

Category: Physical Science - Physics

Student Name: Mikaela Arnson

Team Members (if any):

Project Title: Mighty Gum

Abstract: My question is which gum is the strongest? My hypothesis is Bubble Yum will be stronger at the 1 minute test than at the 5 minutes test and it will also be stronger than Bubblicious and Dubble Bubble gumball. I chewed the gum for 1 minute and then took the gum attached it to the string that was attached to a cup and I put pennies into the cup one at a time one second apart until the gum started to stretch. I repeated 4 more times. I did it 5 more times chewing the gum 5 minutes. In conclusion I found that Bubble Yum was the strongest and my hypothesis was correct.

Category: Physical Science - Physics

Student Name: Eric Ascione

Team Members (if any): Nathan Fairbanks

Project Title: Potato Power

Abstract: Question: How many potatoes does it take to produce more voltage than a D-battery. Hypothesis: We think that four potatoes will produce more voltage than a D-battery. Procedure: Measure the voltage in a D-battery. Connect a copper wire to a copper piece, then place into the end of a potato. Insert a steel nail into the other end of potato. Connect the red wire from the voltmeter to the copper wire. Connect black wire from the voltmeter to the steel nail. Repeat, adding another potato to the series until the voltage for four potatoes are measured. Results: One potato measured .5 volts, two potatoes measured 1.2 volts, three potatoes measured 1.5 volts, four potatoes measured 2.1 volts and the D-battery measured 1.5 volts.

Category: Physical Science - Physics

Student Name: Jennifer Baker

Team Members (if any):

Project Title: Wax It Up!

Abstract: I propped an 11x21 board on top of a 30 inch long piece of aluminum foil. Eighteen inches up from the edge of the board, I set drew a finish line. I collected ice cubes to send down the board. The board represents a ski and the ice represents snow. I predicted that putting wax on the board will make the ice go faster, because the wax will reduce friction. Also, I predicted that wax paper would have the fastest results, rather than the candle wax, because the wax on the wax paper is lighter and has more coverage, reducing the most friction. To begin, I let three ice cubes go on the plain board individually and timed the cubes in these ways: time until crossed finish line and time until stopped. After each one stopped, I put a mark where it rested, measured the inches past the end of the board and inches past finish line, and recorded the information on a chart. Next, I repeated the process but added a light layer of candle wax by rubbing a candle on the board. For the third group, I added more candle wax to the plank and repeated the process yet again, timing and measuring. Finally, I wrapped the board with wax paper and repeated the process for a fourth time. My results indicated that the heavier coat of candle wax produced the fastest times and the farthest distance.

Category: Physical Science - Physics

Student Name: Julya Barnhurst

Team Members (if any):

Project Title: What Is The Relationship Between Magnetic Strength And Quantity Of Copper Windings In A Generator?

Abstract: What is the relationship between magnetic strength and the quantity of copper windings in a generator? For my project I built two simple generators by wrapping insulated copper wire around pieces of PVC tubing. One generator with 500 coils (or windings) and the other with 1000 coils. I used $\frac{1}{2}$ PVC tubing so that I would be able to pass $\frac{3}{8}$ Neodymium supermagnets through the center of the tubing, thus allowing the magnetic lines of force to pass through the coils. The coils were connected to a voltmeter to measure the voltage produced when the magnets slid back and forth within the tube. Starting with one magnet and the 500 coil generator, the magnet was passed back and forth through the tube, confined by a finger and a thumb. This process was repeated while watching the voltmeter, looking specifically for the peak measurement. Once this peak was established, the process was repeated until this peak measurement was confirmed at least 10 times. The peak was then recorded for that test. A magnet was then added and the process repeated. I kept adding one magnet at a time and repeating the process until the voltage quit climbing and leveled off, and data was recorded for each quantity of magnets. This test was performed with both generators. A second test and set of

data was recorded to confirm the accuracy. The data was graphed and shows that the generator with the most windings and quantity of magnets produced the highest voltage.

Category: Physical Science - Physics

Student Name: Morgan Barron

Team Members (if any):

Project Title: Does shape affect fastening?

Abstract: Question: Does Shape Affect Fastening? Hypothesis: If shaped buttons with over-sized button holes are tumbled in dryer over time, then I predict circle buttons will come undone because there are no edges to catch the fabric proving shape affects fastening. Method: Finding any three, shaped buttons the exact size was difficult. Therefore, three different sizes for heart, square, and circle buttons were used. Research lead to oversized button holes to create worn condition. To determine each button hole, the height of button was added three times to the width. Mathematically centered button hole and placement of button before sewing with eight strands of thread per button. With temperature controlled (13-14 degree C.), tumble squares for 20 minutes checked at 5 minute intervals to see if button remained fastened. If button fell off, discontinued trail and discarded data. Each 20 minutes was a trial. Data collected from six trials. Conclusion: The data slightly supports hypothesis, but the heart shape and circle buttons came undone equally while the square buttons always remained fastened. First two trials buttons unfastened, but during the final four trials, all buttons stayed fastened. Therefore, shape slightly affects fastening. During three attempted trials, polyester thread snapped and buttons came off. I think friction caused the thread to snap as there was more buttons than cloth tumbling

in the dryer. I would like to reinvestigate using nylon thread. There is a possibility the buttons which fell off would have come unfastened providing data which strongly support the hypothesis.

Category: Physical Science - Physics

Student Name: Claire Bastian

Team Members (if any):

Project Title: Balloons, Hair and Static Electricity

Abstract: QUESTION: I wanted to find out what length of hair produces the most static electricity. My guess was the longer the hair, the more it produces static electricity. METHOD: My dad, my brother and I washed our hair at the same time. My hair is the longest (11 inches), my dad's hair is medium (6 inches), and my brother's hair is short (1 inch). Then the day after we washed our hair, we got together and rubbed a balloon of the same brand and size, but different color on our head for fifteen seconds. Right after the fifteen seconds we stuck the balloons on the wall at the same level, a few inches apart from each other. We timed each balloon to see how long it stayed on the wall before falling off, and wrote the times down. We did this three times, each time using a different one of the three balloons. RESULT: The results showed that the balloon that was rubbed on long hair stayed up the longest (a total of 142 minutes), the medium hair was next (80 minutes), and the short hair was last (only 1 minute), so long hair seems to produce the most static electricity.

Category: Physical Science - Physics

Student Name: Bridger Bird

Team Members (if any):

Project Title: Boiling Hot Water

Abstract: I wanted to know what size of pot water would boil faster in. I found a study on the internet that stated water in small narrow pots boiled faster. I used three different sized pots that were made out of stainless steel and had the same thickness. I had a 1 quart, 2 quart and 8 quart pot. I used 2 cups of cold water in each pot. I used the same burner on the stove to heat the water. I had a stop watch that I used to measure the time as I watched the water until it began to boil. I thought the small pot would boil faster but the bigger pot actually boiled faster. I think that the water boils faster in a big pot because it has more surface covering the heating source.

Category: Physical Science - Physics

Student Name: Benjamin Brady

Team Members (if any):

Project Title: How Much Helium?

Abstract: I started with the question. How much helium. It went on from there. I stated my hypothesis of how many balloons it would take. To lift one pound. So I tied 6-8 9 in. in diameter balloons to a weight. We needed alot more balloons then I thought 128 to be exact.

Category: Physical Science - Physics

Student Name: Clint Brooks

Team Members (if any):

Project Title: What's the fastest way to cool a soda?

