MARIAN UNIVERSITY
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CIRSEF

Central Indiana Regional Science & Engineering Fair

March 19, 2022

Junior Division

Project Listing

Project Categories

- [x] Animal Sciences (AS)
- [x] Behavioral and Social Sciences (BE)
- [x] Biochemistry (BI)
- [x] Biomedical and Health Sciences (BM)
- [x] Chemistry (CH)
- [x] Computer Sciences (CS)
- [x] Earth and Environmental Science (EA)
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Animal Sciences (AS)

GRADE 5

LeVeque, Maxwell (05-12-37, AS)

Project Submission

Put Your Paws Up

"We've had our two cats for over a year now and I play with them every morning before school. So, I decided to do my research on them. I wondered if cats, were right or left-handed (or pawed), like people are. I chose to do a study to find out if cats prefer one paw over the other. My hypothesis was that cats presented with a teaser would use both paws to swing at the toy and will not favor one paw more than the other. I tested my hypothesis with five different cats, two pets in our home and three more at a local PetCo store. The results surprised me and my proved my hypothesis was incorrect. The cats did show a favorite paw. Both male cats used their right paw over their left paw or both paws. Among the three female cats, one favored the left paw by a small amount, and the other two favored their right paw. The average number of right paw swats for a male was 36, compared to 19.5 with the left paw. The average number of swats for a female with the right paw was 28.8 and the left paw average was 15.2. The average number of swats with both paws for a female was 5.4. The overall percent of right paw swats was 56% and the overall percent of left paw swats was 33.5%. Both paws were used for 10.5% of swats."

GRADE 6

Becha, Aya (06-03-44, AS)

Albared, Sara (06-03-44, AS)

Project Submission 2

Which light can attract the most moths?

"Our project is about finding out which light can attract the most moths. Therefore we chose this experiment because we thought that it would be a fun and physical experiment, and we also had most of the materials at home. We also wanted to do it because we really wanted to experience some moths and because it was a question that we had in mind. So we picked the top 4 lights we could find that would attract the most moths. We thought that the mercury vapor light would attract the most moths because of its shorter wavelengths. So then we did the experiment by hanging a sheet behind the light and waiting for 45 minutes for the moths to come. After, we discovered that the mercury vapor light received the most moths, and so we wrote it down and took some pictures. There we figured out that our hypothesis was right, and our experiment was a success."

Aluko, Theodorus (06-13-54, AS)

Project Submission

Filter Frenzie

"A little more about my experiment my mentor was a pathologist and one of my friends is my mom's friend's dad. He was very helpful but did not do the work for me. Also, the inspiration for my project came from my visit to my sister. My sister is currently in college and she attends Indianapolis University. A while before the science fair started my family went to go see her. I noticed on our trip that my sister Alice uses home water filter jugs and I wanted to know more about these. I was looking for a project and figured that Dr. DAvis could help me if I choose something with bacteria. I realized that the clear option would be to see which filter would be the most efficient at removing bacteria from a water source. I had a lot of fun with my experiment and i hope i can share my endeavor with others."

GRADE 7

Khan, Marwa (07-04-59, AS)

Project Submission

Human Reaction

"Based on this project lots of patterns within the data are found. The first pattern noticed is that all the inactive participants (Person 2 in each category) supported the hypothesis that age does affect reaction time. The youngest individual that was inactive had the reaction time of 6.6in. But the inactive individuals in the category 21-40, had a longer reaction time of 6.7in. To add on, the oldest participant that was inactive had a longer reaction time than both the individuals, 8.3 in.

The second pattern found also supports the hypothesis, physical activity can decrease reaction time. Person 1 in the age category 41+ had a faster reaction time than Person 2 in the age category 6-20. Person 1 in the age category 41+ had a reaction of 3.9in, person 2 in the age category 6-20 had a reaction time of 6.6. Person 2 in the experiment was inactive, but young. Person 1, 41+ was active but older with a faster reaction time.

Finally, the last thing noticed is that it depends what physical activity the contestant is doing. Based on the data, the data points out that the physical activity individuals are doing affects the reaction time. For example Person 1 of the age group 41+ and Person 3 of the age group 21-40 both are constantly running, they both had reaction times close to each other, person 1 in the age group 41+ had the reaction time of 3.9in, while person 3 in the age group 21-40 had the reaction time of 3.6in."

Tijani, Farida (07-06-61, AS)

Project Submission

How Clean Is The Cafeteria Vegetables/Fruits

"My question is : Which cafeteria vegetables/fruit is the cleanest? I chose this question because i needed to find out how the cafeteria vegetables/fruit are cleaned. I chose this project because I wanted to find out how clean what i eat daily is cleaned. After i was done with my experiment i found out that most of our fruit/vegetables have fungus and other gross things. The date of my project is : The Results are that the broccoli had more germs than the carrots but the celery was the second most germs fruit/vegetables in the experiment tested. So, that means that even if we wash our fruits/vegetables we still need to make sure we clean them for at least 20-30 seconds to prevent any germ. In the future I would like to do the actual foods we eat than the fruits and vegetables because i would love to see how similar they are and how much we all need to eat or not eat or I could try and figure out the reason why fruits and vegetables are not yet cleaned after washed."

Behavioral and Social Sciences (BE)

GRADE 4

Noonan, Coraline (04-20-20, BE)

Vincent, Charlotte (04-20-20, BE)

Reynal, Valentina (04-20-20, BE)

Project Submission 2 3

Fidgets for Focus

"Background: Fidgeting is a default behavior. Because of this, we should have fidgets all the time but that's not always the case. One reason fidgeting is helpful is because they help children with attention or anxiety issues to stay focused and calm in the classroom. Secondly, Research has shown fidgets help increase focus and concentration because directing their movements, especially when stressed or anxious, can improve focusing, or concentrating. Another thing people often report is that fidgeting with an object in their hand helps them to stay focused when doing a long task or sitting still and attentive in a long meeting. While anxiety, stress, and even learning disorders can affect the entire body, they most noticably affect the hands and fingers. Heightened anxiety in a child can result in restlessness, shaking, and even cramping in the hands and fingers. Although fidget toys cannot prevent or eliminate these issues, they can help calm a child. Things that could be considered fidgets were created hundreds of years ago. Movement is a fundamental way to trigger the brain stem and fidget toys can serve that for purpose. Movement, even fidgeting with the hands, can help by sending signals from the body to the brain to awaken and be alert. Fidgets serve to productively distract and occupy a child's attention. In addition to boosting focus and productivity, giving your child's mind a bit of a fun mental break makes it easier to pay attention afterward. People use some fidget objects to calm themselves down, helping them achieve a more relaxed, contemplative, even mindful state. Another way to look at it is that fidget can help for a little bit but then become a toy. For example, you use a slinky as a fidget but then you want to stretch the slinky out as far as you can. It is a toy because you are playing with it not using it as a fidget with small movements. Fidget spinners require hand-eye

coordination, so they distract people which is why they are not seen as 'helpful' by educators. Research question and hypothesis: Which fidgets help 4th graders focus best in class? We think that all fidgets will help 4th graders focus except the pop-it-fidget-spinner.

GRADE 5

Moore, Benjamin (05-08-33, BE)

Project Submission

Toasty, Cozy, and Asleep

"Do you have trouble getting to sleep? I do. In this project, I tried to determine if I fall asleep faster in hot, warm, or cold conditions. I hypothesized that I would fall asleep fastest in hot conditions. To test this hypothesis, I created three temperature conditions and timed myself falling asleep for 4 nights per condition. The average time to fall asleep for hot was 14.38 minutes. For warm, it was 15.38 minutes. For cold, it was 21.18 minutes. I fell asleep quickest in hot conditions, but only by about a minute. If I were to keep researching this project, I would do more nights in each condition and I would try the conditions on more people."

Quandt, Avery (05-15-40, BE)

Project Submission

How does the color of an object affect the brain's ability to recognize it?

"Recently, I have been interested in color and if everyone perceives them in the same way. From background research, I learned that brains can automatically fill in a familiar black and white image with color. This made me wonder if having to fill in the object with color slowed down the recognition of the object. To study this, I designed a grid of images and timed participants as they found and identified all of the designated images. I decided to use a 7x7 grid because I needed to have enough images that I could time how fast it takes to recognize them, but also have the images big enough to see. I predicted that if an object is usually seen in color, it will be easier to recognize it in color, even when amongst other colored items. Each participant identified images in color and then repeated the process on an alternate grid in black and white. I created a histogram and an area graph to organize my data. My histogram showed that the fastest times were mostly color times, and some of the slower times were black and white. The area graph showed that color was faster for most of the test runs. Also, the average color time was faster (10.5 seconds) than the black and white average time (10.8125 seconds). I was able to conclude that it is easier to recognize an object in color than it is in black and white, which supports my hypothesis."

