothesized that the plants under different light conditions would have varying growth outcomes. Specifically, the plants under five light bars were expected to die quickly, while those under three light bars were expected to have limited growth, and those under a single light bar were expected to thrive and grow tall. The plants under five light bars were not expected to grow at all.
Conclusion: My hypothesis was partially supported by the results of the project. Plants under one light bar did not grow well, while those under three light bars thrived and those under five died quickly. The study suggests that some California plants may not be immediately impacted by global warming but could be in the future without intervention.

Project # **J2019** Category: **Plant Biology & Physiology - Jr**

Student: **Josiah Himsl** Grade: **8** G: **M**

School: **Sierra Madre Middle School**

Title: **Can I Reduce My Carbon Footprint by Growing Phytoplankton?**

Global warming is a big problem! It can lead to increased natural disasters and increased temperatures. Carbon dioxide is the leading cause of global warming and humans are the main producers of it.

This experiment follows the growth of a phytoplankton culture over a 7-10 day period. The PH is measured at the start of the experiment, again when the culture has reached maximum density, and finally, after harvesting.

The results show that phytoplankton growth is associated with an increase in PH from 6.33 to 7.58, which reflects a greater than 10-fold decrease in the concentration of Co2 due to the uptake of Co2 by the phytoplankton during photosynthesis. If everyone grew phytoplankton in their home, they could reduce their carbon footprint and improve their air quality.

Project # **J2020** Category: **Plant Biology & Physiology - Jr**

Student: **Kendelyn Kay** Grade: **6** G: **F**

School: **Pomona Unified School District Junior Division**

Title: **Can It Grow?**

my project is to see if plants can grow in recycled materials in order to see if recycled materials can be used for growing food to feed our growing population.

Project # **J2021** Category: **Plant Biology & Physiology - Jr**

Student: **Madison Stevens** Grade: **8** G: **F**

School: **Holy Angels School**

Title: **What is the best Plant Food?**

When you are growing your plants, you want something that will help encourage growth, and not negatively affect your plants or plant growth. What I wanted to find out was, what is the best plant food. To find this out, I tested five different types of plant foods(not including water). I tested three store bought plant foods, coffee grounds, a homemade plant food, and water as my control. For my method, I used my control variable (water) every other day, making sure to use three tablespoons. I then used the independent variables (plant foods) according to their directions. I would track the plant growth, dependent variable, over time. My goal is to see which plant food has the healthiest, most encouraged growth by the end of the experiment. I hypothesized that if I watered the plants, and fed them according to their directions, over a two week period, then Miracle-Gro Indoor Plant Food would demonstrate the healthiest plant growth. I think Miracle-Gro will show the most effective growth because it contains NPK, or the core nutrients. The ingredients contained are: Nitrogen, Ammoniacal Nitrogen, and Potassium Phosphates. My results showed that the two “homemade” plant foods had the most positive results. The homemade mixture and Miracle-Gro had the tips of their stems starting to open up, however both bottom halves of their stems were brown. The Folgers coffee grounds had darker/ more moist soil, along with a greener stem. The worst plant food was Dr.Earthy, with molded soil, and a brown/crusted stem. My data shows that Folgers provided the healthiest plant growth, but Miracle-Gro and my homemade mixture encouraged the most growth. I would recommend using your leftover coffee grounds for your plants as the easiest option. However if you’re willing to put in a little extra effort, I say make your own plant food. It contains things you will most likely find around your house, and gives almost exact results to a store bought plant food(Miracle-Gro). I would say that my hypothesis was correct in the fact that it showed the most plant growth, however it is not what I would recommend for your plants considering that there are healthier and easier options.

Project # **J2022** Category: **Plant Biology & Physiology - Jr**

Student: **Sophia Perez** Grade: **6** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Do Lemon, Orange, and Apple Infused Water Affect the Growth of a Centuarea Cyanus?**

The project was supposed to solve the question of what infused fruit water would help the Centaurea Cyanus grow the most, or affect it the most. What was needed to find out this question was to use the infused fruit water and add it to the Centaurea Cyanus, but what was also needed was soil to put the seed of the Centaurea Cyanus, which is obvious but important. This project would need this process to be repeated every week or every Tuesday, Thursday, and Saturday.

This process would help the Centaurea Cyanus with the different types of infused water to grow little by little every week, until the last week.(week 7) Every week the project would need measurements documented to be able to see the process of the plants growth until the growth and which Centaurea Cyanus plant had grown the most, which is needed to solve the question that was needed to know.

After the project was done, what was figured out was that the Centaurea Cyanus with the orange infused water grew the most after the 7 weeks, and after repeating this process a lot of times. This question can also help know which infused fruit water from these 3 will help a Centaurea Cyanus grow the tallest.last week, so you will be able to see the progress towards the plants.

Project # **J2023** Category: **Plant Biology & Physiology - Jr**

Student: **Sahel Munshi** Grade: **8** G: **M**

School: **Portola Highly Gifted Magnet**

Title: **Heavy Metals Alter Plant Development and Physiology**

HEAVY METALS ALTER PLANT DEVELOPMENT AND PHYSIOLOGY. Sahel Munshi and Mr. Schmidt (Teacher). Portola Highly Gifted Magnet. 18720 Linnet Street, Tarzana. CA 91356

Heavy metals are naturally occurring elements that have widely contributed to pollution in many forms. Due to multiple industrial, domestic, agricultural, medical and technological applications, they have been widely distributed in the environment which has raised concerns over their effects on the ecosystem. Their toxicity depends on several factors including the dose, route of exposure, and chemical species. In this experiment, the effects of copper, molybdenum, and arsenic on plant development were tested and compared. While all three elements showed some form
of growth interference, the effects on the root and shoot development varied. The plants treated with copper had inhibited root growth corresponding with the concentration. However, the shoot growth was not as affected. The lowest concentration of molybdenum had no effect on root development, but the higher concentrations prevented both root branching and lengthening. All concentrations of
arsenic showed slowing of root growth, but the shoot growth was not so drastically affected.

