Project ID: 821

JR - Physics and Astronomy

Jose Ortiz Calva

Does the Color of a Glass Bottle Affect Temperature Change?

The project was testing if the color of glass bottles affects the temperature change. It is hypothesized that if the color of a glass bottle is darker, it will retain its original temperature for longer than a bottle that is clear. To conduct this experiment, five glass bottles, blue, green, amber, aqua, and clear were purchased. Ten trials were conducted for each of the five bottles. , Water was placed inside each with a beginning temperature of 40°F (4°C), and were left out at room temperature., videos were taken of the bottles tested to determine at what time each bottle color went from 40°F (4°C) to 60°F (15°C). The results indicated that the hypothesis was not supported, as the darker bottles colors would take a significantly shorter amount of time to go from 40°F (4°C) to 60°F (15°C), while clearer bottle colors would take significantly longer to go from 40°F (4°C) to 60°F (15°C). This data shows that when a bottle color was darker, the surface temperature would increase faster, and would make the pressure inside the bottle go up faster, causing the temperature change to accelerate. These trials show that the color of a glass bottle does affect temperature change significantly, and that the original hypothesis is not supported, as clearer bottle colors will take longer to go from 40°F (4°C) to 60°F (15°C).

Project ID: 822

JR - Physics and Astronomy

Dylan Bomar

How Fast Do Mario Kart Hot Wheel Go on a Loop Track

This project examined how fast Mario Kart HotWheels could go on a loop track. It is hypothesized that the heaviest and most aerodynamic looking car will win. Four Mario Kart HotWheels were tested and weighed, Mario weighed 1.15 ounces, Luigi weighed 1.5 ounces, Bowser weighed 1.15, and Yoshi weighed 1.05. The initial hypothesis was not supported, because Luigi went the slowest even though he was the heaviest and Mario went around the same speed as Bowser and Yoshi even though Mario looked the most aerodynamic. This means that heavier HotWheels probably go slower than lighter ones.

Project ID: 823

JR - Physics and Astronomy

Madison Hulse

The Effect of String Tension on a Tennis Racket's Power

My project explored the effect of string tension on a tennis racket's power. I tested if low, medium, or high string tension would cause a tennis racket to have the most power. After researching thoroughly, I hypothesized that low tension would make the tennis racket I was experimenting with have the most power. I tested this by using three of the same tennis rackets, a ball machine, and a homemade racket stand. I used the ball machine to propel a tennis ball at the center of each tennis racket and I used a tennis radar gun and a tape measure to record the speed and distance of the ball after it hit the tennis racket. Based on my data, low tension had 48.1% more speed than high tension and 18.3% more than the control. High tension had 48.1% less speed than low tension and 25.2% less than the control. Low tension had 23.5% more distance than high tension and 16.7% more than the control. High tension had 23.5% less distance than low tension and 5.9% less than the control. My data helped me to conclude that my hypothesis was supported.

Project ID: 824

JR - Physics and Astronomy

Lauren Bailey

How the Speed of Rotor Blades Affects the Amount of Lift on Helicopters

Since I am in close relations with a military member who has access to helicopter simulators, a wonderful opportunity for me was created. I did my project on how rotor blade speeds affect the amount of lift on a helicopter. I tested rotor blade speeds of 94%, 96%, 98%, 100%, 102%, 104%, and 105%, hypothesizing that without changing any other settings in the simulator, the helicopter would rise at the highest rate when the blades are spinning at 105%. When the speed of the blades is at 100%, the rotations per minute is 296.

The rotor blade speeds were evidently my independent variable, with my rise and descent rate being my dependent variable. I did my experiment with my dad inside of a military huey simulator, and since he flies helicopters often, he froze all of the settings, so they were controlled, and only changed the rotor blade speed. When he changed the rotor speed, we estimated how many feet per minute the aircraft was ascending or descending by looking at the elevation tracker. I ran twenty-one trials, three for each speed.