GRADE 6

Bailey, Henry (06-02-43, BE)

Project Submission

The Music of Movies

"How does a movie's sound affect the viewer's emotions throughout the movie?"

GRADE 7

Bloede, Emmerson (07-16-71, BE)

Project Submission

Candy v. Medicine

"H The purpose of my project was to see at what age children learn to tell the difference between candy and medicine. I took pictures of candy and medicine that looked similar and made them into flashcards. I also found an online test for them to use. I recorded how many out of 6 flashcards they got correct, then I had them take the online test. My hypothesis was that the small children would get candy and medicine confused and would learn to tell them apart around the age of eight or nine because that's when people are getting better at reading. While I was testing I realized that people of all ages were having trouble identifying the difference between candy and medicine. That shows the importance of keeping medicine stored safely away so you don't get it confused."

Biochemistry (BI)

GRADE 5

Bridges, Keegan (05-13-38, BI)

Project Submission

Egg-selent Eggs

"How can I make the fluffiest omelet? I wanted to know because I love omelets so I cook them a lot, and really love to cook anything. I think the blender method will do the best, because it is whipping air into the egg really fast. I think the worst (besides control) will be the baking powder omelet, because I don't think there will be much of a chemical reaction. For all of the eggs, I added 1/2 teaspoon of butter to the pan and 2 tablespoons of water to each omelet. I mixed each for 45 seconds for the following treatments: Control: mix with a fork, Blender: blend the whole mixture in the blender, Baking Powder: add 1/4 teaspoon of baking powder and mix with a fork, Covered: mix with a fork and cover while cooking, Souffle: separate yolks from whites, add 1 tablespoon of water to each yolks and whites separately, blend whites in blender for 45 seconds, lightly beat egg yolks, gently fold blender mixture into yolks. Cook until the eggs are no longer runny and flip onto cutting board. After that, make marks on toothpicks that are poking into the egg to show the height of the egg an d label with the method. Measure with millimeters on the ruler and record data. I found that the baking powder method worked the best. the worst was the souffle method which was even worse than control. So if you want a very fluffy omelet, use the baking powder method. "

GRADE 7

Ezzein, Muhammad (07-03-58, BI)

Diallo, Abdorahman (07-03-58, BI)

Project Submission 2

Extracting DNA from a strawberry

"In our protect we will be extracting DNA from a strawberry using two different liquids one is Hand sanitizer and the other is 70% alcohol. We add 20 ml of soap and a teaspoon of salt to the measuring cup. Then we add water to the measuring cup all the way to the 150ml mark and then mix. Thirdly we put the measuring cup to the side. After that we take a ziploc bag and put 3-5 strawberries in the ziploc bag. Next we smash the strawberries for a few minutes with our hands. We then take a funnel and put the smash strawberries on the measuring cup and add a coffee filter on top and start pouring our smashed strawberries. We then wait a few hours and then we add our liquid (70% alcohol or hand sanitizer) to the measuring cup. Finally after a while you should. start seeing results."

GRADE 8

Davis, Dasia (08-03-74, BI)

Project Submission

Extracting DNA from Fruit

"This project is about the Extraction of DNA from fruits. My experiments question is Does the number of Chromosomes in different fruit affect amount of DNA extracted. I chose to do this project because it looked like a very interesting and fun project. I have done this project and it is very informing. I was also surprised at how much DNA could be in a single piece of fruit. It's amazing how much it can hold. To do this experiment I did a very simple method of balancing out the fruit on a scale making sure I had all the same mas. Then I mashed the fruits and added some cold rubbing alcohol and soap, after that I mashed it up some more, finally I separated all of them from the juices and looked in them to find which ones had the most DNA. My results actually came out well. I expected that I would have results that reflected the amount of DNA in my fruit. I had one that had a lot of DNA, while another had basically none at all. My last one had a fair amount not to little not to much. So in conclusion my project turned out how I thought it would almost at least some part next time I would change like how much fruit was used and possible add more fruits and also collecting more DNA."

Biomedical and Health Sciences (BM)

GRADE 4

Oberlander, TJ (04-01-01, BM)

Project Submission

That's A Lot To Swallow: An experiment to find the best thickening agent for dysphagia patients

"I learned about a condition called dysphagia. Dysphagia makes people have trouble swallowing. Dysphagia can be caused by an injury to the throat or by a brain injury, which means a stroke can cause dysphagia. When someone has dysphagia, they have to thicken everything they eat or drink. If they try to swallow something that is too thin, it can go into their lungs instead of their stomach! I wanted to help people with dysphagia by learning about the best way for them to thicken their food and drink at home with ingredients they can easily buy at the grocery store. I know that corn starch can be used to thicken foods, but I also know that corn starch is not the only kind of starch that you can buy at the store. I tested 4 different kinds of starches (corn, potato, arrowroot, and tapioca) to see which one had the highest viscosity. Viscosity measures how a liquid flows. A high viscosity means the liquid doesn't flow very easily, which makes it better for someone who has dysphagia. They want their food to have a high viscosity so that it is more likely to go into their stomach where it belongs. To test the viscosity of the different starches, I created a mixture of each starch with water. The different kinds of starch were my variables. I also tested water alone as a control. I poured each mixture into a graduated cylinder, dropped a marble in, and timed how long it took the marble to travel the same distance in each mixture. This gave me the measurements I needed for my viscosity formula. I learned that corn starch did have the highest viscosity after all, at 1.286 newton-seconds per meter squared, followed by tapioca, then potato, and arrowroot had the lowest viscosity of 0.212 newton-seconds per meter squared. This means that corn starch is the best starch for people with dysphagia to use at home to thicken their drinks and some of their foods."

Kim, Edison (04-21-21, BM)

Project Submission

Wake Up!

"Does coffee really wake you up? The purpose of this project is to know if coffee actually wakes you up because if it is unhealthy adults might consider to stop drinking coffee. My hypothesis for this project is I think coffee doesn't actually wake you up. In summary my procedure is: Ask the subject their number on Edison's sleepy scale record the number. Ask them if they've had any caffeine today. Stack one ruler on the test subject's hand (this will be removed). Stack another ruler on top of the ruler you just placed on the test subject's hand. Remove the first ruler (the ruler you stacked on the test subject's hand). Without warning quickly drop the 2nd ruler into the test subject's hand this is an important number record it! In a nutshell, I learned that coffee doesn't actually "wake you up" and that it just blocks you from feeling tired. All of my subjects who drank coffee reported feeling more alert and their reaction times decreased. Meaning, their brain was more alert after drinking coffee making their reflexes faster."

Deguire, Alexander (04-22-22, BM)

Project Submission

How Egg-cellent is your Enamel?

"My topic was how certain liquids (sugary and acidic) affect the enamel on your teeth. An eggshell is very similar to the enamel on your teeth. I chose this topic because it is good for people to know how different liquids (sugary and acidic) can affect your teeth. My hypothesis is that Coke and coffee will do the most damage to the egg. This is because they are the darkest in color and the Coke has lots of sugar in it. Sugar can do damage to enamel of teeth and that leads to cavities. Coffee is bitter and acidic. This can also break down the enamel of teeth. This is why I think these liquids will cause the most damage to the eggs. I placed eggs in mason jars letting them sit for 6 days in Coke, Diet Coke, Lemon Juice, Apple Juice, Vinegar, Coffee, and Water as the control. After 6 days I took them out and brushed 1 of the two eggs to see if it would help with the stains. The Lemon Juice egg was worst. It was deteriorating, soft and even dented in spots. While I brushed it with toothpaste, shell was breaking off even more. The Coke, Diet

Coke and Coffee all stained the egg pretty badly. I learned that it's important not to drink these types of liquids and that brushing your teeth is really important! I might want to be an orthodontist someday and this will also help my future patients with their teeth."

GRADE 6

Hipolito, Ximena (06-06-47, BM)

Project Submission

What 5 drinks make your teeth stain?

"In my experiment I was trying to find out what 5 drinks make our teeth stain. I wanted to study this because I see people get their teeth stains a lot and even mine but I really wanted to see what drinks make our teeth stain, so we can drink them less. This would be a physical and life science project since I am studying about teeth, sodas and more."

Simmons, Treasur (06-09-50, BM)

Project Submission

HOW CLEAN ARE OUR HANDS??

"My research question was "Which gender had cleaner hands after leaving the restroom"? The reason that I decided to do this is because I thought it matters in the real world. Kids are not washing their hands properly and I hoped that if they saw how dirty their hands really were, that could help kids wash their hands the correct way. My result was that the boy's hand was dirtier than the girls, but both the boys and girl's hand were really dirty, and had lots of germs on them. If I could do this experiment again then I would definitely get more data by getting more volunteers. Another thing I would do is try to get middle school and elementary volunteers, because this time I only got middle school."