Project # **J2024** Category: **Plant Biology & Physiology - Jr**

Student: **Ananya Balaji** Grade: **8** G: **F**

School: **Ridgecrest Intermediate School**

Title: **Effects of Varied Lighting on Hydroponically Grown Wheatgrass**

As Earth’s population grows, we require an alternative way to produce food. One option is hydroponics, the process of growing crops in water. However, the best form of hydroponics is uncovered, so we intend to unveil some of this unknown: which kind of lightbulb is the best choice to be used in hydroponics. Our hypothesis is that LED lights will work the best.

Three 60-watt light bulbs were suspended 23 cm above the wheatgrass. Seeds were planted in net cups suspended over solutions [120 mL tap water + 15 mL Schultz liquid plant food]. Each system was placed under an LED, incandescent, or fluorescent bulb and allowed to grow for 25 days. External light sources were blocked off by cardboard sheets. Wheatgrass height was measured daily, root length was measured on the first and last day.

The final heights were 2.2 cm [LED], 1.2 cm [Incandescent], 1.3 cm [Fluorescent]. The final LED roots were (on average) 2.1 centimeters long, the final incandescent roots were (on average) about 1.63 centimeters long, and the final fluorescent roots were (on average) 1.03 centimeters long.
Our results showed that the plant with the greatest height and root length was placed under LED lighting. The results were supportive but not definite regarding our hypothesis. For further research, more data could be gathered on the best distance for a light source to be held above the plant, as we suspect that the bulb was too close to the plant itself.

Project # **J2025** Category: **Plant Biology & Physiology - Jr**

Student: **Bella Cho** Grade: **6** G: **F**

School: **Walter Reed Middle School**

Title: **Acid or Alkaline?**

Plant growth is significantly impacted by soil pH. The purpose of this investigation was to determine whether plants will flourish in an acidic, neutral, or alkaline environment. Because too much acidity or alkalinity in the soil would restrict the nutrients that plants could obtain and raise the soil's toxicity, my hypothesis was that plants would thrive in a neutral environment. I planted nine apple sprouts, three in each of the three pots, to test my hypothesis. Every day, I gave each of the three pots 50 ml of water with a varied pH level (pH 4, 7, and 10). And every other day, I measured the plants' growth. After 21 days, I analyzed the height and growth of the three apple plants in three pots. The apple sprouts grew better when they were watered with a pH level of 10 (average 2.2 cm), compared to pH 4 (average 1.1 cm), and pH 7 (average 1.8 cm). The most effective pH level of the three for promoting plant growth was alkaline, pH 10. Finding out a plant's preference for acidity or alkalinity could promote the productivity of agriculture, which is crucial in order to meet the rising food demand sustainably and stimulate economic growth.

Project # **J2026** Category: **Plant Biology & Physiology - Jr**

Student: **Eloise Schaeffer** Grade: **7** G: **F**

School: **Saint Martin of Tours Elementary School**

Title: **Lights on Lima beans**

This research involves studying the impact of light on growing Lima Beans from seed to full plant. I planted 4 seeds, then measured the height of the plant, after 3 of the plants were exposed to 3 different light filters. The fourth one, is a seed with no filter. This seed will be planted and grown "naturally", under normal light, with no filter. 3 of the seeds will be planted and grown, under orange, yellow, and pink filters.

I am measuring the relationship between how much a plant grows and its exposure to light. The leaves carry out photosynthesis and by filtering the light, this will impact plant growth. As a result the experiment used orange, yellow, and pink filters to impact photosynthesis in 3 plants. While the 4th plant had unfiltered light to conduct photosynthesis. "The spectrum of light most utilized by a leaf is limited to three distinct colors, red, blue and yellow."

I want to test if different colors and wavelengths impact photosynthesis. I will explore growing a plant and understanding where to put it within a home. I want to understand the impact of wavelengths and how that hurts or helps the plant grow by measuring its height and leaf length. I will attempt to keep all other variables the same (soil, water, container, fertilizer, air quality, 10 gallon aquarium tank).

Project # **J2027** Category: **Plant Biology & Physiology - Jr**

Student: **Ayden Tashman** Grade: **8** G: **F**

School: **Temple Beth Am Pressman Academy**

Title: **Musical Plants: Does Music Affect the way your Plants Grow?**

The purpose of this project is to see if music (classical and heavy metal) affects plants in any way different than normal. The hypothesis was that heavy metal will kill the plant and make it more bitter, while classical will make it more sweet and flavorful. Music was played to mint plants for three hours a day for five days, and will be tasted at the end along with the control to see if anything changes. The results were that the control wilted and died within the first three days, while the heavy metal flourished and classical stayed in between the entire time. The hypothesis was not supported, as it was thought that the heavy metal would die but it ended up staying alive the best. This project was very interesting and could help people keep their plants alive for longer as well as help botanists grow plants more efficiently.

Project # **J2028** Category: **Plant Biology & Physiology - Jr**

Student: **Nicholas Brown** Grade: **7** G: **M**

School: **Hale Charter Academy STEAM Magnet**

Title: **Which Plant Grows Best in Microgravity?**

As space exploration becomes more prominent in society, humans need to find a way to create a sustainable food source. This project was designed to experiment with different edible plants, and analyze which plants would have the best properties in microgravity, so that the best food source could be identified. It was hypothesized that if plants have the capability to grow in microgravity, then radish plants will grow 10 mm in 10 days, and will be the best option to be grown in space, because radish plants grow quickly (within 3 weeks), can be eaten raw or cooked, only need little amounts of water, and can be grown in many conditions. To simulate microgravity, plants were spun 360' on one axis. This "disorients" the plant, causing it to not know which direction to grow its roots. When rotating the plants, (radish, snap peas, carrots, and soybeans) the plant seeds were embedded in agar filled petri dishes that were mounted to a frame. Magenta LED grow lights provided light. As expected, the radish plants had 5 germinated plants, growing to be 9 mm in 10 days. The plants grown in gravitic conditions had the highest growth, the snap pea, with its highest point being 15 mm in 10 days, as foreseen. This experiment was mostly successful in the fact that valuable data was collected. However, the bacterial management did not meet expectations. If the experiment is repeated, the spread of bacteria would need to be managed, including the sterilization of tools.