Abstract: The purpose of my science project was to find out what would be the fastest way to cool a room temperature soda. My hypothesis was that a soda cooled in an ice-water bath will cool quicker than the refrigerator, freezer or in ice only and I came up with the conclusion from the research that I did. I took a temperature reading of 3 bottles of room temperature soda which were the control group. I cooled 3 bottles of soda in the refrigerator, 3 in the freezer, 3 in ice only, and 3 in a cooler filled with ice and water. I took a temperature reading every 10 minutes of each of the sodas and recorded the information. After a group of soda's stabilized in temperature I took the data and then recorded the average temperature of each variable for every 10 minute reading. I then made a graph and the conclusion was that my hypothesis was correct. The ice water bath cooled the sodas the fastest.

Category: Physical Science - Physics

Student Name: Nathan Burke

Team Members (if any):

Project Title: Bottled-Up Bouyancy

Abstract: To learn how bouyancy affects the performance of a submarine for how it floats or sinks and how far it goes. Hypothesis-If the test submarine is filled with different amounts of water and measured,It is then observed for effect and change in bouyancy of the sub and distance of propulsion... The sub will either sink,rise,or stay level. Conclusion-Adding water in specic amounts made the submarine progressively less bouyant until it sunk when it was full. This also decreased the distance the submarine was able to travel,etc. Thus submarines are quite a technological feat as they are able to float,sink,or maintain their level in the water,as well as travel great distances while under the water.

Category: Physical Science - Physics

Student Name: Bradley Caron

Team Members (if any):

Project Title: Projectile distance vs. launch angle

Abstract: I wanted to find out which launch angle would make a projectile go the furthest. My hypothesis was that the 45 degree launch angle would launch a projectile the furthest. First, I built a golf ball launcher. It didn't work very well because the golf ball was too heavy for the amount of power the springs had. Then I made a launcher that shot small steel balls and used surgical tubing for the power. Next I cut out 6 different angle boards to determine the angle of the launcher. I shot 15 balls per angle and averaged the distance of the 15 shots. Then I figured out the standard deviation for each angle. My hypothesis was correct. The 45 degree launch angle went the furthest.

Category: Physical Science - Physics

Student Name: Madison Clark

Team Members (if any): Paola Diaz

Project Title: Will heat affect the rate the marble will roll

Abstract: Our question was Will heat affect the rate the marble will roll? We pondered that question when we were thinking about the comets in outer space. Comets go super fast when they are hot. We contemplated if this would be the case if we heated marbles. Steps we took: 1. Put marble in boiling water hot water or warm water. 2. Put other marble in room temperature refrigerator or freezer. 3. Time both in their places for 2:30 (min.) 4. Time when the marble touches the ramp then stop the timer when the marble touches the fence. 5. Look at stop watch to see the seconds. Results: Our hypothesis rejected our data. Hot expands - cold contracts. We figured that's why the cold marble went the fastest.

Category: Physical Science - Physics

Student Name: Aaron Clark

Team Members (if any): Bryce Jensen

Project Title: Magnets

Abstract: Question: Can magnets be used to make things levitate? Hypothesis: If enough magnets are used, then certain objects will levitate. Methods and Results: We glued magnets to objects and then created a stability cage so the objects wouldn't flip and added more magnets for heavier objects. The objects levitated because of the magnetic repulsion.

Category: Physical Science - Physics

Student Name: Aidan Compas

Team Members (if any):

Project Title: Ping Pong C.P.R.

Abstract: The science project I chose to present is titled Ping-Pong Ball C.P.R., or in other words how to revive dented ping-pong balls. With this project, I show that by using the Scientific Method that you don't have to throw away dented ping-pong balls anymore. I started with eight dented ping-pong balls in which seven are dented. One of those seven was also cracked. The eighth ball was what I called "the control group." I next tested how to inflate the balls with water; both cold and hot water, steam and a blow dryer. The balls didn't inflate with the cold water. The balls inflated with the hot water. The balls also did not inflate by using the steam method. Then my dad suggested I try a blow dryer. Of course I didn't think that would work until we tried it. I was given a pair of tongs to hold the ping-pong ball with. To my amazement, the ball inflated right before my eyes. I was standing there awestruck, cause the ball with the steam didn't work but this did.

Category: Physical Science - Physics

Student Name: Adam Cook

Team Members (if any):

Project Title: Watch Out Below

Abstract: My question was: Do heavier things fall faster than light things. I hypothesized that if you drop two objects (light and heavy) the heavier object will hit the ground first because gravity has a greater pull on it. I dropped five objects out of our attic window and timed them to see how fast they hit the ground. I did it five times with each object and averaged their times. I also weighed each object. There was very little difference in their times in spite of the great difference in their weights so my hypothesis was wrong. The difference in their times was probably due to air resistance or the inexactness of my Dad's reflexes (he was the one timing them).

Category: Physical Science - Physics

Student Name: McKenzie Curtis

Team Members (if any):

Project Title: Cliff Jumping at Lake Powell

Abstract: This project is my search to answer the question Why is Cliff Jumping so Dangerous. As a result of my research, I realized that two forces are primarily responsible for causing injuries and deaths to cliff jumpers. These forces are the earth's gravity and the resistance of water. My hypothesis is: As the height of the jump increases, both the impact speed of the Jumper increases and the resistance of the water increases, causing rapidly increasing forces at landing / impact. I performed two sets of experiments. The first set experiments were to test the acceleration of gravity. I dropped objects from 5.2 m and 10.4 m and timed the fall. Objects falling 5.2 m averaged 1 second to hit the ground. Objects falling 10.4 m average 1.5 seconds to hit the ground. I concluded since it took 1 second to travel the first 5.2m feet of the fall and it took only .5 seconds to travel the next 5.2 m, the average speed of the object doubled in the second 5.2 m compared to the first 5.2 meters. My next experiments tested the resistance of water on an object at different speeds. I measured the resistance of water on an object at .6 m/sec and 1.2 m/sec. The resistance was significantly increased. I concluded that the force of the impact of jumpers hitting the water increases VERY RAPIDLY as the height of the jump increases. Few cliff jumpers are aware of the dangers / physics involved in cliff jumping.

Category: Physical Science - Physics

Student Name: Finley David

Team Members (if any):

Project Title: Why Do Ears Pop?

Abstract: My Question was why do ears pop? Going down the hill I usually had to pop my ears. I noticed that if I couldn't pop my ears it would hurt like crazy. I wondered what caused the pressure to change as you go down the hill and what does this have to do with ears popping? I researched the parts of an ear and decided to make a model that acted like an ear. I took a jar and placed a rubber glove over it like a drum and sealed it with a rubber band. I taped a straw to the rubber glove on top of the jar. Then we got in the car and started down the hill. About halfway down the hill I noticed that the straw had risen because the rubber glove was caving in. When I went all the way down it caved in almost an inch inside the jar. I was amazed. When we got home I looked up some models of an ear. The amazing thing is that there is a tube that goes from the inside of the ear to the mouth and when you yawn and it opens and allows the pressure out or in. I figured out my hypothesis was exactly opposite. When we went down the hill the rubber caved in. So you had to yawn and pop your ears. That ended my search for why do ears pop.

Category: Physical Science - Physics

Student Name: Andrew Davis

Team Members (if any):

Project Title: Speed...A Weighty" Matter"

Abstract: Question: Does weight affect the speed of a pinewood derby car? Hypothesis: I think that weight placed in the back of the car will be the fastest. Method: I built a pinewood derby car that is 5.1 ounces. The weight is adjustable to measure weight in front, middle, back or evenly distributed. I raced the car on each lane 5 times testing the weight in the 4 different areas. It was timed electronically. The Result was that weight in the back was in fact the fastest!