Jojolade, Abiola (06-10-51, BM)

Project Submission

Eye Color V.S. Vision

"What I did in this project is to determine whether your eye color affects your vision. To do this I had test subjects that wear no glasses or wear contacts say what color construction paper they see on the board from left to right and then I did this again with the next person. I did this project because in science class I learned that our eyes were tricking us, so I wanted to know if there were any more tricks the eyes had. My results from this project was that people with blue and brown eyes have better vision than people with green eyes. Something that I might try next is instead of using color construction paper I will use letters and numbers to see if people can see letters and numbers better than seeing color. The first thing I did was gather test subjects with blue, green, and brown eyes. Then, I selected a variety of colors from a pack of construction paper and taped the paper to a wall on the far side of the room, ensuring that the room is dimly lit, but not completely dark. After this, I brought one test subject into the room blindfolded and stood them about 312 inches away from the colored construction paper. Once the door to the room was closed, I removed the blindfold and asked the subject to immediately identify the colors from left to right. Next, record their answers. Then repeated steps 4 through 6 with each of my test subjects. Finally analyze your results, calculate the percentage of colors named correctly by each test subject. According to rxoptical.com, there is an imperceptible difference in vision capabilities between people with light and dark colored eyes. On dukehealth.org, people with lighter eyes, such as blue or green eyes, have less pigment in the iris, which leaves the iris more translucent and lets more light into the eye. Based on scienceline.ucsb.edu, eye color does not affect a person's ability to identify color in low light because the ability to identify color is handled by the retinal cones lining the inner surface of the eye and that the iris is pigmented or has no colors and therefore blocks light. In one of the passage's in sciencefocus.com "Everyone has roughly the same amount of melanocytes but our genes determine how much of a pigment, called melanin, they produce'', it is the same pigment that determines skin color and the more we produce, the darker the color it gets, so therefore, a person with dark skin also has darker, browner eyes."

GRADE 7

McCormack, Zachary (07-01-56, BM)

Project Submission

Don't Give Me a Heart Attack

"How do different chemicals and temperatures affect the heartbeat of a daphnia? I think that the chemicals are going to have an extreme impact on the daphnia. Based on my research Tylenol will raise or lower; aspirin will lower; caffeine will raise; cold will lower; and warm will raise the heartbeat."

Adam, Sera (07-07-62, BM)

Project Submission

What is the best way to kill bacteria?

"My project was to see what was the best way to kill bacteria. The reason I chose my project was because of what's going on in the world, more specific, it was because of kids. Kids are always touching things and then putting their hands in their mouths. The experiment showed that the better method to kill bacteria was Clorox wipes. The next thing I would do is redo the experiment but this time with more methods. There are different cleaning methods that I can try. The thing I could do differently is to change the method. I could use different classrooms to determine if there were different results than what I got."

GRADE 8

Nuthakki, Mira (08-01-72, BM)

Project Submission

Potential microRNA biomarker panel for predicting evolution of pancreatitis to pancreatic ductal adenocarcinoma

"Pancreatitis is one of the most important risk factors for pancreatic ductal adenocarcinoma (PDAC). PDAC is a silent, aggressive malignancy that has less than 5% survival rate at 5 years. Detection at early stage and resection of PDAC significantly improves survival. A differentially expressed microRNA panel was sought that could predict the risk of progression to PDAC from pancreatitis. Differentially expressed microRNA (DEM) in serum that were common between pancreatitis and PDAC were extracted from two microarray GSE datasets containing pancreatitis, PDAC, and control samples. Eight groups of DEM were derived from multiple bioinformatics methods such as differential expression, miRNA interaction networks, target gene prediction tools, functional enrichment analysis, and machine learning models. The functional enrichment pathway of these groups were identified. These groups were trained on the original datasets and were used to predict pancreatic cancer in a validation set consisting of six other GSE datasets containing pancreatic cancer and controls. The miRNA panel with the highest precision and recall was the group derived from the target hub genes with the highest interaction (hsa-miR-28-3p, 320b, 320c, 320d, 532-5p, and 423-5p, with a mean F1 of 0.968, mean recall of 0.99, mean precision of 0.947, and mean AUC of 0.995). These results provide a potential biomarker to identify and follow individuals at high risk for pancreatic cancer after pancreatitis."

Karonwi, Bewaji (08-04-75, BM)

Project Submission

PH vs TEETH

"My research question is, how does the PH of common solutions affect baby teeth. I chose this because a couple years before this, i tested the effect of the ph of shampoos on hair, and I wanted to know the effect of ph on other parts of our body. My hypothesis was that the acidic beverages would have the most effect on the teeth. To conduct this experiment, I took the ph of common liquids, soda, water, lemonade, and sodium hydroxide. I then placed a half of MY baby tooth into each container and sealed it. I then made observations as to what happened to the tooth over time. I expected that the tooth fill would decay in solutions with a high and a low ph. I also expected that the tooth would change color in solutions that contain food dyes, like the soda and lemonade. My next step will be to take quantitative data, like the dexterity of the tooth before and after and during a series of time intervals, I would also check if there was any change in mass."

Chemistry (CH)

GRADE 4

Gomez, Edgar (04-02-02, CH)

Project Submission

Ice Melts

"In my experiment I was trying to find out will ice melt in ice vs water vs soda vs juice. I wanted to study this because i want to see which liquids melt the ice faster. This would be a physical project since I am studying which liquids melt the ice."

Chernysheva, Nadiya (04-03-03, CH)

Project Submission

Which Chocolate melts faster? White, 100%, 56%, 48%, chocolate

"In my experiment I was trying to find out which type of chocolate melts faster. 100%, 56%, 48%, or white chocolate. I wanted to study this because I wonder which chocolate melts faster. This would be a physical science project since I am studying about chocolate when it melts."

Riley, Nicholas (04-04-04, CH)

Project Submission

Bouncy Ball

"Rubber bouncy balls were made in 1964 and the it was made by Norman stingley he was born in 1919 and he made the bouncy ball when he was 83 years old when he made it it was made out of borax and rubber and glue and the world record for the has bounce was 143 feet high and that was the highest it was bounce it is 75 year old the first bouncy ball was made in 1964 first ball was made out of rubber and glue it not a solid or liquid it because it both it sometime bounce and hard if you leave it out it will turn black and become a solid. I wonder how long it needs to be out to become solid and black and I want to see if a home made one will bounce higher. bouncy ball noun. Synonyms: superball. bouncy ball noun. A small polybutadiene rubber ball with a strong rebound when thrown or dropped. Synonyms: superball. A bouncy ball or rubber ball is a spherical toy ball, usually fairly small, made of elastic material which allows it to bounce against hard surfaces. When thrown against a hard surface, bouncy balls retain their momentum and much of their kinetic energy."

Martinez-Gomez, Tairy (04-05-05, CH)

Project Submission

Growing Crystals

"I've been studying about crystal snowflakes and how they grow. That snowflakes also are made with crystals. My experiment has to grow and turn into a medium shape of a snowflake. Snowflakes mixed with crystals make Crystal snowflakes which are snowflakes but have little pieces of crystal. Crystal Snowflakes can also be used as a ornament for a Christmas tree. You can also get a borax snowflakes. Crystal snowflakes may also be cute for a room decoration. Crystal snowflakes can be whatever color you want. You can also make your crystal snowflake glow in the dark if you put a little bit of glow in the dark glue so the crystal snowflake can glow up. I learned that my project can be a made of all type of sizes. Crystal snowflake can take a lot of time to grow. All crystal snowflakes may sometimes have little pieces of little crystals. Crystal snowflakes can also be short time to grow. It took over 3 nights to it to grow. In my experiment i was trying to find out if the crystal snowflake will absorb the food coloring. I wanted to study this because I wanted to see what will the crystal snowflake look like when it grows."

Omotoso, Oluwatobi (04-06-06, CH)

Project Submission

What is the effect of density on how Alka Seltzer mixes different liquids?

"The purpose of my experiment is to understand how density works among different liquids. I thought that the alka seltzer with corn syrup, water, and oil would make the corn syrup stay at the bottom of the container. I compared two bottles with different liquids. The first bottle had water and oil. The second bottle had corn syrup, water, and oil. I added alka seltzer because I wanted to see how the alka seltzer mixes with the water, oil ,and corn syrup. I took observations, and watched to see how alka seltzer mixes with different liquids and their densities. I

learned that the Alka Seltzer made bubbles that floated to the top bringing corn syrup with them into the oil. I thought that the corn syrup would be too dense for the Alka Seltzer bubbles to carry to the top. My hypothesis was incorrect. The Alka Seltzer did bring bubbles to the top. I want to add a larger amount of oil than water to see if it changes the amount of density. And I want to add less corn syrup, more water, and an equal amount of oil."