Project # **J2029** Category: **Plant Biology & Physiology - Jr**

Student: **Hiromi Ouchi** Grade: **8** G: **F**

School: **Ridgecrest Intermediate School**

Title: **Using RuBisCO to Enhance the Growth Rate of Wheatgrass**

With the growing population of the world, the demand for food will continue to increase. In the near future, we will need food that is grown at a faster rate, to fulfill the increasing demand for food. One solution is the enzyme RuBisCO, which in photosynthesis, converts carbon dioxide in the atmosphere into the organic form of carbon, found in the biomolecules of all organisms. My hypothesis is that soaking the seeds in RuBisCO will increase the rate of growth of wheatgrass.
To grow the wheatgrass, I first soaked the first half of the seeds (five seeds each) in RuBisCO and water, and soaked the other half of the seeds in just water. I then planted the seeds in two pots split by non soaked and soaked, in a controlled environment. From there I sprayed the plants everyday, and took photos and measurements of the plants everyday.
The plant with the RuBisCO soaked seeds grew 17cm, versus the plant without any soaking, which grew 15cm. The plant with the RuBisCO soaked seeds grew slightly taller than the plant with no soaking.
My hypothesis stated that soaking the seeds with RuBisCO will increase the rate of wheatgrass, and it was supported. It would be very beneficial to study the growth rate of produce soaked with more RuBisCO than I originally gave it; one step closer to solving hunger is a job well done.

Project # **J2030** Category: **Plant Biology & Physiology - Jr**

Student: **Anson Lee** Grade: **6** G: **M**

School: **Pomona Unified School District Junior Division**

Title: **Do Temperatures of Water Affect Plant Growth?**

My Science Fair project is to see if water temperatures will affect plant growth. I used 15 pots full of soil and planted 3 in each, then I labeled 5 pots cold, 5 other ones warm, and the last 5 hot. Then I watered each pot with their respective temperatures. After a few days of measuring the plants' growth, I compare the plant's heights to find out which temperature will be best for a plant.

Project # **J2031** Category: **Plant Biology & Physiology - Jr**

Student: **Ibraheem Mulla** Grade: **7** G: **M**

School: **New Horizon School**

Title: **Testing the Effect of Earthworms and Peanut Shell Powder on String Bean (Phaseolus vulgaris) Growth and Soil Moisture Content**

The objective of this experiment was to find the effect of earthworms and peanut shell powder on string bean growth and moisture of the soil. It was hypothesized that if string beans were grown with regular soil, earthworms, peanut shell powder, and both, the plants grown with both would grow the tallest and conserve the most moisture. The materials used were 20 string bean seeds, gardening pots, 50 red wiggler worms, soil, and 2000 grams of peanut shell powder. The method was to fill twenty pots with 600 grams of soil and place five red wiggler worms in ten pots. In ten pots, add 200 grams of peanut shell powder and 5 pots (control). The average height of string bean plants after 37 days was tallest in earthworm + peanut shell powder group (24.6 cm), followed by earthworms (20.5 cm), followed by peanut shell powder (13.6 cm), followed by control (11.8 cm). The average soil moisture before watering between days 34-37 was highest in earthworm + peanut shell powder (3.8), followed by earthworms (3.6), followed by peanut shell powder (3.1), followed by control (3). Some of the factors that might have influenced the results include temperature, humidity, and light conditions under which the plants are grown. In the future, other species of plants will be tested with different amounts of peanut shell powder and earthworms. This experiment applies to agriculture; one could potentially use peanut shell powder and earthworms to successfully retain more moisture, minimize watering, and enhance plant growth.

Project # **J2032** Category: **Plant Biology & Physiology - Jr**

Student: **Sophie Audu** Grade: **7** G: **F**

School: **Rudecinda Sepulveda Dodson Gifted Magnet Middle School**

Title: **Plants to the Rescue: Do plants have an effect on noise pollution?**

The purpose of this study and experiment is to find a solution to exposure to elevated sound levels, which people suffer from every day. Noise pollution is greatly overlooked, and more solutions need to be devised in order to resolve this issue, which is the target of this study. Exposure to elevated sound levels is detrimental to the health of both humans and animals and continues to affect our communities daily. Research showed that a way to reduce elevated sounds in a room was to place plants in a room, which is tested with a box in a small room, a sound greater than 85 dB, 5 different plants, and a decibel meter to measure sound reduction when plants are present. From my study and experiment, I was able to conclude that plants indeed have the capability of reducing elevated noise levels in a room. Out of all the plants tested, the Crazy Bunny Cactus plant reduced sound the most. My results proved that recent studies and research showing that plants can absorb plants were correct. This solution to noise pollution using plants can be utilized both indoors and outdoors and will prevent people from the complications that come from elevated noise levels. This solution can be used in my community to reduce loud sounds that I often hear due to traffic, cars, construction work, and much more, as well as in my room and classrooms, as a way to have a more quiet environment to work and focus in.

Project # **J2033** Category: **Plant Biology & Physiology - Jr**

Student: **Stephanie Yanez** Grade: **7** G: **F**

School: **Bell Gardens Intermediate School**

Title: **Follow the Light**

Our project is about which of the two plants grows but one plant is growing with a green light and the other one is growing with the purple light. In our experiment we got two boxes, we made a maze with paper, we cut a hole on the top of the box and we added a purple light and we put our plant inside of the box. We also did that for the other box that contained a green light. In the end of the experiment we found out that our hypothesis was right because we said that the purple light was going to have a better effect on the plant and therefore the plant with the purple light did grow. So in conclusion the purple light had a better effect on the plant.

Project # **J2034** Category: **Plant Biology & Physiology - Jr**

Student: **Moses Kaplan** Grade: **7** G: **M**

School: **Portola Highly Gifted Magnet**

Title: **Polluted vs Pure Microgreens**

TESTING THE EFFECTS OF LA RIVER WATER COMPARED TO DISTILLED WATER ON THE GROWTH AND NUTRITIONAL VALUE OF RUDOLF RADISH MICROGREENS. Moses Kaplan. Mrs. Ruth Gramajo (teacher). Portola Highly Gifted Magnet, 18720 Linnet Street, Tarzana, CA 91356.