My hypothesis was supported since when the rotor blades are spinning at 105%, the most air is being pushed downward so the aircraft is being forced up at a higher rate. My other results were as follows: when the blades were spinning at 94%, the aircraft descended at 366.67 feet per minute, at 96%, the helicopter descended at 250 feet per minute, 98% was a descent of 183.33 feet per minute, 102% was a rise of 146.67 feet per minute, 104% was a rise of 233.33 feet per minute, and 105% was a rise of 366.67 feet per minute. If somebody were to try this experiment for themselves, I would recommend using a more accurate system to calculate the rise and descent rate.

Project ID: 825

JR - Physics and Astronomy

Branden Soukup

The A, B, and C's of UV Radiation

Uv radiation is a very large danger in the modern world, and even though weaker forms of it (such as UV-A and UV-B radiation) may be stopped easily by protection such as sunscreen, stronger version of UV radiation (such as UV-C) are much harder to block, and it is always important to update current protective gear and make it safer. One idea that relates to protective gear is that since the structures of crystals are different from typical amorphous solids, it could be possible that they block UV radiation less or more effectively. The Hypothesis in this experiment was that since the atomic structure of a crystal is more organized than an amorphous solid, less radiation will be able to pass through a crystal. This is because the atoms of the crystal will be organized in patterns that strengthen certain parts of the crystal. The procedure for the project was first to obtain all the necessary supplies, then to set up the black light flashlight facing downwards in a room without any UV radiation interference. After that the UV detector's wireless transmitter was placed underneath the UV light and each material was tested by placing it in front of the UV detector. Results were compiled and it was found that crystalline structures were not the only factor in material ability to block UV. Opacity, density, and the reactivity to UV light seemed to also have a significant effect. The hypothesis was partially supported but clearly more study is necessary.

Project ID: 826

JR - Physics and Astronomy

Rachel Susan

LED vs Incandescent: Which Performs Better?

LED light bulbs can impact our environment substantially. The use of incandescent light bulbs is still pretty high, and as a result of this the environment can be negatively impacted. So, I based my project experiment on what is the significance of using LED light bulbs. My project question is “Will LED light bulbs produce a greater amount of light and also use less electricity?”

I hypothesized that LED lights would produce a greater amount of light and use less electricity. My independent variable was the different types of light bulbs used. The dependent variable was the wattage used and the brightness generated, which I measured with a digital multimeter and a lux meter. I ran a total of six trials, three for each light bulb. Incandescent light bulbs used 37.47 watts more than the LEDs did.

My results supported my hypothesis. LED light bulbs use less energy than incandescent light bulbs and generate a brighter light. One thing I noticed while conducting my experiment was that incandescent bulbs tend to heat up incredibly quickly. So if you have these lights close to anything that shouldn't be heated up, I advise you to use LED light bulbs.

To further improve my experiment, I advise also testing other types of light bulbs such as Halogen bulbs or even CFL bulbs, because these light bulbs are also commonly used in household settings.

Project ID: 827

JR - Physics and Astronomy

Kristine Nguyen

Size and Magnetic Power

The size and magnetic attraction of magnets are relevant because magnets can be very useful in many ways, to keep refrigerator and freezer doors closed, to power speakers, store data in computers, and to even be used in MRIs (magnetic resonance imagers), which doctors use to look inside people's bodies. The purpose of this experiment was to figure out if larger magnets would attract a magnetic material at a further distance than a smaller magnet would. Having the knowledge of how magnet size affects magnetic attraction will furthermore benefit people's understanding of how to design products that utilize magnetic power. The experimental question was: Will the size of a magnet increase the distance of attraction it has to a paperclip? The hypothesis stated that if a magnet is larger then it will attract at a further distance than a smaller magnet because a larger magnet will have more magnetic power. The procedures required 3 magnets of different sizes to be pushed 1 centimeter closer to a small paperclip until the magnet and the paperclip stuck together. Once the magnet and the paper clip stuck together, the data was recorded. The result of the experiment showed that a larger magnet attracted the paperclip at a further distance than the smaller magnet. Based on the data, the hypothesis was supported because the larger magnet attracted the paperclip at a further distance than the smaller magnets.