GRADE 5

Martinez-Barrera, Kenia (05-03-28, CH)

Project Submission

Warm Blubber

"My science fair project is about Blubber, Blubber is a thick layer of fat (adipose) tissue. In my experiment I am trying to discover if blubber can keep someone warm in the cold. Animals store extra digested food in the form of adipose tissue, which contains molecules called lipids. A Lot of animals in the Arctic like whales, seals, and polar bears have blubber to keep themselves warm. Animals need blubber to stay warm in the arctic to live because if arctic animals that don't have fur and blubber they could not live in the arctic. In addition to providing insulation, blubber actually manipulates a mammal's blood vessels to help it stay warm. Blubber is more densely packed with blood vessels than a typical layer of fat, and when the temperature drops, the blubber constricts those blood vessels to reduce the blood flow in the animal. Blubber is usually taken from right whales. The blubber is cooked until rendered into oil, known as whale oil, that can be used for soap, and as a component in makeup that contributes a glossy shine. Blubber is also turned into fuel for lamps, wax for candles and grease for machinery. Whaling largely targeted the collection of blubber: whalers rendered it into oil in try pots, or later, in vats on factory ships. I have learned that whale oil could serve in the manufacture of soap, leather, and cosmetics. Whale oil was used in candles as wax, and in oil lamps as fuel. From the 16th century through the 19th century, whale oil was used principally as lamp fuel and for producing soap. According to forest sleuths, Ambergris is a solid and waxy substance produced in the digestive system of the sperm whale and is produced only by an estimated 1 percent of these whales. This glue-like substance is used to enhance the aroma of perfumes and also make medicine. It's very valuable in Gulf. Dioxins can cause cancer, metabolic dysfunction, and immune system disorders. Methylmercury consumption can cause neurological and developmental problems. The contaminants are often highly concentrated in blubber because they are lipophilic, meaning they bond easily and even preferentially to fat. In my experiment I was trying to find out how animals stay warm in the arctic. I wanted to study this because it was insisting on how animals use blubber to stay warm in the arctic."

Ayodele, Mercy (05-05-30, CH)

Project Submission

Does flour change consistency?

"The purpose of my experiment is to help people understand what flour does and how it can change somethings consistency. My hypothesis was that the slime with flour would be harder than the slime with baking soda because flour holds things together. Firstly I added white glue to two bowls then, I added water and flour to one bowl and water and baking soda to the other then mix them both after, I added shaving cream to the bowls and mixed it up then,I added food coloring (optional) and slowly added contact solution Lastly, I Kneaded the slime with my hands and compared the texture. I analyzed my results by researching what flour does and how it does what it does. In the end I learnt that flours consistency is the way it is because it holds things together and make things thicker. In the future I would change the recipe that I used to make the slime."

Tsai, Xavier (05-14-39, CH)

Project Submission

What's Popping?

"The purpose of my project is to learn what makes popcorn pop and to understand variables that may affect how popcorn kernels pop. My hypothesis is that the popcorn yield or percentage of popped kernels will be greater as the storage temperature of the popcorn bag increases. The tested

temperature conditions were 15ºF, 30ºF, 40ºF, 70ºF and 170ºF. For this project, the key materials were bags of popcorn, a microwave and devices such as refrigerator or oven to change the temperature of the popcorn bag. The procedures included getting all the materials for the experiment, storing the popcorn bags at different temperatures and letting them sit there for a few hours. Next, each bag was put in the microwave for 2 minutes. Finally, I counted the popped and unpopped kernels of each bag and wrote down the findings and recorded the data. Each temperature condition was repeated three times, so I analyzed the data at the end of the experiment. Based on my results, it showed that the popcorn yields were very similar for each tested temperature. So, my hypothesis was incorrect. From this project, my conclusion is that the popcorn percentage of popped kernels was not greater as the storage temperature of the popcorn bag increased."

GRADE 6

Christie, Alice (06-01-42, CH)

Project Submission

Baked to Perfection

"How does changing the temperature of an oven affect the vanilla cake? "

Woodson, Davianna (06-07-48, CH)

Project Submission

What material makes the best battery?

"I want see to what material makes the best battery. I want to see it because if I would ever need an emergency battery than I know what to do. The branch of physical. This is the branch of physical because it is using the properties of matter.

Karonwi, David (06-08-49, CH)

Project Submission

Juiceballs

"Boba has become a very popular item in modern times. It is made using a process called spherification. The question I asked was would changing the pH change the shape and or structure of the boba ball that formed. This was interesting to me, as I wondered how careful you had to be when making boba. I found a recipe online and attempted to make boba at the neutral pH. And on my first attempt, was successful. I repeated this attempt and after knowing that it worked, adjusted the pH for subsequent trials. What I found was that if the pH was not correct, the shape and texture of the boba that was made was altered. This lead to boba with tail and with soft less firm boba balls. This made me think that this process could be useful in other areas of manufacturing besides boba. Future steps would be to try more liquids and determine if the solution's pH influenced the results.

Evans, Autumn (06-14-55, CH)

Project Submission

What metal is most affected by saltwater?

"If you change the type of metal then it will rust at a different speed from salt water, because different type of metals have a different affect from salt water. I think the copper is going to get rust on it first, because the copper metal is weak."

Computer Science (CS)

GRADE 4

Mehta, Aadi (04-14-14, CS)

Project Submission

Caution! Hacking in progress...

"Password hacking is a major problem in today's society and many people are working to prevent it. The purpose of this experiment was to determine how easy it is to hack a password. Hypothesis: Longer, more complex passwords will take longer to hack than simpler shorter passwords. Null Hypothesis: The length of the password will not determine the time it takes the program to break the password. Methods: I downloaded the Python program, edited the password code, then, tested 3 types of passwords of differing lengths. I then compared the times and tests it took for each of these simulations. Results: According to the data, alphanumeric passwords were the hardest to guess as they took the longest time and most tests. In complexity, the password types were

ranked by alphanumeric, alphabetical, and numerical, from most to least difficult to guess. Conclusion: The results support the hypothesis. According to the data, the number of tests and seconds increased as the complexity (number of characters and alphanumeric) of the password increased."

Zhao, Isaac (04-15-15, CS)

Project Submission

Penny Probability Performed in Silico

" Aim: What is the probability of 5 heads or 5 tails in a row? Hypothesis: The probability of one penny landing on heads is 50%. Thus, 5 heads is going to be 1 out of 2^5, which is 32, and the percentile of 5 heads is about 3%. Method: Using Java, I created a coding program to test it out. For the basics of my code I ran it 10,000 times. Each time I created five random numbers, either 1 or 2. I define 1 as heads and 2 as tails. If all of them are heads, the results will increase by 1. If not all are heads, the results will not increase. Eventually, I will receive the total number of 5 heads in a row. The program will be repeated 3 times. I could easily make it run the code 100,000 or 1,000,000 times instead of 10,000 times, and I could also do 100 heads in a row instead of 5 by just changing a number."

GRADE 7

Miller, Dominik (07-14-69, CS)

Project Submission

The Point of a Parabola: Focusing Signals for a Better Wireless Network

"The purpose of this project was to investigate how Wi-Fi speed fluctuates around a Wi-Fi extender with three different designs of parabolic reflectors. Each parabola followed the equation y = ax^2 + bx + c, and the three designs used included a control (a = 0.07, b = 0, c = 0), a narrow (a = 0.11, b = 0, c = 0), and a wide (a = 0.03, b = 0, c = 0). The home-made parabolic reflectors used in this experiment were constructed from cardboard and aluminum foil, inserted onto a Wi-Fi extender antenna, and swiveled to the desired angle. The experiment was run outside on three different days, with the same 21 Wi-Fi speed test locations (seven angles at three different distances) for each parabolic reflector. The speed test site used (at speedtest.net) measured signal speed in Mbps (megabits per second). The findings show that parabolic reflectors improve Wi-Fi speed in line with the axis of the parabola, but to different extents with each of the designs. There was no significant difference between the control and narrow parabolic reflector performances, with each of them focusing the signal well at all distances in line with the axes of the parabolas. On the other hand, the wide parabolic reflector gave a moderate signal to a wide range of angles rather than a strong signal to a narrow range of angles. This project is important because strong Wi-Fi speeds are essential to an increasingly digital world, especially with the rise of virtual work and school with the COVID-19 pandemic. Parabolic reflectors in conjunction with a Wi-Fi extender antenna offer physical flexibility without requiring the device to be physically tethered to the router with an Ethernet cable."