The purpose of my experiment is to determine the harmful effects of LA river water on plants that we would eat. I am comparing LA river water to normal water (from the hose) and the purest form of water, distilled water. I am trying to test how Distilled and LA river water differ from normal water. My hypothesis is that LA river water will have low nutritional value and stunted growth because of all the harmful chemicals in the LA river. In contrast, distilled water will have beneficial or at least normal effects on the plants because it has no harmful materials of any kind. I will be testing this hypothesis with radish microgreens watered with my three different types of water. I will track their growth by final weight and nutritional value with a tool called a brix refractometer. The results showed that distilled water has the highest germination rate but the lowest nutritional value and that normal hose water (control) has the lowest germination rate but the highest nutritional value. LA river water had a good germination rate but low nutritional value. In conclusion, my hypothesis was partially correct because the distilled water did have the highest germination rate and the LA river water did have a low nutritional value but the LA river water had a high germination rate which was unexpected. In addition to this the distilled water microgreens had a low nutritional value which was not expected either.

Project # **J2035** Category: **Plant Biology & Physiology - Jr**

Student: **Penelope Ehrich** Grade: **8** G: **F**

School: **Saint Martin of Tours Elementary School**

Title: **BE WISE WHEN YOU FERTILIZE!**

Determining what nutrients are the most important for healthy plant development requires research into the various nutrients as well as how plants grow. Nitrogen, Potassium and Phosphorus are the primary nutrients for healthy plant development. Understanding how these nutrients help with successful plant growth allows us to know what type of fertilizer is best for specific plants. Nitrogen helps leaves grow and turn green, phosphorus helps root growth, and potassium helps the internal plant functions work correctly.

In determining which fertilizer works best, we tested fertilizers rich in each individual primary nutrient as well as a balanced fertilizer with all three primary nutrients included. I observed the plants each week and recorded our observations. I looked for height, leaf structure, plant rigidity, root development and direction of growth. I also compared the growth patterns of each plant with the various fertilizers. Each plant was given the same amount of water, soil and sun exposure to determine which fertilizer works best for healthy development.

The plant fertilizer that was the most efficient for growth was the all purpose fertilizer. I believe that this fertilizer was best because it is made up of all primary elements needed for a successful plant. The fertilizer that was proven to be the least effective was the bone meal fertilizer. I think that this fertilizer was the worst because it takes the longest to grow, it isn't a balanced fertilizer, and only works if the pH is below seven.

Project # **J2201** Category: **Product Science - Jr**

Student: **Belicia Califano** Grade: **6** G: **F**

School: **Pomona Unified School District Junior Division**

Title: **Most Absorbent Paper Towel Brand**

My Project is about on what is the best paper towel brand for absorption among Viva: Signature Cloth, Kirkland paper towels, and Bounty: the quicker picker upper. My project shows which brand picks up coffee, milk and water the best.

Project # **J2202** Category: **Product Science - Jr**

Student: **Celia Sasamoto** Grade: **6** G: **F**

School: **St. Timothy School**

Title: **Which Color Leaves the Most Unpopped Kernels?**

For my experiment, I will be testing which color of popcorn will leave the most unpopped kernels. I used three different colors: yellow, white, and purple. First, I got three different colors and split each group into 9 groups of 100. I used three different microwave times and tested each color three times per cooking time. After, I did a sample test to find how long each will take to start popping, and when it will stop popping. I found that it starts popping around 70 seconds. So I created 3 different times: 3 minutes, 3 minutes 15 seconds, and 3 minutes 30 seconds. I microwaved three groups of each color of popcorn for each different time. Once I completed all 27 rounds, I found out that the purple kernels had the most amount of unpopped kernels. The purple kernels beat white and yellow by a large amount. My hypothesis was incorrect because I thought that the white kernels would leave the most unpopped kernels, but instead purple did. I learned that the size of the kernels didn't really matter. I think that the amount of starch contained inside would be one of the bigger reasons why some kernels didn't pop. The purple kernels had 18 grams of starch while the others both had 25 grams. It would be interesting to repeat this experiment except with a wider variety of colors or just different types of popcorn.

Project # **J2203** Category: **Product Science - Jr**

Student: **Maryam Ahmed** Grade: **7** G: **F**

School: **Institute of Knowledge Middle School**

Title: **Color Coded: Examining the Interplay of Age and Color in Shaping Our Perception of Flavor**

Problem: How does age influence the way we perceive taste in relation to color?
Procedure: In each of three test trials, four participants in three age groups (below 10, 10-20, above 20) were given 60 mL of three different flavored clear beverages. In a subsequent test, the same participants were given the same beverages, but with added dye to create mismatched colors. The entire test period lasted 48 hours.
Results: In the first group, everyone correctly identified the clear citrus flavor, but when the same flavor was dyed purple, 75% of them mistakenly identified it as grape. The second group had similar results, and the adult group had nearly identical results as well.
Conclusion: The first group correctly identified 8/12 flavors in the clear test and only 3/12 in the colored beverage test. The second group correctly identified 4/12 flavors in the clear test and 3/12 in the colored beverage test. The third group correctly identified 6/12 flavors in the clear test, with a 50% overlap between clear and colored tests. These results support the hypothesis that age affects taste perception.

Project # **J2204** Category: **Product Science - Jr**

Student: **Chirsten Gloria** Grade: **7** G: **F**

School: **Rudecinda Sepulveda Dodson Middle School**

Title: **Soundproofing Door Hanger**

Sound from one to another can cause distractions to students. By making a door hanger with proper sound-absorbing materials, noises can be canceled allowing students to focus. Focusing more on schoolwork can help students understand and perform better. Evidence from many studies proves the fact that noise distractions can cause significant effects on our understanding and development, especially to children. Children are distracted by many things, from the random sounds they may hear, to the sound of kids playing outside. With a device that blocks this noise, children are able to stay less distracted and focused on what they are doing. To make this door hanger, we used pool noodles with a hook-and-ring system to attach a durable cotton sack filled with sound-absorbing foam. When placed on a door, this invention did protect, absorb, and block sound from entering the room. To test our device, we used the “Chrome Keyboard” to play sounds at a certain decibel level per trial. We would then see how many decibels were passing through the door with and without the hanger. The data would be recorded and would be examined for any significant positive or negative changes. Using the data that we have gathered, our hanger was able to reduce more sound than the door on its own. In all four of our trials, the door hanger reduced more sound when louder sounds were produced. This door hanger can be used in classrooms and work spaces to help reduce the number of distractions made.