Category: Physical Science - Physics

Student Name: Paola Diaz

Team Members (if any): Madison Clark

Project Title: Will heat affect the rate the marble will roll?

Abstract: Our question is will heat affect the rate a marble will roll? what gave us this idea was that comets go fast and they are always hot. Our hypothesis was that the hot marble would go faster because of the reson above.our methods were by puting a marble but not the same one in a boiling pot for two minutes and thirty seconds then take it out with a cooking spoon and put it on a ramp, have a dogy fence so it dosent keep going and time it with a stopwatch then with another marble you put it in the fridge and leave it tere for two minutes and thirty seconds and then take it out with a cooking spoon and put it on a ramp, have a dogy fence so it dosent keep going and time it with a stopwatch. our concusion or results was that our DATA rejected our hypothesis .We found out that the hot marbe expanded and cold cantracted. Overall,we figured it took more time to roll around the expanded marble and less time for the contracted marble to roll around.

Category: Physical Science - Physics

Student Name: Brinli Dillon

Team Members (if any):

Project Title: The Rubber Band Experiment

Abstract: My question is How will varying temperatures affect the elasticity of a rubber band. My hypothesis is that added heat will cause a rubber band to expand becoming more elastic. I also predict that colder temperatures will cause a rubber band to contract. My method is to first place equal weight on three rubber bands and measure them from top to bottom. I then placed the rubber bands into a heated environment (192 degrees F) and then measured again. Last I placed the rubber bands into a cold environment (24 degrees F) and measured them again. The results were opposite from what I had hypothesized. Heat caused the rubber bands to contract and cold caused them to expand. This is due to the process of entropy."

Category: Physical Science - Physics

Student Name: Raven Ekins

Team Members (if any):

Project Title: What Makes Ice Melt Faster

Abstract: The title of my project is "What Makes Ice Melt Faster?" I chose this title because I'm trying to figure out which substance of salt sand sugar and pepper can melt a small ice cube the fastest. I wanted to know this because I thought it would be interesting when I figured out the results of my project. For my method I decided to make all the ice cubes the same size. Next I put each one in a bowl and sprinkled 1/8 of a teaspoon of the substances on the ice cube. Then I just sat and waited until one of the ice cubes was completely gone. I recorded the time. I repeated this twice with each ice cube. by cloning this I figured out which one melted an ice cube the fastest. My results were that salt melted the ice cubes fastest because it was an earth made product. Then sugar came in second place but I thought it was weird because sugar is a factory made product. Then sand. I thought that sand would be in first because it has a lot of iron monoxide minerals in it and when you put iron monoxide to something cold it will melt it really fast. But it was actually in 3rd place. Then in last place was the pepper. I thought that pepper was going to be in 2nd place but it was actually in last.

Category: Physical Science - Physics

Student Name: Nathan Fairbanks

Team Members (if any): Eric Ascione

Project Title: Potato Power

Abstract: Question: How many potatoes does it take to produce more voltage than a D-battery. Hypothesis: We think that four potatoes will produce more voltage than a D-battery. Procedure: Measure the voltage in a D-battery. Connect a copper wire to a copper piece, then place into the end of a potato. Insert a steel nail into the other end of potato. Connect the red wire from the voltmeter to the copper wire. Connect black wire from the voltmeter to the steel nail. Repeat, adding another potato to the series until the voltage for four potatoes are measured. Results: One potato measured .5 volts, two potatoes measured 1.2 volts, three potatoes measured 1.5 volts, four potatoes measured 2.1 volts and the D-battery measured 1.5 volts.

Category: Physical Science - Physics

Student Name: Jessi Ferrin

Team Members (if any):

Project Title: Meltdown!

Abstract: Question: Does the shape of ice affect its melting time? Research: The more surface area ice has, the faster the process of melting will occur. Hypothesis: Yes. I believe the flatter the shape of the ice, the faster it will melt. Methods: I poured 1/4 cup of water into five separate containers of different shapes: a toothpick holder, a popsicle holder for homemade popsicles, a short and flat 1/4 cup measuring cup, and taller 1/4 cup measuring cup, and a sandwich baggie. I froze them in my home freezer. I placed them in saucers, which were then placed on a table to allow the ice to thaw, and I timed the process. I repeated this entire process again one more time. Results: The ice in the baggie melted fastest, and the ice in the toothpick holder took the longest to melt. The hypothesis was correct.

Category: Physical Science - Physics

Student Name: Lincoln Gifford

Team Members (if any): Bronson Gifford

Project Title: Catch Some Rays: Blocking Ultra-Violet Rays

Abstract: Question: Which containers will block out ultra-violet light? Project: Test different types of containers to see which block UV rays using beads that change color in UV light. Hypothesis: We think the prescription bottle will block out the most UV light, and the clear food container will block the least amount of UV light. Experiment: We used a black light in a dark closet and tested 11 different containers with UV color change beads in them. We rated the bead color of each after five minutes. We also tested the beads alone that were not in a container for a control test. Results: The medicine bottle blocked the most UV light, because it is made that way to protect the medicine. The clear containers blocked the least amount of UV light.

Category: Physical Science - Physics

Student Name: Bronson Gifford

Team Members (if any): Lincoln Gifford

Project Title: Catch Some Rays: Blocking Ultra-Violet Light

Abstract: Question: Which containers will block out ultra-violet light? Project: Test different types of containers to see which block UV rays using beads that change color in UV light. Hypothesis: We think the prescription bottle will block out the most UV light, and the clear food container will block the least amount of UV light. Experiment: We used a black light in a dark closet and tested 11 different containers with UV color change beads in them. We rated the bead color of each after five minutes. We also tested the beads alone that were not in a container for a control test. Results: The medicine bottle blocked the most UV light, because it is made that way to protect the medicine. The clear containers blocked the least amount of UV light.

Category: Physical Science - Physics

Student Name: Christopher Gustman

Team Members (if any): Conner Smith, Trevor Otterson

Project Title: Which would shoot farther, a rubber band catapult or a mousetrap catapult?

Abstract: Question: Which would shoot farther- a rubber band catapult or a mousetrap catapult?

Hypothesis: We thought the mousetrap catapult would shoot farthest due to its strong metal spring powerful enough to kill a mouse. We didn't think a rubber band catapult would have much power. Methods: Each of us chose and built a catapult. We tested the catapults to see which could shoot farther by launching marshmallows. We put the catapults beside each other. We loaded them and launched them. We measured the distance where the marshmallow landed and wrote it down. We shot them 2 more times each and wrote down the distance. Trevor's 1st Launch went 37 feet. For his 2nd Launch, he slid the arm down on his catapult to see how it would change the distance. It went 9 feet farther: 46 feet. For the 3rd Launch, he slid it up higher than it was at first. It went 7 feet shorter: 39 feet, the shortest distance. Conner's catapult didn't have any adjustments. Launch#1 was 32 feet. Launch#2 was 43 feet. Launch #3 was 38 feet. Chris' 1st launch went 36 feet.. His rubber band broke after launch #1. He added another and twisted it more than the original. On Launch #2, it went 43 feet- 7 feet farther. Launch #3 was 34 feet. Conclusion: Our Hypothesis was wrong! We thought a mousetrap's spring would provide more thrust than a rubber band. Possibly, the weight of the materials (burden) on the mousetrap catapult caused less thrust.