GRADE 8

Xia, Yunwei (08-06-77, EA)

Project Submission

smartFrog environmental robot

" Environmental education is very important for children because it engages them in the community, and also teaches them how to live eco-friendly lives. My research goal is to provide kids with a website that inspires children to take action in their own homes, and teach them about local environmental issues. My software application has four parts. First, a virtual robot generated and animated using JavaScript drawing and animation API. Next, JavaScript speech API transfers human voice into text and vice versa. The third part is the artificial intelligence chatbot server. Using DialogFlow, a natural language processing AI platform provided by Google, an AI chatbot can be conveniently created and trained. The last part is data collection and data integration. Some answers can not be stored in DialogFlow because they include large scale data or update frequently. Data will be collected, analyzed in real-time and integrated into answers. And overall, that's the brief structure of my application. The last step is testing this application. Web clients who talk to the robot will be training it, making the interactions better and better.

The application will also be tried on different browsers, like Google Chrome vs Safari, and devices like iPhone vs Android. This is to make sure there will be as much accessibility as possible."

Earth and Environmental Science (EA)

GRADE 4

Crawford, Norah (04-08-08, EA)

Project Submission

Helping Hydroponics

"Hydroponics is a way of growing plants without soil. There are many benefits to this process of growing. The purpose of this project was to determine whether nutrient additives (Miracle-Gro Indoor Plant Food, Bontone Rooting Powder, and fresh flower food) help improve the rate and extent of root growth compared with bottled water when grown with hydroponics. My hypothesis was that additives would improve the growth of the roots, and Miracle-Gro would be the best. Five plant cuttings were added to each nutrient solution and the control solution. Initial root growth and root lengths after 28 days were measured and documented. The results of this study showed that not all additives improve root growth. All documented first roots appeared between days 6-14, fresh cut flower food group had no root growth. Bontone Rooting Powder improved root generation, but not root length. Bottled water had the longest average root length, but fewer number of roots than other additives. Miracle-Gro was the best additive because there were several roots with good size and length. I think that more roots are better than one long root because they can suck up more water and nutrients. If Miracle-Gro is not available, bottled water still showed promising results. Fresh flower food was ineffective and should not be used on growing plants. In the future, I would like to compare the combination of Bontone Rooting Powder (days 1-7) and Miracle-Gro (days 8-28) with Miracle-Gro alone."

Kosaraju, Hasini (04-11-11, EA)

Project Submission

The race to melt Black Ice

"Many people put salt on the road to melt snow, but only a few know how salt melts snow. When we add salt on the road it breaks the snow molecules and melts the snow back into water. This is caused due to Freezing Point Depression. What are the alternatives to salt that can be used? I have tried Salt, Sugar, Sand, and Baking Soda. Salt was very efficient at melting ICE of all the substances I tried. But on further research there are a lot of environmental issues that occur due to Salt usage. The melted salt gets into Streams and Lakes causing serious damage to the marine life. The melted salt also gets into ground water which is used by humans for agriculture and drinking. Rock salt the most commonly used salt has contaminants like Lead, Iron, Aluminum and Phosphorus causing even more damage. Sand, Ashes Sugar Beet, Kitty Litter, Coffee Grounds and Pickle Brine are alternatives to Salt more effective and cause less environmental issues. Based on my research it is advisable for cities to use salt smartly using optimal application strategies, which is economical too. Households need to shovel well and often to prevent formation of sleet or black ice."

Lena, May (04-18-18, EA)

Project Submission

Color changing flowers

"The purpose of this experiment is to determine if the flowers transport water from the stem to the petals without roots. It is important to understand the way plants drink water so we can grow plants and flowers and at the same time keep our environment healthy. Before doing this experiment, I believed that the flowers will use there capillary action to carry the colored water to the petals. The first experiment I added 6 drops of food coloring in 4 inches of water. The second experiment I added 10 drops of food coloring in 4 inches of water. In the third experiment I did 15 drops of food coloring in 1 inch of water. I learned throughout the experiment that, with 4 inches of water and only 6-10 drops of water the flower does not use the xylem as much as plants with 15 drops of color in 1 inch of water."

Mohler, Alister (04-19-19, EA)

Project Submission

What soil drains water fastest?

"What soil drains water fastest? My grandpa owns a corn and soybean farm, and it's important that the fields don't flood. If the fields flood, the crops will drown. If a field doesn't drain well, you will have to put in drainage tile. I studied 4 different types of soil to understand which one will drain fastest so fields don't flood. My hypothesis was that sand would drain fastest because it is a larger particle size. In the end, sand drained fastest because of its large particle size, but I would not recommend a field full of sand because it would drain too fast. The best soil for a field would be clay or a mix of sand and floodplain. If I had to do anything different, I would make sure that all the dirt samples have the same amount of time to drain because it will affect the results."

Younker, Ayva (04-23-23, EA)

Project Submission

Which type of material creates the clearest water?

"The purpose of this scientific experiment is to determine which water filtering material creates the clearest water. I intend to use granulated and powdered activated charcoal to filter dyed water to visualize the effects of the clarity."

GRADE 5

Dosunmu, Kofoworola (05-04-29, EA)

Project Submission

My Cloud Experiment Explained and finalized.

"I made my experiment because I like clouds and I have always wanted to know how they form. My hypothesis was that the cloud will be more full in the small jar because the condensation will be kept in a smaller volume. For my experiment the design was two jars(small and big).I did my experiment, then reviewed my results and compared them to my hypothesis. Then wrote down my observations. For my conclusion I talked about my experiment. I would make two experiments. That have the same materials but different steps to making them. I would also make more time for Science Club."

Temple, Miller (05-07-32, EA)
Shah, Anwesha (05-07-32, EA)

Project Submission 2

Tsunami: The 'T' is Silent

"We chose to pursue this project because we heard about the tsunami in Tonga and we wanted to see how we could help the people who live in coastal areas minimize the damage due to tsunamis. This is because in the coastal areas there is no warning for tsunamis. It is not like hurricanes or tornadoes there is no warning, the tsunami just comes out of nowhere. Our question was: What precautions can best protect coastal areas and minimize the damage due to Tsunamis? Our hypothesis is that the sea wall would best protect the coastal land from a Tsunami. This is because the wall would stop the waves from crashing over onto the land. We also believed the rocks would prevent the waves from coming onto the shore the least. What we used for our experiment was a plastic bin, and we created a beach-like slope out of cement and clay, we then filled the more open side with water and we created a plastic flapper which we used to displace water into a reservoir. We then measured the amount of water to see how well each precaution works. Our Independent Variable was the simulation of the waves. Our dependent variable was the preventive items. Our constant was the simulation of the land with the cement and clay. We used a Sea Wall, Rock Barrier and Various sizes of Foliage. After we did Our experiment our results showed that for our Seawall experiment approximately 61.5 mL of water spilled over into the reservoir. After our rocks experiment approximately 18 mL of water spilled over into the reservoir. and for our last experiment, the foliage, approximately 48 mL of water spilled over into the reservoir. Our hypothesis was that the Sea Wall would work the best in protecting the land from the disastrous tsunami, but our hypothesis was utterly incorrect, the best precautionary item would be the use of a rock barrier in lessening the damage due to tsunamis."

Spong, Chloe (05-10-35, EA)

Project Submission

What best prevents erosion?

"The purpose of my experiment is to see what best prevents erosion. For my hypothesis I think that out of rocks, mulch and dirt rocks will best prevent erosion. I established a control by testing three different ways erosion might occur. I tested each preventative for one hour under running water and made observations every ten minutes. I tested my preventatives two separate times. The first and second times weren't that different, however I believe the pressure of the water made the biggest difference. The water at a higher pressure caused a greater erosion compared to the water at a lower pressure, no matter the preventative. After running my tests my hypothesis was correct out of the three preventatives, rocks prevent erosion the best. I also learned that mulch doesn't really help, there was no significant difference between the mulch and the plain dirt. The rocks moved a little, however out of the three the rocks were best at preventing erosion."

GRADE 6

Abdulmajid, Anas (06-04-45, EA)

Tayeh, Rayan (06-04-45, EA)

Project Submission 2

Box Funnel Cooker

"The purpose of the box funnel cooker is to cook food with sunlight without using solar panels. The reason we chose it is because it has a lower chance of tipping over and falling which causes the experiment to possibly break which won't help. The box funnel cooker is used to warm up a box to higher temperature of food and cook it. People use box funnel cookers to cook vegetables, Grill meats, Bake Bread and Boil Water at high temperatures. Cutting the vegetables and smaller portions of food is recommended for faster results and a shorter amount of cooking time is needed (if done right)."