Project # **J2205** Category: **Product Science - Jr**

Student: **Sana Khan** Grade: **7** G: **F**

School: **Al-Huda Islamic School**

Title: **Dis Dis Away! Which Disinfectant Works Best at Killing Bacteria?**

If you are looking for the best disinfectant to clean your cutting boards that you cut meat with, which disinfectant do you think would work best? This project will show whether Fabuloso, White Vinegar, Rubbing Alcohol, Lysol, Hydrogen peroxide, Bleach, or a Soap and Water mixture will work the best in disinfecting cutting boards. I hypothesized that if I test several disinfectants to see which one will work the best to remove bacteria off of a cutting board, then I think that the white vinegar will work the best. After buying all the materials needed to perform the experiment, I took 3 cutting boards and divided them into 8 sections each then I evenly rubbed chicken all over the boards and let it sit for an hour. I then swabbed them with the disinfectant and transferred it to the agar plates. Every day for a period of 14 days, I observed each and every plate and recorded the number of bacterial colonies in a chart. Every day, more bacterial colonies grew on each agar plate. My hypothesis was not supported. The agar plates that were disinfected with bleach had an average growth of 32 bacterial colonies. I concluded that using bleach to disinfect cutting boards is the best option to minimize bacteria growth but can be dangerous to handle.

Project # **J2206** Category: **Product Science - Jr**

Student: **Samia Halari** Grade: **6** G: **F**

School: **New Horizon School**

Title: **The Effectiveness of Plant-Based Detergent and Chemical-Based Detergent on Stained Pieces of Cloth.**

This science experiment tested the effectiveness of plant-based detergent and chemical-based detergent on stained pieces of cloth. The objective of this experiment was to test a plant-based detergent and a chemical-based detergent on stains to see if harsh chemicals in chemical-based detergents were really needed to clean a stain. Chemical-based detergents are harmful to the environment whereas plant-based detergents are safer due to clean, natural ingredients. The hypothesis was that chemical-based detergent would clean the stain better than plant based detergent because the chemicals would break down stains better. For this experiment, 90 pieces of cloth were cut, and ketchup, coffee, and olive oil stains were applied to them, 30 each. For each batch of 30 pieces of cloth of one kind of stain, 15 were washed with plant-based and 15 with chemical-based. Some errors that occurred during my experiment was the use of vegetable oil. Vegetable oil is often hard to see with the naked eye, making it difficult to see if the stain is thoroughly removed. In this case, the results were not clearly seen, so the stain had to be changed. The results showed that plant-based detergents are just as effective as chemical-based detergents, proving that the harsh chemicals in chemical-based detergents are not needed. This means that when people use plant-based detergents not only are they getting clean clothes they are also protecting the planet and saving its waters and animals.

Project # **J2207** Category: **Product Science - Jr**

Student: **Clarissa Mata** Grade: **8** G: **F**

School: **Montebello Intermediate School**

Title: **Botany in Distress**

Objective: The goal is to see which plant is more damaged than the others.

Materials and Methods: 3-ring binder, 3 different colored cups, 3 different types of water, a science journal, construction paper, glue, scissors, decorative trees, crayons, and colored pencils. I used a small shovel to add dirt into the cups, seeds that I had in my garden, and I also used the water sources we had available around the house.

Results: The results of this experiment show that water with sugar was the most harmful to my plants and that the soap water was the least harmful. One thing I did notice while observing the plants is that the soap watered plant also grew first.

Conclusions: The results supported my hypothesis by showing that the water with sugar was the most harmful to my plants. My prediction at first was that the soap water would kill my plants, but in the end it was the least harmful as well as the salt water, the soap watered plant grew a bit taller but they both worked better than the sugared water.

Project # **J2208** Category: **Product Science - Jr**

Student: **Noah Weissman** Grade: **7** G: **M**

School: **Temple Beth Am Pressman Academy**

Title: **Which is better? Powder or granular carbon**

The purpose of this science experiment is to determine whether the use of charcoal is efficient in filtering drinking water. If so, does the type of charcoal used, whether in a powdered or granular form, affect the efficiency in filtering out impurities such as food coloring in water. The hypothesis to be tested is whether the partial size of active carbon (charcoal) will demonstrate the effects of drinking water filtration efficiency. In order to test this hypothesis, food dye will be added to tap water and then filtered separately using equal amount of both powdered and
granular charcoal. The data resulting from these tests will demonstrate that the use of powdered charcoal is far superior to filter out impurities of colored drinking water than by the use of granular charcoal. The conclusion reached is that the particle size of charcoal does in fact affect the efficiency of waste removal during the water filtration process.

Project # **J2209** Category: **Product Science - Jr**

Student: **Angelique Matavosian** Grade: **8** G: **F**

School: **Chamlian Armenian School**

Title: **What Materials Are Good Sound Insulators**

For my science fair project I tested to see what materials are better sound insulators than others. This is useful because when building a room for instance in a house, an office, or an apartment building you need to make sure the walls have a good material that will insulate sound. If the walls do not absorb the sound well then there will be a big problem for the residents that live there because everyone will be able to hear the noise from the other room. For instance, I have used a metal bowl, a clay bowl, a plastic bowl, and a glass bowl to cover my phone while playing music. After I cover it I use an apple watch's noise level counter to measure the decibel of the music playing while the bowl covers it. To make my tests more comprehensive I have also measured the thickness of the material I used to cover the phone. The lower the decibel level the better the insulation. For example, if I cover my phone with a metal bowl and the decibel is 50 and I cover the phone with a clay bowl and the decibel is 45 I can conclude that clay is a better insulator than metal. The sound at the same level of volume was 78 decibels for control, glass was 54, clay was 54, and metal was 59. Based on the data I have collected, the best sound insulators were glass and clay while the worst was metal.

Project # **J2210** Category: **Product Science - Jr**

Student: **Halo Ruiz** Grade: **6** G: **F**

School: **Pomona Unified School District Junior Division**

Title: **Which of Shampoo is Healthiest for your Hair and Which is the Best?**

I chose to do this project to find out what shampoo is healthiest not only for my hair but for others too . I discovered a lot about different chemicals in most shampoos some of the chemicals can cause diseases such as cancer and some of the hair extensions that were washed with Pantene and Head and shoulders would contain unhealthy chemicals such as sulfate and parabens they are known as hormone disruptors and have been linked to cancer. Herbal Essences did not contain any unneeded chemicals. I have learned a lot and now I know what shampoo to use and what is healthiest and how to take care of it better.