Category: Physical Science - Physics

Student Name: Jeff Hakala

Team Members (if any):

Project Title: The Levitating Coin Bank

Abstract: I wanted to make a ball float under an electromagnet. The hollow steel ball I chose was a coin bank. I investigated the voltages to lift different numbers of coins. My question was: Can I detect the number of coins by checking the voltage needed to lift the bank and make the force of gravity and magnetism equal? My hypothesis: I can detect the number of coins by measuring the voltage that makes the bank levitate. My method was (1) make electromagnet from a steel bolt and copper wire, (2) make the bank float under the electromagnet, (3) record voltages for levitating different number of coins, (4) average the data, (5) use the data to see whether I could detect an unknown number of coins in a blind" experiment. Results: It worked. More coins required more voltage. About four volts would lift the empty bank. But it took almost 8.8 volts to lift the bank when 120 grams (or 4.0 troy ounces) were added to the bank. When I had someone else add coins to the bank without telling me or letting me see how many

Category: Physical Science - Physics

Student Name: A. J. Hall

Team Members (if any):

Project Title: Dial In On The Savings

Abstract: The question is, which way is more energy efficient; setting the thermostat in your home to a constant temperature or varying the temperature by setting the thermostat down when you leave and up when you come home. My hypothesis was that leaving the thermostat at a constant temperature would be more energy efficient because the furnace would only have to maintain the heat in the home rather than using a lot of energy to re-heat the home. I tested my hypothesis by setting thermostats on 3 homes to variable and constant temperatures for three days each so that I could get consistent data. I used the gas meter on each home to record how much gas was used during each test and compared the total gas used during the variable test to the total gas used during the constant test for each home. To make my tests accurate I also had to take into account other variables that could affect the gas usage in the homes such as weather patterns, and gas usage by other appliances in the home. I eliminated these variables by testing during consistent weather patterns and using vacant homes where the only gas being used was by the furnace. The results surprised me as they didn't confirm my hypothesis. It is better to vary the temperature rather than leave it constant for two reasons. First, when you vary the temperature the furnace is off more during the day and saves enough energy to more

than compensate for the energy used to re-heat a home. Second, homes have insulation so even with the heat off, a home doesn't cool down drastically during the day, so it doesn't take a lot of gas to re-heat the home.

Category: Physical Science - Physics

Student Name: Garrett Harmon

Team Members (if any):

Project Title: Salty, Stinky and Wet

Abstract: What affect does salt or vinegar have in ice? Does is make ice stonger or weaker? If you wanted to make an ice rink or ice sculpture you would want to use the strongest ice possible. Does adding seomthing to the freezing water make it stronger or weaker? I added salt and vinegar to make ice to see which one was the stongest with a pressure test in a controlled lab. Salt had the highest average amount of 83.9% pounds of pressure. Water was next and followed by the vinegar ice.

Category: Physical Science - Physics

Student Name: Karanda Heimuli

Team Members (if any):

Project Title: Phi: The Golden Ratio

Abstract: Does every body fall within the golden ratio? My hypothesis is that only fully developed people will measure within the golden ratio. The golden ratio, which I first heard about in the book The Davinci Code, states that most things in nature adhere to Phi (1.618). I thought it would be an interesting project to reaserch because in the sixth grade corriculum we learn about greek culture and greek math and i wanted to learn more. I tested this theory in human body measurements of all different ages, genders, and ethnicities. My methods of testing were to measure each person's (1) full height (2) from navel to floor and then find the ratio of height divided by the second measurement. Next I measured shoulder to fingertip, then elbow to fingertip, found that ratio and finally hip to floor, knee to floor, and found that final ratio. My conclusion and findings were that most people fall within 0.1 cm of Phi. My data and graphs are in my research folder.

Category: Physical Science - Physics

Student Name: Jackson Hill

Team Members (if any):

Project Title: Flex that stick

Abstract: My question is How does flex in a hockey stick effect speed and accuracy. My hypothesis is I think that the hockey stick with the lowest flex would be best for accuracy and the hockey stick with the highest flex would be best for speed (flex is defined as how much weight ((in pounds)) it takes to bend the hockey stick 1 inch). I asked 3 people to help me Bryce, Mike, and Steve. They would shoot 10 hockey pucks with each hockey stick (flexes of 67, 85, and 105) at a target and radar gun. My conclusion was my results supported my hypothesis for Mike but not for Bryce. I correct on speed for Steve but off on accuracy. After the experiment I recommend Bryce uses a 67 flex for speed and a 67 flex for accuracy. I recommend Mike uses a flex for 105 speed and a 67 flex for accuracy. I recommend Steve uses a 105 flex for speed and a 85 flex for accuracy.

Category: Physical Science - Physics

Student Name: Travis Hill

Team Members (if any):

Project Title: Insulation

Abstract: Which insulators hold in heat the best? That is what I wanted to find out. My research showed that fabrics would work well for insulation. My hypothesis was that fiberglass insulation would hold the heat in the best. There were ten insulators that I used for the experiment. I wrapped ten baby food jars in different insulators and put them out side and checked the temperature at certain intervals. I did my experiment two more times and averaged the results. I averaged all the test results because they were hard understand. I was correct in my hypothesis. Fiberglass worked the best out of the ten. Wool and foam did well also.

Category: Physical Science - Physics

Student Name: Zachry Jacklin

Team Members (if any):

Project Title: Heat Transfer

Abstract: The question I used for my project was; How does distance affect how heat transfers? It is my thought that if you change the distance between 2 frames of glass, the closer the frames are to each other, the faster the glass will heat up by two degrees. I built a box with two panes of glass that could be moved by a space of 1/2 each time we tested the experiment. I performed the test 10 times at each distance and then took the average time for the final result. The control temperature was 115 degrees. I observed the receiving pane of glass raise go up 2 degrees in temperature and that was when a time was recorded. The result of my experiment was that each time we moved the panes of glass further apart the average time for the receiving pane of glass to get 2 degrees hotter than room temperature took longer.

Category: Physical Science - Physics

Student Name: Bryce Jensen

Team Members (if any): Bryce Jensen, Aaron Clark

Project Title: Magnets

Abstract: Question: Can magnets be used to make things levitate. Hypothesis: If enough magnets are used, then certain objects will levitate. Method: We glued magnets to objects and then created a stability cage so the objects wouldn't flip. We added more magnets for heavier objects. Results: The objects levitated because of magnetic repulsion.

Category: Physical Science - Physics

Student Name: Kamber Jensen

Team Members (if any):

Project Title: Roller Coasters - Making the Loop

Abstract: In this project I investigated the conversion of potential energy to kinetic energy. The question I was trying to answer was, How much height is needed for a marble to run through a loop of a fixed size? My hypothesis was that the height of the track needs to be higher than the height of the loop. I used foam pipe insulation to make a track. The diameter of my loop was 11½ inches. I ran a glass marble down the track 10 separate times, keeping track of how many times it made it through the loop. After 10 times, I would raise the track. I discovered that in order for the marble to make the loop, the height of the track needed to be quite a bit higher than the loop. With my track starting at 26½ inches, the marble couldn't make the loop at all. At 29 inches, the marble made the loop every time. The height that seemed to be just enough for it to make it through half the time was 27½ inches.

Category: Physical Science - Physics

Student Name: Zachary Kelley

Team Members (if any):

Project Title: Got Flight?