Project ID: 828

JR - Physics and Astronomy

Matthew Nagal

Using the Solar and Heliospheric Observatory Satellite to Measure the Motion of a Coronal Mass Ejection and Calculating Their Arrival Speeds to Earth

My project is about using SOHO to measure the motion of a coronal mass ejection and calculating their arrival speeds to Earth. A Coronal Mass Ejection(CME) occurs when a large amount of plasma is ejected from the Sun due to the disruption of its magnetic field. My hypothesis was that when a CME is directed to Earth, It would take 7 days to reach Earth. First I found two sets of pictures online that were dated March. Then I calculated their velocities using a specific formula and then used the time formula time=distance/speed to find out how long the CME would take to reach Earth. From the first set of images, I calculated from the second velocity, that it would take almost 6 days to reach Earth. And from the second set of images, I calculated that the CME would take approximately 25 days to reach Earth from the first velocity, and 36 days to reach Earth from the 2nd and 4th velocities. One of the velocities we measured had a negative value, which meant that it was decreasing in speed toward the Earth and was actually returning back toward the Sun. The length of time to reach the Earth depended on the speed and the actual direction that the CME being measured was either going toward the Earth or back toward the Sun.

Project ID: 829

JR - Physics and Astronomy

Reid Mitchell

What Is the Best Weather Condition to Throw a Football

In this project I looked at what the best weather conditions are to throw a football accurately. I thought that the dry football would have the most accurate throw out of the wet football and the frozen football. What I found out is that in normal dry weather conditions is the best to accurately throw a football because it's not as weighed down as the wet football and the frozen football. When I threw the dry football most of the time it hit the middle or very close to the middle. When I threw the wet football I would usually just drop down to one of the second to last rings of my target. And when I threw my frozen football it dropped to the bottom. Also the dry football had either less P.S.I. (pressure for square inch) or less weight than the wet or frozen footballs. The dry football was 0.57 pounds and a P.S.I. of eight. The wet football was 0.59 pounds and had a P.S.I. of 8. And the frozen football was 1.13 pounds and had a P.S.I. of 8.5.

Project ID: 830

JR - Physics and Astronomy

Zoey Chen

Circling around Earth or the Sun? Using a Cell Phone APP to Reconstruct Orbits of the Moon and Planets in the Sky

How did ancient astronomers find out that the Moon is circling around Earth and Planets are circling around the Sun? I plan to repeat what ancient astronomers might have done long time ago by keeping a dairy of the positions of the moon and Planets in the sky relative to the Sun and other far away stars, and see how they move around the sky over time.

Project ID: 831

JR - Physics and Astronomy

Brooklynn Owen

Putts to Perfection: Comparing Repeatability of Heavy and Light Putters

PURPOSE: Have you ever wondered if the weight of a putter affects the repeatability of a putt? Half of all strokes in golf are expected to be putts. If a player can make a more repeatable putting stroke, then they can reduce the total number of putts and achieve a better score. This project studied the effects of golf putter weight on the repeatability of putting results. My hypothesis is that a heavier putter's putts will be more repeatable than a lighter putter's putts.

PROCEDURE: I tested two different weights of a putter. I tested "light" (482 g) and "heavy" (585 g) putters using a home-made wooden, pendulum-based putting machine on a 1.27 cm thick synthetic turf putting green. I did 100 trials for each putter weight. I measured the distance and lateral deviation of each ball roll. Using a light putter, I placed a golf ball in front of the putting machine and held back the putter then I let go and watched the ball roll. I next measured the lateral deviation and the distance for 100 trials. I then added 103g to the putter and did another 100 trials.

RESULTS: For my results, the heavy putter's putts had a lower standard deviation for both distance (57.1% less) and lateral deviation (19.7% less).

CONCLUSIONS: The heavier putter's putts were more repeatable than the lighter putter's putts. Therefore, my hypothesis was correct. The heavier putterâ€™s putts had a smaller deviation than the lighter putter's putts. Therefore, the heavier putter's putts were more repeatable. If I were to do this experiment again, I would use an installed putting green because the blades of grass are more consistent. Also, I would use a putter that weighs between 300-350 grams and then add 100g.