Project # **J2211** Category: **Product Science - Jr**

Student: **Matteo Magnano** Grade: **8** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **The Race Against Pain**

Pain is a signal from your nervous system that something may be wrong . Pain is a symptom of illnesses or injury. Drugs come in many different types from tablets, to capsules, to films. Have you ever wondered which type of drug is most effective in treating your pain as quickly as possible to give you the best relief? Does it matter which Advil pill you take? Which Pill type should you take? People need to understand the solubility and dissolution rates so they can know which type of pill they should take to get the quickest results for their pain.

To determine which type of Advill pill had the fastest dissolution rate, three trials were conducted. Each trial used a different type of Advil pill consisting of Advil Coated Caplets, Advil Liqui-Gels and Advil Chewable Tablets. The different types of pills were placed in lemon juice with a pH of 2 to simulate stomach acid pH of 1.5-2.0. Each trial recorded the time it took for each pill to dissolve. The experiment determined that the fastest average dissolution time was the Advil chewable tablets, followed by Advil coated caplets and Advil liqui-gels took the longest to dissolve. The chewable tablets dissolved 33% faster than coated caplets and 86% faster than liqui-gel capsules. Coated caplets dissolved 81% faster than liqui-gel capsules, they dissolved 33% slower than chewable tablets. Liqui-gel capsules dissolution rate very slow, and dissolved 616% slower than chewable tablets and 437% slower than coated tablets.

Project # **J2212** Category: **Product Science - Jr**

Student: **Caleb Polk** Grade: **6** G: **M**

School: **Turning Point School**

Title: **Evaluating Solar Ovens**

The objective of our science project is to help people make the right choice when it comes to solar ovens. As solar ovens become more popular people need to know if the product is good and here is where our project comes into play. Our project will go over 3 types of solar ovens: a cheap one, a medium priced one, and lastly an expensive one. The way we experiment is making food with the same quantity of ingredients and time to cook. After that we also grade the food's quality when it comes to baking it.Our material is flat pre-made dough, marina pizza sauce, and lastly cheese.The solar oven's we used was Sunflair Portable Solar Oven Deluxe it cost about 200 dollars on Amazon.com. Another solar oven we used was EnergyWise Solar Oven it cost about $40 on Amazon. The third was from Solarcookers.org. It cost about $20.
With all this we experiment with our projects and see the results, and so far we have seen some of the results like how the medium priced one cooks fast but on overall concerted and for the the most expensive one it cooks slower though it cooks at a better overall heat. Though we have not concluded our experiment, we have done a test. We have another test scheduled for this week because it is supposed to be hot and sunny. We are happy to present our findings and results at the LA science fair. Thank you so much for your time and have a great day!

Project # **J2213** Category: **Product Science - Jr**

Student: **Joseph Hynes** Grade: **7** G: **M**

School: **Holy Angels School**

Title: **What soda is the worst for your teeth.**

ABSTRACT

We wanted to test which soda is the worst for your teeth. The term “the worst for your teeth” was very vague so we decided to focus on the aspect of staining since we figured everybody prides over the whiteness of their teeth. So, after finding the most popular sodas we chose six sodas to test Coca-Cola, Diet Coke, Dr. Pepper, Mountain Dew, Pepsi, and Sprite. Our hypothesis was: “If we leave the eggs in the sodas for 24 hours then pull them out the egg in Coca-Cola will be the worst stained.”

The procedure for this experiment was very simple. To begin, we labeled six cups with one of the aforementioned sodas’ names. Then, we hard boiled six eggs for approximately 12 minutes. Next, we filled each cup with its corresponding soda and an egg and let it sit for 24 hours. Finally, we pulled the eggs out of the sodas. The results were that all the eggs were stained very badly except for the egg in sprite. The egg that was stained the worst was the egg in Coca-Cola, proving our hypothesis correct. Although the egg in Dr. Pepper was a very close second.

To summarize, almost all the eggs were horribly stained but, the egg in Coca-Cola was the worst stained. In contrast, the egg in Sprite was not stained. So, we recommended staying away from or not often having any colored sodas (especially Coca-Cola).

Keyword: teeth, stained, egg

Project # **J2214** Category: **Product Science - Jr**

Student: **Kai Quan** Grade: **6** G: **M**

School: **Mark Twain Middle School**

Title: **The Science of Trendy Insulated Water Bottles: Do They Deliver?**

The purpose of this experiment was to determine whether trendy, insulated water bottles actually keep water cold all day. By learning this, we can determine if these pricey water bottles deliver value to support their cost.

For the experiment, I used a thermal gun & three water bottles: a 16oz bottle, a 24oz bottle, & a 32oz bottle. To test, I placed all the bottles in the freezer for 10 hours. After they were removed from the freezer, I measured the water temperature of each bottle & the ambient temperature with a thermal gun. I measured & recorded results every 30 minutes for 12 hours. I performed these same steps for two additional rounds, except with the additional rounds having longer freezing times: 15 hours, and 20 hours respectively.

Results: Averaging my results across all bottle sizes & all rounds of testing, I saw an average total rise of 21 degrees F from 7:00AM to 7:00PM. But, even with this average 21 degrees F rise, the average water temperatures remained 14 degrees cooler than the ambient temperature by the end of the experiment.

So my hypothesis: ‘If the water bottle is chilled, then it will stay cold for the day’ is correct, because based on my data, the water temperature remained well below ambient temperature from start to finish (12 hours). So, I conclude that these trendy water bottles do provide some value.

The data also shows that there is only a marginal difference in performance, from freezing for longer than 10 hours.

Project # **J2215** Category: **Product Science - Jr**

Student: **Luke Dymtrow** Grade: **7** G: **M**

School: **St. Timothy School**

Title: **Candle Scandal: Are You Getting The Best Bang For Your Buck?**

The goal of our project was to find out if lighter candles burn more wax than heavier candles in the same amount of time and if candles made from more expensive wax burned slower and lasted longer than candles made from cheaper wax. The purpose was to find out which candle wax gives consumers the most bang for their buck. To do our experiment, we made three sets of five candles made from different waxes. We measured the weight of the candles before and after four hours of burning. Then we performed calculations to determine how much candle wax was burned in four hours and how much the amount of wax burned cost to make. The results of our experiment were complicated. The lightest wax burned the fastest and the heaviest wax burned the slowest. For candles that weighed somewhere in between, the results were more complex. For example, two of the waxes, on average, weighed about the same, but one burned more wax than the other. Our results also showed that the most expensive candle wax burned the least in four hours. However, the next most expensive wax did not burn slower than two of the cheaper waxes. In conclusion, our hypothesis that lighter candles will burn more wax than heavier candles was not always supported and our hypothesis that the most expensive wax will burn the slowest was not always supported. Based on our experiment, however, candles made of beeswax give consumers the most bang for their buck.