Abstract: Which paper airplane design flies the farthest? If I throw all eight paper airplanes the same way then I think the Professional paper airplane design will fly the farthest because it can fly long range fly fast be thrown any way and have a good flight. I folded and labeled each of the eight paper airplane designs. I went to a gym so I could conduct my experiment indoors so there was no affect from the wind or other outside elements. I laid out the tape measure on the floor and taped it in place. I made a starting point and got ready to fly the airplanes. I threw each airplane six times the recommended way for best performance and recorded the distance for each flight in my notebook. Then I threw each airplane hard two times and then soft two times to make a fair experiment and recorded the distance for each flight in my notebook. Then I took the ten flights of each airplane and added them together and divided by ten to calculate an average for each airplane. I found the Hammer's average was greater than the Professional's average. The Professional was within 8.1 of the Hammer so it came in second. My hypothesis of thinking the Professional would fly the farthest was wrong. I thought the Professional's design of being a glider dart and stunt plane combination would help it to fly the farthest. It turns out that The Hammer's single dart design flew the farthest. "

Category: Physical Science - Physics

Student Name: Keeton Knight

Team Members (if any):

Project Title: Radiant Energy

Abstract: Question: Which light sources give off the most radiant energy (heat). Hypothesis: Because radiant energy is heat and the sun has the most heat, the sun should spin the radiometer the fastest. Also the hotter the light bulb feels, the faster it should spin the radiometer. The black light feels the hottest and should spin the radiometer the fastest. The incandescent bulbs are next then the fluorescent bulbs, and then the flashlight.

Method: Put all light bulbs the same distance from the radiometer and count the revolutions of the radiometer and record. Just go outside to test the sun. Results: The sun really did put off the most radiant energy. But, the light bulbs did not go in the same order as said in the hypothesis. The black light did not come in second, and the coating on the black light must keep the radiant energy inside the bulb, but still heat up the bulb too. The flash light also gave off more radiant energy than expected. The focused beam of the flash light must also focus the radiant energy.

Category: Physical Science - Physics

Student Name: Cayla Larson

Team Members (if any):

Project Title: Supreme Slidin'

Abstract: My question is on kinetic friction and what pair of materials and items will eliminate the most kinetic friction. I used glass, metal, wood and cork for the items, and I used tinfoil, cardstock paper, felt and my table (control) for the materials. I thought the glass and the tinfoil would eliminate the most kinetic friction, but it was actually the glass and cardstock paper. I did seven trials to get a pretty accurate result in the end. I put an item in the rubber band, launch the item across a material, and measure the distance in inches. If it went farther it used less friction. To find what did eliminate the most kinetic friction, I added up all the measurements and found the average. The pair that had the highest average meant the item eliminated the most kinetic friction and it went farther on the table.

Category: Physical Science - Physics

Student Name: Joshua Leigh

Team Members (if any): Jordan Nestman

Project Title: How Does Temperature Affect Air Pressure?

Abstract: The purpose of this project was to answer this question: How do hot and cold temperatures affect air pressure? We performed experiments that would show how temperature would change the air pressure in a bottle. We used a two-liter bottle with a balloon attached to the spout of the bottle, and we observed what happened to the balloon when the air molecules were heated or cooled. We filled a bowl with water and then added snow to the bowl to chill the water quickly. We then put a balloon over the spout of the two-liter bottle and put the bottle into the cold water. In the second part of our project, we heated water and placed the bottle in the bowl of hot water. The cold water caused the balloon to be sucked into the bottle. The hot water caused the balloon to inflate. We observed that cold temperatures caused the air molecules to clump together, resulting in a drop in air pressure, which pulled the balloon down into the spout. Hot temperatures caused the air molecules to expand, which made the balloon expand outward. We learned that heat makes air molecules move faster, which results in more air pressure. The cold makes molecules move slower, which results in less air pressure. Our experiments helped us observe that heat and cold affect air molecules in different ways. Understanding air pressure is important in many aspects of science.

Category: Physical Science - Physics

Student Name: Caleb Lindquist

Team Members (if any):

Project Title: Magnetism vs. Temperature

Abstract: Can temperature affect the strength of a magnet? Hypothesis - I think temperature can affect the strength of a magnet. Method - I put three magnets in four different temperatures. The freezer which was 0 degrees, a glass of ice water which was 38 degrees, room temperature which was 66 degrees, and boiling water which was 203 degrees. Once we got the magnets to the desired temperature, we put them in a bowl of BB's and weighed them to see how much weight they attracted. The result was that heat affected the magnet's strength. The heat made it lose it's magnetism. The cold temperature and room temperature had little or no affect on the strength of the magnet.

Category: Physical Science - Physics

Student Name: Callie Lythgoe

Team Members (if any):

Project Title: Expansion of Frozen Liquids

Abstract: My question was to find out which liquid increases the most in volume and weight when frozen. I predicted that orange juice would expand the most, because I thought it had the most amount of dissolved solids, and those solids would expand, too. The liquids I used were: orange juice, water, soapy water, root beer, milk, and pancake syrup. I poured an equal amount of each liquid into identical cups and froze them overnight, being careful to keep them together and frozen in the same conditions. I measured height and weight before and after freezing. I discovered that my hypothesis was wrong, as the most expansion was found in root beer instead of orange juice. None of my liquids increased in weight after freezing, the only changes were in volume. The large expansion of the root beer is probably an outlier due to carbonation. If you exempt the root beer, the results showed clearly that the items with the least amount of dissolved solids expanded the most. In fact, the one with the most dissolved solids, pancake syrup, did not freeze at all! I did some more reading and asked my teacher, and I learned this is probably because dissolved solids actually interfere with the crystallization of freezing. This study could be helpful to anyone who wants to know how much space to leave in the container when freezing liquids, or who wants to know what the volume of a frozen liquid might be after thawing.

Category: Physical Science - Physics

Student Name: Kate Mattle

Team Members (if any):

Project Title: Potato Power

Abstract: I know that a potato can be used as a battery to power an electrical object like a calculator or digital clock. Does a bigger potato produce more voltage than a small potato? My hypothesis is that a bigger potato will make a battery with more volts. I gathered potatoes of different sizes, then weighed each potato. I then put a penny in one end of the potato and a zinc screw in the other end to produce a current. I then put an alligator clip on the penny and another alligator clip on the screw, and clipped the other ends to the probes of a multimeter. I turned the multimeter to the Vdc setting and recorded the readings. After analyzing the data, I found that the size of the potato does not make that much of a difference in the amount of voltage produced.

Category: Physical Science - Physics

Student Name: Trevor McGuire

Team Members (if any):

Project Title: Ice Melt Down

Abstract: I wondered which material is the best insulator to keep an ice cube from melting. To find out I took different materials including a glass jar, thermos lid(plastic), porcelain cup, paper plate, styrofoam plate, wooden cutting board, cotton balls, and newspaper. I used the same size ice cube and same environment, and placed an ice cube on each material. I timed the amount of minutes it took for the ice cube to melt completely. My hypothesis was that the styrofoam plate would be the best insulator. My results were that the newspaper was the best insulator taking 160 minutes to melt while the styrofoam plate was the next longest taking 131 minutes. The porcelain cup took the least amount of time to melt with 55 minutes. This information is helpful in knowing that different materials affect the rate in which ice melt. Therefore, if you need to keep something cold, using the best insulator will help it stay cold longer.

Category: Physical Science - Physics

Student Name: Robert Mechling

Team Members (if any):

Project Title: Wind Power- More Blades or Less?