Dahlstrom, Leila (06-11-52, EA)

Project Submission

The Moldy Truth About Storing Bread

"Storing bread without access to preservatives makes the bread go bad quickly. This is common in developing countries, as well as in remote areas around the globe. This experiment evaluates three common methods to store bread and how effective they are to make the bread last longer without mold. Mold is a type of fungi, especially of the genus Rhizopus, that grow on bread and other foods. The purpose of this project is to see which method will protect bread the longest from mold. The four methods compared in this experiment are storing the bread in a plastic bag, wrapped in aluminum foil, wrapped in a paper towel, and no covering. Mold is a living organism that can be grown on anything. It grows best in warm, dark, and moist environments. Mold grows from tiny spores that float around in air. When some of these spores fall onto a piece of damp food, they grow into mold. Mold should not be eaten if on bread. Even if mold can't be seen, it doesn't mean it isn't there. Mold roots quickly spread through bread and infect the whole bread. The results of this experiment showed that bread in a plastic bag or foil did not have mold for the first couple of days, but mold then grew quickly covering the bread completely. Bread wrapped in a paper towel for all batches had no mold spots except for one bread slice. The lack of mold is likely because the bread dries in the air. Moisture helps mold grow. The only mold found on the bread wrapped in paper towels might be due to contamination from other slices. The hypothesis that the bread covered with a paper towel would protect the bread the best from mold is correct because the bread slice didn't have mold. Although it didn't have any mold doesn't mean that it was ok to eat because it was as hard as a rock. The bread would not be safe to eat because it could damage teeth and possibly taste horrible. This is a balancing act because if you have too much covering the bread will mold and if it doesn't have a lot of coverings it will be stale. The results prove that all of these coverings are only ok for a day or two but none of these methods keep the bread from going bad (stale, moldy, etc.). The results affect everyday lives by helping with understanding why some coverings protect the bread from mold more than others. Based on the data, it is recommended to store bread with a plastic bag for only 1-2 days and also use a natural preservative such as salt.

Dahlstrom, Lilian (06-12-53, EA)

Project Submission

Say Hello to Clean Filtered Water

"Clean drinking water is vital to our health. Unfortunately, many people don't have access to clean water, especially in rural areas where the water sources are lakes or rivers. In big cities, water is cleaned thoroughly in water treatment plants. In some developing countries, the only option is to use their own water filters made out of cheap materials that they can find in their environment. This experiment compares how different filters that are made out of natural resources or can be bought at a local store affect water quality. Unfiltered water is a problem in the world that affects humans because it can be dangerous and deadly. Nitrate and pH are two indicators of water quality. High nitrate is toxic in water and can affect how blood carries oxygen through the body. pH is the measure of acidity in the water. A pH value higher than 7.0 is alkaline. A pH value lower than 7.0 is acidic. The purpose of this project is to analyze how effective different methods are at filtering water from a local creek and bringing the two measured water quality indicators to a healthy amount. The experiment tested three portable water filters. The filter methods were made out of sand, coffee grounds and also an old used Brita filter. The hypothesis for the experiment is that the coffee ground filter will result in better water quality than the sand filter or the used Brita filter. The test results displayed that the coffee ground filter had a neutral amount of pH level of 7.0 and a low amount of nitrate of 5.0 ppm (parts per million). The sand filter had an average pH value of 7.75 and an average nitrate value of 8.75 ppm. The creek water itself had an average pH value of 7.85 and an average nitrate value of 10.0 ppm. The used Brita filter had an average pH value of 7.9 and an average nitrate value of 25 ppm. Based on this, the results supported the hypothesis that the coffee grounds resulted in better water quality. This is likely because the coffee grounds slowed down the water and removed the particles from the water so only the water would drip through the filter. Sand grains are larger and harder, which would help to filter out debris, but not catch small particles. The used Brita filter didn't filter out most of the particles. In conclusion, filters that have smaller grains are better at filtering the water. This research and the portable water filters can help spread awareness and educate people to use DIY (Do It Yourself) water filters that will keep humans healthy."

GRADE 7

Kolurejo, Oluwagbenga (07-08-63, EA)

Project Submission

Clearing the path to the future

"Starting with the question of my project it insisted of How does flocculation concentration affect the clearing-up of murky water also I predicted it because well i was reading the background it said the particles with clump up together making it sink to the bottom. The reason this is an important project because it shows you have to purify water using minimize equipment. The result should be that water should be filtered. I should probably start working on other things I need for the project."

Smith, Carter (07-09-64, EA)

Brack, Dylan (07-09-64, EA)

Project Submission 2

Soil Erosion! Which Plant?

"This experiment was conducted because farmers struggle with soil erosion every year and a real world problem needs a real world solution. If the density of root and vegetation of a plant increases, then the soil erosion will decrease by 10% because less water and soil matter is able to erode off the surface of the top soil and will be more stable. The control groups used in this experiment was exposed top soil. The experimental setups included four different types of plants with different densities. In the experiment the wheat grass prevented the most soil loss, the Zinnia was second, the Kentucky blue grass was third and last was the radish. The control group had the most erosion. The hypothesis was supported for this experiment because the wheat grass had the highest density and prevented the most soil erosion."

Engineering (EN)

GRADE 4

Stuerzenberger, Carter (04-07-07, EN)

Project Submission

Built for a Windy Day

"Our project goal is to observe the sturdiness of 3 building types when hit with a cross-wind. Building design is very important in city planning and I find it very interesting that there are many types of building construction methods. We are going to test a 'standard design', a 'blow-through design', and a 'spiral design' to see which building type can stand strong against the wind."

GRADE 5

Kumar, Dhairya (05-06-31, EN)

Project Submission

The Buzzer's Pitch

"Question: The purpose of this experiment was to determine how easy it is to hack a password. Hypothesis: Longer, more complex passwords will take longer to hack than simpler shorter passwords. Null Hypothesis: The length of the password will not determine the time it takes the program to break the password. Procedure: I downloaded the Python program, edited the password code, then, tested 3 types of passwords of differing lengths. I then compared the times and tests it took for each of these simulations. Results: According to the data, alphanumeric passwords were the hardest to guess as they took the longest time and most tests. In complexity, the password types were ranked by alphanumeric, alphabetical, and numerical, from most to least difficult to guess. Conclusions: The results support the hypothesis. According to the data, the number of tests and seconds increased as the complexity (number of digits and alphanumeric) of the password increased."

GRADE 7

Sethi, Musa (07-05-60, EN)

Project Submission

The Outer Depicts of Hydraulics

"I wanted to know that among canola oil, vinegar and water, which liquid is the most efficient to move in hydraulic pipes. My hypothesis was that canola oil will work the best. I made 3 sets of 2 syringes connected with a tube. To keep one tube upright, I made a wooden stand to hold it. I made an elevator with popsicle sticks, and placed it on the top of the plunger of the other syringe of the set. I filled the upright syringe with canola oil. I placed the weights (3 tuna cans) on the elevator. I recorded the time taken in seconds for the weights to move the liquid from 1 syringe to another. I repeated my experiment with water and vinegar. The results showed that the oil was the most efficient hydraulic liquid. It was the fastest liquid to move in this hydraulic system. Water was the slowest. There was only a little difference between water and vinegar, as vinegar is a combination of water and acetic acid."

Strole, Carter (07-13-68, EN)

Stafford, Maddox (07-13-68, EN)

Project Submission 2

Do Gloves Really Work?

"Do football gloves help increase the chance of catching the football. If the static friction of the glove increases, then the amount of mass needed to move the football will increase because the friction coefficient will increase. A device was built that had 2 hands, that applied pressure to a football on a pulley system. Then place weights in a bucket until the ball cant hold anymore newtons. Repeat the last step with used and new gloves. The results of this experiment supported the hypothesis, the static friction did increase with new gloves. During each trial, there was a different time in between each new trial because the weights have to be put in the bucket."

Mathematics (MA)

-

Microbiology (MI)

-

Physics AND Astronomy (PH)

GRADE 4

Farooq, Hamza (04-10-10, PH)

Project Submission

LEGO Balloon Car

“Reflections Did you know that cars can move around just with air?! My experiment was seeing how far the balloon car can go with air from an inflator. Wouldn’t it be amazing if a car could move around just because of air? My project question is how much air would a Lego balloon car need from a Ryobi inflator in order to go 10 feet. I wanted to find out if a balloon car could actually go 10 ft, and if it could, then I wanted to know how much air it would need to have in order to go that far. In order to complete this experiment you would need: a balloon, a straw, tape, a tape measure, a car, and an inflator. First you would have to mark your starting point with tape, then you would attach the balloon to the straw, and secure it to the car. Then you would set a timer for 10 seconds and start inflating the balloon with the inflator while the timer is going and stop when the timer goes off, then just let the car go! After you measure and record the distance, repeat these steps for the other times. On the first try of the experiment with 10 seconds of air the car went 86 inches. Then on the next try with 11 seconds of air the car went even farther and got to 96 inches. On the next attempt with 12 seconds of air it went even further to 133 inches, which is more than 10 ft! After 12 seconds I did it for 13 seconds of air and the car went even further to 150 inches. Lastly I did it for 14 seconds of air however it went less than it did for 12 seconds to only 132 inches. I think this was because the balloon had gotten stretched out from all of the earlier attempts. I learned that it did not need 15 seconds of air in order to go 10 feet, it only needed 12 seconds of air! If I did the experiment again, I would use a different balloon for each test so that the balloon would not stretch out. My favorite part of the experiment was using the inflator."