Project # **J2216** Category: **Product Science - Jr**

Student: **Meisen Luna** Grade: **6** G: **M**

School: **Bell Gardens Intermediate School**

Title: **Silky Smooth**

If you are looking for a product that will make your skin silky smooth, search no more! The purpose of our experiment was to find which lotion will keep the most moisture in one's skin from evaporating. Our hypothesis was that if Vaseline, Aveeno, Johnson and Johnson lotions are used to test the moisture in people's skin, then Vaseline will be the most preserving moisture out of the three. The materials used were Vaseline Advanced Repair "8 Oz" Aveeno Daily Moisturizing "8 Oz" Johnson and Johnson Baby Lotion "6 Oz" 50 box of masks, 100 box of gloves, Portable Skin analyzer, Hand Sanitizer "Noir" (1 fl. oz.) We tested which lotion would keep the most moisture in your skin from evaporating, and the results revealed that Vaseline, and Aveeno tied for the most moisture in people's skin.

Project # **J2217** Category: **Product Science - Jr**

Student: **Vinay Rao** Grade: **6** G: **M**

School: **Sierra Madre Middle School**

Title: **Sun Smart**

My experiment is called “Sun Smart”. The question I want to answer is, how different SPF levels of sunscreen affect UV protection over a period of time.

My hypothesis for this experiment is that the higher SPF factor sunscreens will be more effective at blocking the sun’s UV rays over a period of time. I used different SPF sunscreens for this experiment - SPF 50, 30, and 15, and compared them to the control (which has no sunscreen). I also included Aloe Vera, which is sometimes called out as a natural sunscreen. I used a UV monitor to record results.

For this experiment, I first placed a plastic wrap tightly over the top opening of 5 boxes of the same size. I cut a hole out of the boxes to take the readings of the UV index. I then evenly applied about a nickel sized amount of sunscreen on top of each of the boxes and placed them in the sunlight. I took the UV readings by sliding the UV meter under the box every half an hour for 4 hours. I did this three times over 3 days to ensure repetitive data.

The data from my experiment showed that the effectiveness of all the sunscreens wore off over time. However the higher SPF factor sunscreens were effective for longer periods.

Project # **J2218** Category: **Product Science - Jr**

Student: **Yahia Qasem** Grade: **8** G: **M**

School: **Al-Huda Islamic School**

Title: **How Safe are Child Proof Medicine Bottles?**

Child-resistant medicine bottles, contrary to common belief, are not child-proof medicine bottles. Consumer Med Safety reports that if a child is left with a child-resistant medicine bottle for 10 minutes, they are very likely to open it. “The nonprofit group Safe Kids Worldwide reports that a child under the age of 6 in the United States dies from an accidental medicine-related poisoning every 12 days. Every nine minutes, a child goes to the emergency department for that same reason, and every hour a child is hospitalized as a result.” (www.familyhelpers.com)

This project examined which of five medicine bottles is safest and hardest to open. The bottle caps were: a control with no safety mechanism (bottle 1), line up with arrow and push up (bottle 2), pull down and turn (bottle 3), push down and turn (bottle 4), and squeeze and twist cap (bottle 5). It was hypothesized that 16 children ages 5 to 6 will find it hardest to open bottle 5, with the squeeze and twist cap.

The results proved that a 100% of subjects were able to open the control bottle. Only 6% were able to open bottles 2 (line up with arrow and push up cap) and 5 (squeeze and twist cap).

While bottle 5 tied for least opened, it cannot be concluded that it is the safest! One child is one too many when it comes to safety.

Other safety precautions should be followed while storing medicine. Bottles should be kept away from children’s reach.

Project # **J2219** Category: **Product Science - Jr**

Student: **Aliyah Husaini** Grade: **7** G: **F**

School: **New Horizon School**

Title: **Testing the Amount of Glucose Produced by Different Lactase Supplements**

The goal of this experiment was to test different brands (Lactaid, Equate, and Natural Factors) of lactase supplements to find the best lactase supplement for lactose intolerance. The hypothesis was that Lactaid brand would produce the most glucose out of the three brands because it is the most popular. The materials used were lactase supplements, 400 mL of 25º C water, 100 mL of cow milk, 400 mL beakers, 50 mL test tubes, 4 Bartovation glucose strips, and 20 mL of standard glucose solution. To begin, 100 mL of room temperature water was added into four beakers. Then, 20 mL of glucose solution was added to the first beaker and each of the brands of lactase supplements were added into three other beakers. After stirring thoroughly, 50 mL of each solution was put into separate test tubes with 25 mL of cow milk. Lastly, glucose test strips were dipped into each test tube and the glucose amounts were measured. The results showed that the Equate brand was, on average, the most glucose-producing supplement, proving the hypothesis to be incorrect. The average glucose produced for each brand was glucose solution (110 mg), Lactaid (850 mg), Equate (1030 mg), and Natural Factors (850 mg). Some errors could have occurred in measurement as there were some outliers in the glucose produced. By testing these brands, people with lactase deficiency can be helped with their difficulty in digesting lactose. In the future, a wider variety of brands will be tested on a larger scale.