Abstract: Every morning on my way to school, I pass by the Wind Turbines at Camp Williams. From a distance, they seem to turn slowly and they only have 3 blades. I wondered if they would be able to turn quicker if they had more blades. The faster they turn, the more energy they could produce. With natural energy as such a hot topic these days, I decided to test my hypothesis: If I add more blades to the windmill, it would produce more energy. In a wind turbine, the more revolutions it makes the more energy can be produced. In order to test my hypothesis, I built 3 miniature windmills with different numbers of blades. I painted one blade pink so that I could count the revolutions it made per minute. I set them all in front of a large fan at the same time and the same distance. I tested them at different air speeds. I found that my hypothesis was not completely true. More blades are better if the wind speeds are lower. High wind speeds need less blades to produce more energy.

Category: Physical Science - Physics

Student Name: Tanner Meeves

Team Members (if any):

Project Title: Does the Temperature Affect the Strength of a Magnet?

Abstract: Question: Does the Temperature Affect the Strength of a Magnet? When magnets are exposed to hot and cold temperatures, will they have more or less magnetic power compared to the same type of magnet at room temperature? Hypothesis: I think that when magnets are colder they lose some strength because when molecules are colder they move slower. I also think that when magnets are hot, they are already energized and can easily attract. Methods: I created a measurement board. Then I placed 4 magnets in a bag with dry ice and 4 magnets in boiling water. I took room temperature magnets and tested their strength, three different times to verify the results. Then I did the same with the cold and hot magnets. I recorded all the results. Results: The tests showed that when magnets are colder, they lose about 25% of their strength. When they are hot, they lose about 8% of their strength. The results showed that the temperature does affect the strength of magnets.

Category: Physical Science - Physics

Student Name: Katie Millett

Team Members (if any):

Project Title: Floating Objects

Abstract: Question: Why do balls hover over a stream of air but people don't? Hypothesis: I believe that a Styrofoam ball will float over a stream of air but a Styrofoam person, because of its shape, will not. Methods: During my research, I found out about the Bernoulli Principle which explains why a ball will float in a stream of air. Then I did my experiment to see if my hypothesis was correct. For my experiment I got a Styrofoam ball and block. I carved a person out of the Styrofoam block weighing the same as the ball. Then I setup a blow dryer to provide a stream of air. Then I put the ball over the stream of air and observed that it hovered in the air. Next, I put the person over the stream of air and observed that it fell out of the stream of air. I decided to try the person in different positions. I tried it standing up, laying down, and upside down. In each case the person tumbled out of the stream of air. Results: My results were that the ball hovered in the air stream while the person fell. The reason was that the round shape of the ball allowed the Bernoulli Principle to take affect while the uneven shape of the person did not allow this to happen.

Category: Physical Science - Physics

Student Name: Jordan Moore

Team Members (if any):

Project Title: Wavy Sounds

Abstract: Which sounds vibrate things and travel the furthest? If I make a deep sound, then it will vibrate causing movement in the air particles. These particles will bump into the particles close to them causing a chain reaction. It will also travel further than a high pitch sound. A) Rice Drum: 1. I chose 2 instruments to create a deep and high pitched sound. 2. With each instrument I created a sound from different distances (2; 4; 6; 8 and 10 inches away). 3. I recorded the vibration results of the rice at each distance. 4. I compared the results. B) Sound Gun: 5. I used the sound gun to make sound pointed towards a thin strip of paper standing up. 6. I made sound from different distances away from the paper strip (2; 4; 6; 8 and 10 inches). 7. I measured the movement/vibration of the paper strip at each distance. Based on my data I can conclude that deep sounds do travel further than high pitch sounds and make objects vibrate more.

Category: Physical Science - Physics

Student Name: Kyle Moss

Team Members (if any): Zack Moss

Project Title: How Could Seat Belts Keep You From Crackin' Up"?"

Abstract: Our science project question was - how does wearing a seatbelt affect the damage to a passenger in a car crash? We predicted that our eggs that were restrained in seatbelts would be safer. To test this we got a board and raised it on one end to make a ramp. A wall was two feet away from the bottom. We had eighteen eggs each numbered in plastic bags. We placed an egg in a small car and timed it down the ramp until it crashed. Then we rated the damage to the egg on a scale of one to five. The first three eggs were done without the car seatbelts, the next three eggs had seatbelts. The ramp was eighteen inches high on one end. The following six eggs were done the same way but with the ramp at thirty inches high.(The ramp was raised to increase the speed.) The results showed that the greater the speed the greater the damage, and the eggs that were restrained suffered less damage. We concluded it would be similar to people with seatbelts in car crashes.

Category: Physical Science - Physics

Student Name: Zack Moss

Team Members (if any): Kyle Moss

Project Title: How Could Seat Belts Keep You From Cracking Up?

Abstract: Our science project question was - How does wearing a seatbelt affect the damage to a passenger in a car crash? We predicted that our eggs that were restrained in seatbelts would be safer. To test this we got a board and raised it on one end to make a ramp. A wall was two feet away from the bottom. We had eighteen eggs each numbered in plastic bags. We placed an egg in a small car and timed it down the ramp until it crashed. Then we rated the damage to the egg on a scale of one to five. The first three eggs were done without the car seatbelts, the next three eggs had seatbelts. The ramp was eighteen inches high on one end. The following six eggs were done the same way but with the ramp at thirty inches high. (The ramp was raised to increase the speed.) The results showed that the greater the speed the greater the damage, and the eggs that were restrained suffered less damage. We concluded it would be similar to people with seatbelts in car crashes.

Category: Physical Science - Physics

Student Name: Kerstin Mueske

Team Members (if any):

Project Title: A Hair Raising Experience

Abstract: The purpose of my project was to see if a balloon's static-electrical charge would change depending on its contents. My hypothesis was that it would not matter because a balloon has a charge and its contents could not escape its wall and change that charge. The materials I used to test this hypothesis were four 12 round balloons a salt water solution vegetable oil helium and carbon dioxide produced from mixing vinegar and baking soda. The controlled variable was the amount of time each balloon was rubbed in hair to create a charge. The experimental variables were the contents of each balloon. Each balloon was charged and placed above the head. How far the hair rose in inches was measured. The results were that the gas-filled balloons had a greater charge than the liquid-filled balloons. Thus my hypothesis was wrong. My research said that a certain position or weight of an object can affect its static-electrical charge. Because the liquid balloons weighed more they produced less charge. This information might be helpful if a person wanted to power an electrical appliance with static electricity. Using a gas to fill a balloon would have a greater charge and be better able to power the appliance.

Category: Physical Science - Physics

Student Name: Thomas O'Reilly

Team Members (if any):

Project Title: Paper Clip Pick Up

Abstract: For my project I asked the question, Does the gauge of wire affect the strength of an electromagnet? My hypothesis was that the thicker the wire, the more room it would have to carry electricity, and the stronger the electromagnet. (I later found out that the correct way to say this is that larger wire has less resistance.) This turned out to be true. I did the same test with four different gauges of wire. With each test, I kept all variables the same, besides the gauge of the wire. I used a fresh battery, the same size nail and the same number of wraps around the nail. In my research, the biggest thing I learned was that scientists do not know exactly how magnets work. Nor do they know why an electrical field around most metals create a magnet. It is a scientific mystery that limited my research significantly. So I was basically just looking for an interesting project that had a scientific purpose. It was an enjoyable experience. I hope to continue with electrical experiments next year as a group project. I hope that my next experiment will be as fun and educational as this experiment was.

Category: Physical Science - Physics

Student Name: Megane Osborne

Team Members (if any):

Project Title: Is there an affordable way to get drinkable water

Abstract: Is there an affordable way to get drinkable water? : granular filters vs distillation? With quality and cost as the 2 main factors for the decision, I believed distillation will prove to be the most effective process at the lowest overall cost. Testing each process 3 times in a row, within the same conditions, with the same materials, measuring before and after each test, I have demonstrated that distillation produces a better quality water. I assumed the number of times a filter could be used vs the one off cost of a distillation kit, and concluded that distillation was the cheapest solution overall. Therefore I was able to confirm the initial hypothesis that distillation is indeed both more effective and cheaper than the granular filter process.