Schmidt, Lucy (04-12-12, PH)

Project Submission

Break the Tension

“The purpose of my project is to examine how surface tension is affected by different soaps. My hypothesis is that surface tension will decrease with the addition of different soaps. I hypothesize the Alconox will have the most effect on surface tension (number of pepper grains that sink), followed by hand soap, dish soap, shampoo, then laundry soap. The water will have no effect on the number of pepper grains that sink; they will all float. My null hypothesis is surface tension will not decrease with different types of soap. I measured 1 part of each soap to 9 parts water into a shallow dish and floated 10 pepper flakes. I then recorded how many flakes sank after one minute in each solution. Results-Dish soap had the most effect on surface tension, followed by shampoo, and Alconox, then hand soap, and finally laundry detergent. None of the pepper sank in pure water. The results closely match my prediction in that that the different soaps will decrease the surface tension. Also, as predicted, pure water had no effect on the surface tension of the solution.”

Ruden, Hunter (04-16-16, PH)

Danforth, Malli (04-16-16, PH)

Project Submission

Kicking Under Pressure

"We did this experiment to test whether or not the amount of air in the ball affects the kicking distance. We inflated three soccer balls to different pressures. Each ball was kicked three times by each participant. The average distance traveled by each ball was compared. Our data showed that the ball with the least amount of air most consistently traveled the farthest. We believe that we were wrong because the ball with the least amount of air didn’t hurt our bare feet as much, so we were able to kick the lighter balls harder. If we wore shoes or cleats, the results could have been different. This change could improve this experiment.”

Kabaria, Sahaj (04-17-17, PH)

Project Submission

How Far Will It Fly?

“Just one sheet of paper can lead to a whole lot of fun. How? Paper planes! All you have to know is how to fold and you can have a simple plane in a matter of minutes! But what design should you use to build the best plane? In this aerodynamics science project, you will change the basic design of a paper plane and see how this affects its flight. What allows the paper plane to glide through the air? And how far it will fly? In this investigation, weight, lift, thrust, and drag are considered in an effort to determine which paper airplane flies the farthest.”

Alnusair, Nora (04-25-25, PH)

Project Submission

Tennis Ball Drop

“Gravity is the force that makes objects fall towards any physical body having mass. Air resistance is the force caused by air and works in the opposite direction of the moving object. In this research, I examined the effects of gravity and air resistance on falling objects. My research question is “If you drop two objects having the same size and shape, but different weight from the same height at the same time then which object would fall on the ground faster?” My hypothesis is that the two balls will hit the ground at the same time. To test my hypothesis, I experimented with two tennis balls. The green ball weighed 206g and the pink weighed 56g. In this experiment, I also used a camera and a timer. I experimented by throwing the balls from the same height four times while my mom recorded me in slow motion. When I watched the video, it turned out that the green ball hit the ground slightly faster in all four experiments. If my mom wasn't videoing me in slow motion, the slight difference wasn’t visible. My experiments didn’t support my hypothesis. There was a slight difference between the heavier ball and the lighter ball. The slight difference observed for the heavier ball to fall first was because I did my experiment in the presence of air and the air pushes back the falling ball due to air resistance.”

GRADE 7

Bhatnagar, Raghav (07-12-67, PH)

Project Submission

The Effect of Mass on Deflection of Leaves

"The purpose of The Effect of Mass on Deflection of Leaves is to try to find out if the effect of certain objects based on mass can change the speed and total amount of leaves closed of a Mimosa pudica. The hypothesis for this project is: If a blow air (balloon), which is the least pressure is used on a Mimosa Pudica, then the pressure, and amount of leaves closed will be less then the coin, which is the highest amount of pressure because: air has the least amount of resistance, it will go through, and close up the least amount of leaves, compared to a coin, which has the most pressure, therefore making the leaves close the fastest, and with a stroke, the plant will close the most compared to the other materials. The way the project was done from the start is: plant seeds from Amazon.com were bought after reviewing the information. an Artificial Sunlight with a set amount of sunlight and water was used to keep the planets growing. Four main objects were chosen which were going to be tested: a Small Bird Feather, a Quarter, a Facial One-Fold Tissue, and a Balloon. For the testing, two main variables were used: Speed of First Leaf closing, and Amount of Leaves Closed. The hypothesis was going for a side of: More Mass = More Pressure = More Leaves Closed. 4 trail tests were taken, with an average for each variable. For the Small Bird Feather, and Amount of Leaves Closed, Trial 1 received a test of 1 leaf. For Trial 2, it was 5 leaves. For trial 3, it was: 7 leaves, and for trial 4, it was 3 Leaves. The total average was 4 Leaves. For Speed of First Leaf Closing, Trial 1 was: 4.07 seconds. Trial 2 is: 4.89 seconds. Trial 3 was: 6.4 seconds. Trial 4 was: 3.75 seconds. The average was: 4.778 seconds. For the Facial One-Fold Tissue, the first trial for: Amount of Leaves closed was: 6 Leaves.”

Ferguson, Colin (07-15-70, PH)

Project Submission

Fire and Ice, How temperature affects magnetism?

“My project was about how temperate affect the magnetism of bar magnets. I used 9 magnets in three groups of three. I used the Arduino Science Journal to

measure magnetism in this experiment. One group I measured their magnetism at room temperature. This Group would be my control group. The second group I placed in the refrigerator at 0 degrees Celsius. Then I measured the temperature to make sure it was at 0 degree. Once at 0 degree I measured the magnetism of the magnets and recorded my data. The last group I put in the oven at 100 degrees celsius while wearing my oven mitt. I measured the temperature till it got to 100 degrees then once at 100 degrees I measured the magnetism of them and recorded my data. My conclusion was that the) degrees celsius group had the highest magnetism. the 100 degrees had the lowest magnetism. The strange thing is the 0 degree group upon returning to room temperature the magnetism relatively returned to normal, however the 100 degree magnets didn't return to normal."

GRADE 8

Munoz Montoya, Angel (08-02-73, PH)

Project Submission

How can you see your voice

" My experiment is to try and find if the light from a laser. After it's affected by vocal vibrations would let me see my voice on a surface. The purpose of my experiment is test and shows if I use the light from a laser. would I be able to see my voice or not. After using vocal vibrations. My experiment uses Light and sound vibrations, so my experiment falls under the physics branch of science."

Alcantara, Benjamin (08-07-78, PH)

Project Submission

Bright Ideas: The Effects of Installation Position Relative to Heat Sink on LED Light Bulb Efficiency

"The purpose of this experiment was to determine the impact of installation position (inverted, vertical, or horizontal), relative to the heat sink, on LED light bulb efficiency. Hypothesis: LED light bulbs installed in an inverted position (with heat sink in superior position) will be more efficient than LEDs installed in a vertical position (with heat sink in inferior position), and LEDs installed in a horizontal position (with heat sink in adjacent position) will be the least efficient. Null Hypothesis: There is no relationship between installation position, heat sink, and LED light bulb efficiency. Procedure: 4 LED light bulbs (800 lumens) were tested in 3 different installation positions (inverted, vertical, horizontal) with measurements taken for watts, lux, and temperature. 10 trials were performed for each combination of bulb and installation position for a total of 120 trials. Results: LED light bulbs installed in an inverted position (with heat sink in superior position) operated more efficiently than LEDs installed in a vertical position (with heat sink in inferior position), and LEDs installed in a horizontal position (with heat sink in adjacent position) were the least efficient. Conclusion: Installation position impacts the efficiency of LED light bulbs with inverted installation being the most efficient, vertical installation being less efficient, and horizontal installation being least efficient. The position of the heat sink relative to the bulb affects its ability to draw heat away from the LED. Creating more efficient heat sinks with adjustable designs specific to installation position can improve LED efficiency and lifespan."