Project ID: 832

JR - Physics and Astronomy

Marcello Carreon

Does the Amount of Wire on a Guitar Pickup Affect Sound

This project examined the effect the number of wraps of wire around a guitar pickup would have on its sound quality. It was hypothesized that the sound quality of the guitar pickup would change depending on the amount of wraps used in the pickup because the more wraps there are, the higher the frequency and decibels will be. Each pickup was tested by itself and plugged into the same guitar. The sound was measured using a decibel meter and a frequency counter. Each trial consisted of plucking the same string (E string) 10 times and measuring the amount of decibels per pluck. The average number of decibels were calculated from the trials and used to determine the difference of the decibels every 250 wraps. This means that each trial has 250 more wraps than the last one. This was repeated for frequency. The frequency, measured in hertz, is what helped determine how much the number of wraps really affected the pitch. Results indicate that the hypothesis was supported, decibels increased by 37% when the number of wraps increased by 2250. The frequency increased by 18% as well. The increase in the number of wraps changed the sound quality to a sharper sound. This is due to the fact that the more wire there is, the more voltage will be produced. Voltage is what is being converted to sound which means that the more voltage there is, the more sound will be produced.

Project ID: 834

JR - Physics and Astronomy

Evan Hettena

What's the Fastest Way to Cool a Soda

This project examined the effects and best ways to cool a soda. And which of three common ways to cool a soda is the most effective way to cool the soda. It is hypothesized that the rate of cooling is faster by using a cooler with an appropriate amount of ice and in an area that is room temperature (68 degrees Fahrenheit). 3 trials were done by cooling all ten cups or cans of soda for thirty minutes then obtaining all the temperatures (^{o}F) and calculating an average temperature of all the 10 cans or cups then repeat two more times. The average temperature results were 49.05 ^{o}F, 47.96666667 ^{o}F, and 53.06666667 ^{o}F. My conclusion is that the best way to cool a soda is to use a cooler with ice. This is because the surrounding of the bottle needs to be ice. Ice is the best material for cooling a liquid. The cooler is also really helpful because it keeps the heat inside the cooler to keep it cool for a longer amount of time due to its helpful materials such as styrofoam. The temperature outside the cooler also comes into hand because the process may be faster if the outside of the cooler is cooling temperature (extra insulation). This information is helpful for my demonstration because then I will know if I need to change the materials used in the demonstration. I will most likely change the materials to find a more thorough answer to the question.

Project ID: 835

JR - Physics and Astronomy

Elodie Arnaudy

Flipping Fast: The Effect of Body Shape on Flip Speed

This project investigated how body shape in the air affects flip speed. As a gymnast, I was interested to learn how to improve my technique using science and physics. My hypothesis was that a compressed body position would rotate faster because it is a smaller shape with a shorter radius and has less surface area. Since weight is a constant. I predicted that a back tuck would have shorter time in the air.

I asked someone to video me performing ten back tucks and ten layouts (a layout is a flat body position). I analyzed the videos and calculated the air time using iMovie for each back tuck and layout. Then, I averaged the data points. I used ten data points for each type of flip because the body performs slightly differently each time.

My results showed that a back tuck is in the air, on average, for 0.85 seconds and a layout is in the air for 0.98 seconds. These results were interesting because I thought there would be even more of a time difference between the two flip shapes.

This data led me to the conclusion that a tucked body shape with a shorter radius will have less air time which means the body flips faster with a smaller shape. To expand this research, it would be interesting to also measure the radius and velocity.

Project ID: 836

JR - Physics and Astronomy

Olivia Marsh

Moon and Star Light

In this experiment I wanted to find out if the phase of the moon would affect how many stars you can see. My hypothesis was that when the phase of the moon was more complete there would not be as many stars visible. To carry out this experiment, I went outside every day for two full moon phases, roughly 60 days, and took pictures of the stars in the same place. After taking the photo I counted the stars in each photo and looked up the percentage and phase of the moon. My results were that if one plans to observe the stars, the phase of the moon most likely does not affect its visibility. The experiment showed that for the same space in the zenith it was almost random how many stars could be seen. Based on the data I concluded the phase of the moon to not be the only factor, or for that matter, the main factor, contributing to the number of stars that can be seen. This project is important because it helps demonstrate that while the phase of the moon does slightly affect the number of stars one can see, there are many other factors to consider if one wants to get the least obstructed view of the night sky and its beauties.