Application: The process is applicable to any area where there is a drinkable water shortage but plenty of salted / raw water. While this is not widely used to help people in places like Africa, it is a good kit to have with you at all time in such areas, or a deserted island!

Category: Physical Science - Physics

Student Name: Trevor Otterson

Team Members (if any): Trevor Otterson, Conner Smith, Chris Gustman

Project Title: Mousetrap Catapult Vs Rubber band Catapult

Abstract: Question: Which would shoot farther- a rubber band catapult or a mousetrapcatapult? Hypothesis: We thought the mousetrap catapult would shoot farthest due to its strong metal spring powerful enough to kill a mouse. We didn't think a rubber band catapult would have much power. Methods: Each of us chose and built a catapult. We tested the catapults to see which could shoot farther by launching marshmallows. We put the catapults beside each other. We loaded them and launched them. We measured the distance where the marshmallow landed and wrote it down. We shot them 2 more times each and wrote down the distance. Trevor's 1st Launch went 37 feet. For his 2nd Launch, he slid the arm down on his catapult to see how it would change the distance. It went 9 feet farther: 46 feet. For the 3rd Launch, he slid it up higher than it was at first. It went 7 feet shorter: 39 feet, the shortest distance. Conner's catapult didn't have any adjustments. Launch #1 was 32 feet. Launch #2 was 43 feet. Launch #3 was 38 feet. Chris' 1st launch went 36 feet. His rubber band broke after launch #1. He added another and twisted it more than the original. On Launch #2, it went 43 feet- 7 feet farther. Launch #3 was 34 feet. Conclusion: Our Hypothesis was wrong! We thought a mousetrap's spring would provide more thrust than a rubber band. Possibly, the weight of the materials (burden) on the mousetrap catapult caused less thrust.

Category: Physical Science - Physics

Student Name: Evan Parry

Team Members (if any):

Project Title: The Effect of Launch Tube Angle on the Range and Accuracy of a Ball Launcher

Abstract: My question was simple. Does the angle of a launch tube affect the range and accuracy of the projectile? I got this question when I realized that guns on a battleship usually point slightly upwards. I wondered if this was to increase range, so I planned an experiment. For a launch tube I used a pneumatic marshmallow gun with a barrel modified to fire a golf ball. In the experiment I fired ten shots at three angles at 60 PSI. I fired at 30, 45, and 60 degrees down a local road. My assistant (My dad) marked where each shot landed. We measured and recorded the distance of each shot. We recorded minimum distance, maximum distance, and distance between nearest and farthest shots. The results surprised me. My hypothesis was that the 45 degree angle shots would go farthest and the 60 degree shots would be most accurate. It turned out that the 30 degree angled shots went farthest and the 45 degree angled shots were most accurate. It turns out that the guns on a battle ship were angled for maximum range, but at their angle, it's most likely that they were not aiming for a specific part of the ship-just the ship in general. If I could do this again, it would be indoors, with a machine firing and pumping the launcher.

Category: Physical Science - Physics

Student Name: Jacob Perry

Team Members (if any):

Project Title: Battle of the Barrels

Abstract: Purpose I have been playing paintball with my dad since I was five years old and have always enjoyed the sport. In September we went to a large tournament in Logan where my dad played a predator (sniper). My dad has several barrels for his guns. I was interested in knowing if the barrel length would make a difference in accuracy. Will a longer barrel be more accurate than a shorter barrel? Hypothesis If a longer barrel is the most accurate, then a shorter barrel will be least accurate because a longer barrel allows the ball to travel on a straight path longer in the barrel thereby improving its trajectory. Conclusion Did the results agree with your hypothesis? Yes they did. The longest barrel was most accurate. And the shortest was hitting all over the target. What did you learn? I learned that a longer barrel is more accurate; however you must turn up the volume of CO₂ fired to compensate for the length of the barrel. This increased volume of CO₂ needed will shorten the time you can play between CO₂ tank refills. I learned that weather can affect the way you play. I discovered that the quality of the paintball is more important to accuracy than the barrel. Why did things happen the way they did? Things happened the way they did because of the longer barrel helped keep the paintball on a straighter path longer which improved the accuracy. The paintball is directly influenced by gravity, wind, altitude, air pressure and other forces of nature. What surprises did you experience? What

surprised me was how wide spread the hits were. The paintball hits were always in a different place even with the longer barrel. Was there anything that you thought would happen, but it didn't? I thought that the barrels hits would always be close to the same spot. How does this experiment connect to world circumstances? Paintball players must learn how important it is to understand the role the length a paintball barrel has on accuracy and what barrel you should use depending on the position you play on the field. Did you gain any new insights? I learned that when you use a longer barrel the feet per second drops dramatically. The quality of the paintball may be more important than the barrel used.

Category: Physical Science - Physics

Student Name: Dalton Peterson

Team Members (if any): Megan Peterson

Project Title: Pendulum's Swing

Abstract: Our project is an experiment on pendulums. We wanted to know what determines how fast a pendulum swings. I wondered if the speed of the swing was caused by how heavy the bob at the end of it was or if it was because of how high you held the bob and if the string length made a difference. Our hypothesis was that if we shorten the string, it will swing faster than if the string was long, no matter how much the bob at the end weighs. To test our hypothesis, we made a stand out of pipe and used nylon string and metal washers. We cut the string into 3 different lengths and used 3 different sized washers. We released each one from a 90 degree angle and counted the number of swings the pendulum made in 30 seconds with each washer/string combination. We had a total of 9 string and washer combinations and 3 counters to make sure the counts were accurate. We repeated the same exercise using a 45 degree angle, testing the hypothesis 18 times total. In the end we learned that it is the length of the string that determines how fast the pendulum swings.

Category: Physical Science - Physics

Student Name: Megan Peterson

Team Members (if any): Dalton Peterson

Project Title: A Pendulum's Swing

Abstract: Our project is an experiment on pendulums. We wanted to know what determines how fast a pendulum swings. I wondered if the speed of the swing was caused by how heavy the bob at the end of it was or if it was because of how high you held the bob and if the string length made a difference. Our hypothesis was that if we shorten the string, it will swing faster than if the string was long, no matter how much the bob at the end weighs. To test our hypothesis, we made a stand out of pipe and used nylon string and metal washers. We cut the string into 3 different lengths and used 3 different sized washers. We released each one from a 90 degree angle and counted the number of swings the pendulum made in 30 seconds with each washer/string combination. We had a total of 9 string and washer combinations and 3 counters to make sure the counts were accurate. We repeated the same exercise using a 45 degree angle, testing the hypothesis 18 times total. In the end we learned that it is the length of the string that determines how fast the pendulum swings.

Category: Physical Science - Physics

Student Name: Haydon Phillips

Team Members (if any):

Project Title: Egg"xactly"

Abstract: This study investigates: Can an egg be pushed into a bottle? If so will it push in a balloon or clay? I chose this project because I thought it would be fun to see if an egg or other objects could be sucked into a bottle like a vacuum sucks dirt. My hypothesis: I think the egg will get pushed into the bottle by the air in the room, but not the clay or or balloon. I tried the different variables(egg, balloon, clay) then I tried the clay flat. It only sucked where the clay was. Conclusion: An egg & water balloon can be pushed into a bottle. There needs to be a tight seal between the egg and the bottle.