Plant Sciences (PS)

GRADE 4

Soel, Dylan (04-09-09, PS)

Evans, Makayla (04-09-09, PS)

Project Submission 2

Effects of Grass Growth with Different Light

"We chose to experiment with grass growth in different light because we were wondering if plants can grow in sources other than sunlight. This is important because it can tell us if we can use other light to grow plants. We did our experiments by putting the same grass seeds, the same water, and the amount of seeds and soil into cups but changed the color of light that they grew in. We discovered that pink light and sunlight are the best light to grow plants in compared to green light and darkness. We also found out that in the beginning of a plant's growth, the color of the light did not matter until the plants sprouted. It was surprising that the grass cups grew in the darkness. Our hypothesis stated that we expected the grass cups in the darkness to not grow at all. In summary, our experiments suggest that grass

will grow in the early days with good nutrients and water, but without good light will not grow healthily."

Palmer, Atticus (04-13-13, PS)

Project Submission

Musical Legumes: are they classy or jazzy?

"Purpose: The purpose of my experiment was to observe how different musical genres affect bean plant height. Hypothesis: Bean plants exposed to music will grow taller than bean plants exposed to white noise. (classical>jazz>control). Null Hypothesis: Music exposure will have no effect on bean plant height. Procedure: I planted 3 groups of 4 bean seeds under the same conditions, exposing each group to different sound stimuli for 2 hours daily. I recorded daily observations, including plant height to determine which musical genre produced the most growth. Results: Only 2 out of the original 12 bean seeds germinated within 10 days. In an effort to continue the experiment, I unsuccessfully attempted to germinate 36 additional bean seeds in a separate container. A single bean plant exposed to jazz music grew 24 cm, and a single bean plant exposed to white noise grew 8 cm in 20 days. These results did not adequately test my hypothesis. as a consequence of the extraneous variable of loss of bean seed viability. Conclusion: These are the results of a failed experiment as a consequence of the extraneous variable of loss of bean seed viability, which did not allow me to accept or reject the null hypothesis. To avoid reporting bias, I share these results and will consider attempting to replicate my experiment in the future."

GRADE 5

Qattash, Kareem (05-01-26, PS)

Project Submission

Do different soils affect the pH of the water?

"My project is Do different soils affect the pH of water. My reasoning behind this project is because there is no soil that is considered good for all plants. Some plants need acidic soils and others need basic soils. If the plant needs acidic soils it is an acidic plant and the same thing for basic plants. My hypothesis was that yes they would affect the pH of the water and the reasoning behind this was that the water will take the soils pH when they are mixed so if the soils pH is more or less than 7 that means the water would take the pH of the soil. To measure this I had to mix water and different soils and then put them in coffee filters and then measured the pH of all the 3 types of soils and compared them. In conclusion to this project I observed that all the soils started the same but then they all ended different when mixed with water, meaning that the water actually affected the soil more than the soil affected the water. This project helped me understand what pH meant and how it and with what it is measured."

Whelan-Edwards, Natalie (05-09-34, PS)

Brown, En Ai (05-09-34, PS)

Project Submission 2

Which Fertilizer is Better? NPK vs. Coal/Carbon

"Our project is based on showing which fertilizer will produce plants with the best color, taste, and root system. We also looked at the impact on the environment based on the ingredients of the fertilizers used. All plants will grow, but the carbon and coal-based plants will have better color, taste, and roots. We conducted a controlled experiment. We planted eight grass and eight lettuce samples under the same conditions. The variable was the type of fertilizer used. We had one controlled group that used no fertilizer. We each observed four grass and four lettuce plants. Each set of plants was left in the same location and watered as needed. Observations were recorded. Lettuce: Coal and carbon had the best color; Carbon and NPK had the longest roots; Coal and carbon had the best taste; all grew, but NPK grew the most. Coal and carbon grew the same amount. No fertilizer grew the least. Grass: Coal and carbon had the best color; Coal and NPK had the longest roots; all grew, NPK grew the most, then carbon and coal. No fertilizer grew the least; and without the pots, the one with NPK stayed together the best, carbon fell apart more than the others. Fertilizers make a difference in plant growth; Coal and carbon-based fertilizers are less harmful to the environment because they don't hurt habitats around where they are used; Coal and carbon-based fertilizers produce plants that taste better and have better color; Plants with fertilizers had better roots than the ones without fertilizer. The

best fertilizer for roots isn't clear. NPK had good results, but so did carbon and coal. NPK produces the most growth both types of fertilizers work. It depends what results you want - taste and color, or growth."

Gileno Lloyd, Joel (05-11-36, PS)

Project Submission

Best Light Color to Grow Plants Indoors

"I chose this project because I like gardening and I can't grow plants in the winter. I wanted to know which color light is the best to grow plants indoors. My prediction was that the seeds under the purple light would grow the most because it does not have too much bright light and not too much darkness."

Alcantara, Joshua (05-16-41, PS)

Project Submission

Polyploid Plant Predictions: Using Ploidy Number to Predict Relative Yield of Fruit DNA Extraction

"The purpose of this experiment was to determine whether plant ploidy numbers can be used to predict the relative yield of DNA extraction in different fruit samples of the same mass. Hypothesis: Strawberry (octoploid) will yield more DNA than kiwi (hexaploid), which will yield more DNA than raspberry (diploid). Null Hypothesis: There is no relationship between plant ploidy number and fruit DNA extraction yield. Procedure: DNA was isolated from 3 different fruits: strawberry, kiwi, and raspberry, using the same mass of each fruit. The extracted DNA was weighed on a scale and volume was measured in a graduated cylinder. Results: Strawberry yielded the most DNA followed by kiwi, and raspberry yielded the least DNA. Conclusion: The results support the hypothesis that plant ploidy numbers can be used to predict the relative yield of DNA extraction in different fruit samples of the same mass."

GRADE 6

Erdogan, Zeynep (06-05-46, PS)

Project Submission

Which Aquatic plant is better for my room?

"During photosynthesis, plants take in carbon dioxide (CO_2) and water (H_2O) from the air and soil. Within the plant cell, the water is oxidized, meaning it loses electrons, while the carbon dioxide is reduced, meaning it gains electrons. This transforms the water into oxygen and the carbon dioxide into glucose. The plant then releases the oxygen back into the air, and stores energy within the glucose molecules. (ABC News, 2017). Water plants are also good for water with fish because they also promote a balanced ecosystem and provide many benefits to your fish including: Producing oxygen and consuming CO_2 during the day, which benefits fish, and helps with filtration and stabilizes pH."

GRADE 7

Gudoor, Vidisha (07-10-65, PS)

Project Submission

Soil With Decomposed Vegetables

"This project was performed because, the conductor of this experiment wanted to find a way to make a good use of old vegetables. If the mass of decomposed vegetables used as fertilizer increases then the plant height will increase because, the rotten vegetables provide nutrients for the plants. The first step of setting up this experiment was research. The research was about decomposition, decomposition of vegetables, and fastest growing plants. The next step was to gather the materials and set up the experiment. The data was recorded twice a week, for six weeks. The data showed that the 75 grams of vegetables had the highest height average. The data showed that the control group had the second highest height average, this shows no pattern. The conclusion of this experiment stated that the hypothesis is inconclusive."

GRADE 8

Olokode, Ifeoluwa (08-05-76, PS)

Project Submission

Does soil pH affect plant growth?

"My hypothesis was if I use different pH levels to grow, the pH level of soil between the scale of 6.0-6.5 will make the Phaseolus vulgaris the Common bean or haricot beans sprout faster. My results agreed with my hypothesis, although I am not very confident because of my small sample size. The pH level of 6 plants had an average of 2.08 inches (5.28 cm) after 2 weeks, while the Plant with a pH level of 8 had an average of 0 inches after 2 weeks. Since the plants with the pH level of 6 sprouted faster, I'd like to test if a pH of 5.0-5.5 is good for the growth of a plant."

Robotics AND Embedded Systems (RO)

GRADE 5

Aburajab, Adnan (05-02-27, RO)

Project Submission

Does the Diameter of the Balloon affect distance

"My project was to see whether the diameter of the balloon would affect the distance achieved by the balloon-powered car. In this experiment, I learned the importance of symmetry and precision. By accomplishing this I created a car that was able to achieve maximum distance. Firstly, I constructed my vehicle with a rectangular piece of cardboard with 2 straws taped to one side. By inserting the skewers through the straws and attaching the wheels on either side I had a functioning car. All that was left to complete was the balloon engine. By wrapping a balloon around a straw and taping it to the other side of the cardboard, my vehicle was finished. From my experiment, I gathered data that confirmed my hypothesis to be accurate. The distance most accumulated was 175 inches when the diameter of the balloon was 18 inches and the least amount of distance accumulated was 28 inches when the diameter of the balloon was 9 inches. From the data collected I learned that my hypothesis was supported and that with the increase of air in the balloon which increased diameter, the more distance was accumulated."

GRADE 7

Burke, Ryan (07-02-57, RO)

Project Submission

The Chickens vs the Robots

"How does artificial intelligence compare to different live organisms' intelligence?"

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