Project # **J2220** Category: **Product Science - Jr**

Student: **Max Sinanian** Grade: **8** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **Paper Towel vs Sweidsh Dishcloth**

The paper towel was created by the Scott Brothers, Clarence and Irvin, in 1907. By 1931, it was being sold in supermarkets as the hottest item to have in your kitchen. Today, the paper towel is one of the most popular household inventions. From cleaning spills to wiping windows and drying hands, the paper towel has become a staple in almost every household. The experiment conducted an experiment to determine which absorbent: a paper towel or a Swedish dishcloth, will absorb water more effectively and which of the two adsorbents is more effective in holding more water weight compared to its own dry weight.In the first trial, the paper towel gained 15 grams of water weight and it held 750% more water weight compared to its dry weight. The Swedish dishcloth gained 125 grams of water weight and it held 1250% more weight compared to its dry weight. In the second trial, the paper towel gained 12 grams of water weight and it held 600% more water weight compared to its dry weight. The Swedish dishcloth gained 133 grams of water weight and it held 1230% more weight compared to its dry weight. In the third trial, the paper towel gained 14 grams of water weight and it held 700% more water weight compared to its dry weight. The Swedish dishcloth gained 132 grams of water weight and it held 1220% more weight compared to its dry weight.

Project # **J2221** Category: **Product Science - Jr**

Student: **William Wickstrom** Grade: **8** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **What Tape is the Strongest**

Tape is used all over the world to fulfill basic needs and complicated ones. Adhesive tape was first created by Dr. Horace Day for his work as a surgeon. Scientists believe tape can even date back to the Egyptians. They can infer this by looking at their distinct hieroglyphics which show some sort of tape being used. It could be thought to be made of animal parts and resin to be an adhesive. Today, the tape is made of glue, a carrier, another layer of optional adhesive, and the release liner.

To conduct this experiment, four different tapes were set up on a long table. Then, a cardboard box flap was taped to one end while the other end was attached to the table. A digital scale was clamped to the cardboard flap and gradually pulled until the tape broke. The number on the scale is how much weight the tape could hold before breaking. When the tape breaks, the data on the scale was recorded in a table and this was repeated for all four different tapes.

After performing the experiment, I can concede that the hypothesis was rejected. While Tape A was the weakest and broke with the least amount of weight, Tape B was actually the strongest, holding almost 26 kilograms. I found that there was one main source of error. The adhesiveness of the tape would not stick to the wood table so I added two more clamps to keep the tape from moving.

Project # **J2222** Category: **Product Science - Jr**

Student: **Emilie Gabrielyan** Grade: **7** G: **F**

School: **Chamlian Armenian School**

Title: **Synthetic Vs. Natural Antacids**

My science fair project is “Synthetic Vs. Natural Antacids.” My independent variable is synthetic and natural antacids. For synthetic antacids, however many pills are recommended on the bottle, the same mass will be measured and taken for the natural antacids. My dependent variable is the pH of the stomach acids increasing. This acidity or basicity will be measured with the digital pH meter.
Procedure:
Make a solution with a pH of 1 by mixing potassium chloride, sodium chloride, and hydrochloric acid in 6 different cups.
In each cup, put a different antacid, three naturals, and three synthetics.
Wait for it to dissolve completely.
Use a pH meter to check all of the solutions' pH; for it to be a good antacid, it must reach at least a pH of 7.
Repeat this process three times in all and average the data.
Significant Findings:
I learned synthetic antacids raise the pH level (making it less acidic) than natural antacids. The natural antacids also worked, but it took much longer.

Project # **J2223** Category: **Product Science - Jr**

Student: **Sydney Lem** Grade: **7** G: **F**

School: **Archer School for Girls - Junior Division**

Title: **Chemical vs. Natural: Which key ingredient works best at preventing ants?**

Objectives
My objective was to see if a chemical or natural repellent works better at preventing bugs. To do this, I dipped two pieces of apple in Lemon Eucalyptus Oil and DEET repellent with both a 30% concentration on two different days and released the ants at the opposite end of the cage.

Materials and Methods
My experiment used two types of repellents and different key ingredients with the same concentration of 30%: DEET and Lemon Eucalyptus Oil. To test the effectiveness of these repellents I placed the ants on one end and the apple which they were fed regularly, but this time covered in repellent on the opposite end with blue tape marking the ½ , ¼ and ¾ marks of the cage. I waited 30 minutes to see the distance between the apple slice with pesticide and ants.

Results
The results were based on how close the ants got to the bait. I did two trials per group; in the first experimental group (DEET) I got a combined average distance traveled of 36.21 cm. In the second experimental group (Lemon Eucalyptus Oil), I got the combined average distance traveled of 38.6 cm.

Conclusion
In conclusion the DEET prevented the ants from the bait the best. My results support my hypothesis because I hypothesized that the DEET would travel the least out of all the groups. Now I know what repellent to use when going outside and that this repellent will be best for keeping the bugs away.

Project # **J2224** Category: **Product Science - Jr**

Student: **Liam Sacino** Grade: **6** G: **M**

School: **Incarnation Parish School**

Title: **Is What UV What You Get?**

Tens of thousands of people are diagnosed with cancer each year and even more people are worried about the possibility. These people want to find ways to prevent it from happening, but is what they are doing actually working? What if the things they buy do not work; if that is the case we want to help them.
We believe that regular clothing is as effective as UPF clothing. If we are right we can save people hundreds of dollars in clothing purchases. If we are wrong we are still comparing UPF clothing across different brands in hopes of showing alternative choices and in essence, opportunities to save money on these protective measures.

Project # **J2225** Category: **Product Science - Jr**

Student: **Ben Waterman** Grade: **7** G: **M**

School: **Saint Martin of Tours Elementary School**

Title: **Does Your Straw Suck?**

This experiment covers what is actually the best straw that is an alternative to plastic. We all know paper straws are great, yet they break as soon as you set one in your drink. After realizing you have to grab another straw, you wonder, 'If only there was a straw that could last five extra seconds.' This brings you today to my experiment, in which I test basic Striped Paper, Biodegradable Paper (BioPaper), Rice, Coconut, and Agave straws. To conduct this experiment in the same way I did, grab 10 jars, fill half with your selected liquid, being Crystal Geyser Water, Coca-Cola, or a Slushie. Now that you have five dry and filled jars, set five of each straw type into the dry jars. Set a timer and put the straws into the liquid jars, and once you take them out, weight test each one. Repeat this until all of the straws break or they have been sitting in the filled jar for 45 minutes total. Mark it down and then share your results. The results of this experiment were quite interesting. The coconut straw went haywire, lasting about five minutes in water, twenty minutes in the slushie, and a whopping forty minutes in coca-cola. The reason for this is unknown. The agave always managed to not lose any integrity after 45 minutes in any of the liquids, being the greatest straw. On the contrary, the striped paper individual time until loss of integrity being at 4 minutes.