Category: Physical Science - Physics

Student Name: Nicholas Price

Team Members (if any):

Project Title: Sugar/Salt Solutions Bend Light

Abstract: When light travels from air into water the path of the light bends. For instance, when you have a straw in a glass of water, the straw seems to bend as it enters the water. The amount that a substance bends light is called the refractive index. I decided to test whether I could use a laser pointer to compare sugar or salt content of a liquid. I laid a laser pointer on the kitchen counter, pointing at the wall, perpendicular to it. I taped some paper to the wall and marked where the laser hit the paper. I then placed an empty triangular cuvette in front of the laser. With nothing in the cuvette the laser beam didn't bend at all. When I put water in the cuvette, the dot on the wall shifted to one side. This showed that the water bent the laser beam. Next, I wanted to know whether sugar or salt solutions affected the amount of bending. We made salt and sugar solutions of different percentages. We used 5, 10, 15, and 20% solutions of salt and measured how far the spot on the paper moved compared to an empty cuvette. We repeated that with sugar solutions. We also measured other water based liquids: soy sauce, ginger ale, sprite, diet coke, maple syrup, and corn syrup. Each one bent the light farther than water. I found that I could use the amount of bending to estimate the salt or sugar content of a liquid.

Category: Physical Science - Physics

Student Name: Bowen Reville

Team Members (if any):

Project Title: The Science of The Shot""

Abstract: The topic I have researched is the basketball shot and how to become the most accurate shooter. My question was which is more accurate; a basketball shot released from the chest forehead or over-head? After studying the fundamentals of basketball in some books I decided to test my hypothesis on some professional basketball players. I used three different Utah Flash players for my research and had them each shoot thirty shots. I had them each shoot ten from the chest ten from the forehead and ten from over-head. I used these results to determine which shot is the most accurate. In the end the most accurate shot was the over-head shot because it is easier to get the correct amount of velocity and the right arch to get it in the basket.

Category: Physical Science - Physics

Student Name: Danielle Riss

Team Members (if any):

Project Title: Awesome Ooze

Abstract: There are many types of fluids in the world that are used for various purposes. One way to classify a fluid is whether it is a Newtonian fluid or a non-Newtonian fluid. A fluid whose viscosity changes when the gradient in flow speed changes is a non-Newtonian fluid. Water for example is a Newtonian fluid whose viscosity doesn't change when a shearing force is applied but a non-Newtonian fluid's viscosity does. In real life that means that a non-Newtonian fluid whose viscosity changes when a shearing force is applied could potentially be used to protect things. The purpose of my project was to see if a non-Newtonian fluid could be used to protect a fragile object, like an egg, when the fragile object encountered a strong force. My hypothesis is that I can use a non-Newtonian fluid like a mixture of corn starch and water to protect a fragile object like an egg from breaking when dropped from a height of 10 -20 feet by changing it's viscosity and distributing the force of impact. I will test 3 different fluid's,- water, ketchup, and a mixture of corn starch and water, (awesome ooze) and observe their ability to protect a fragile object like an egg from breaking when it decelerates rapidly,- like when it hits the ground. I want to apply extreme acceleration by dropping the egg from varying heights of 10 - 20 feet and then ultimate deceleration when the egg hits the ground but have the egg survive. The egg I dropped in the bag full of water exploded. The egg in the bag of Ketchup broke too.

But the awesome ooze was amazing. It did an amazing job of protecting the egg. When I dropped the bag full of ooze with the egg in it from 10 feet the egg was not harmed at all. Even when I dropped the egg from 20 feet the ooze still protected it from breaking. I wanted to drop it from 30 feet but my ladder wasn't tall enough, and I'm kind of afraid of heights!

Category: Physical Science - Physics

Student Name: Drake Roskelley

Team Members (if any):

Project Title: Which Propeller Design Will Produce the Most Current (Amps)

Abstract: The purpose of the experiment is to discover which propeller design will produce the most current(Amps). My hypothesis stated that the propeller with 3 blades at 45 degrees would produce the most current. Nine propellers were tested (2,3 and 4 blades and 30,45 and 60 degree blade angles) and current was recorded. The 3 blade 30 degree propeller design design produced the most current (39.9 milliamp average for trials#1-3).

Category: Physical Science - Physics

Student Name: Lauren Routh

Team Members (if any):

Project Title: An Evaporation Experiment: Now You See It, Now You Don't!

Abstract: My question was, If I increase the air flow speed over a liquid, will it evaporate faster? My hypothesis says, If I place a liquid in a pan, and double the air flow over it then it will evaporate twice as fast. My procedure was to fill a pan with rubbing alcohol and mark the level with a marker. I also measured the mass and volume of the liquid. I put the pan in my wind tunnel, which basically was a big box with a fan on one end. I also will also record the air and liquid temperatures. After 60 minutes, I took out the pan and made my final measurements. I repeated this procedure three times for three wind speeds, at a low wind speed (1 m/s), a high wind speed (2 m/s), and at no wind speed at all (0 m/s). In my results, the tests with the no wind speed did not show much evaporation but the test with high wind speed evaporated 7 times faster compared to the no wind speed tests. When compared to the average evaporation rate of the low wind speed tests, the high wind speed tests did not evaporate 2 times as fast, but they did evaporate 1.43 times as fast, so my hypothesis was partly correct.

Category: Physical Science - Physics

Student Name: Elizabeth Sam

Team Members (if any):

Project Title: Sled Velocity

Abstract: My experiment is on sled velocity. The reason I chose this is because I love sledding. I wondered why and which type of sled would go the fastest on different types of snow. First I did some research, and I learned about gravity and friction and how friction slows things down. I also learned that the greater the surface area the less pressure it creates. A sled with a greater surface area would go faster because it creates less pressure as it goes down the hill. With that, I thought that the tube would go the fastest because it looked like it had a greater surface area than the other three sleds, and it had a very smooth surface. I measured four different types of sleds and calculated their surface areas. Then, I timed my friend sledding down an icy hill, ten times on each type of sled. I wrote down my results and averaged the sled times. I repeated this process on slushy snow and on dry, fresh powder. My controlled variables were the distance timed, the slope of the hill and the weight of person sledding. The variables were the type of sled and type of snow. The tube was the fastest on all three types of snow. My hypothesis was correct! I realized that if I only tested each sled once, my results might not have been as accurate. It would have been even better if I tested each sled an hundred times.

Category: Physical Science - Physics

Student Name: Holly Schellenberg

Team Members (if any):

Project Title: Does Your Candy Dissolve Too Fast?--A Different Shape Might Make It Last!

Abstract: The title of my science fair project is: Does Your Candy Dissolve too Fast? A Different Shape Might Make it Last!" My question was: Does the shape of a hard candy affect how fast the candy will dissolve or how long it will last? Hypothesis was: if I make hard candies so that they are all the same size but just different shapes (sphere flat rectangle and cube) then the flat rectangles will dissolve the fastest because they are very skinny and more of their surface touches the water. I followed these steps: First I boiled the candy on the stove. Then I weighed equal amounts of candy syrup and made three spheres three flat rectangles and three cubes. After the candies were hard I measured each one to get surface areas. Then I equally filled nine bowls with water. The water was all the same temperature. I put each candy in its own bowl and timed the candies' dissolving. I went online with my dad and found the equation for finding surface areas of spheres. Then my dad and I figured out the surface areas for the spheres cubes and flat rectangles. My conclusion was that the flat rectangles dissolved the fastest because they had the most surface area; therefore more of the candy was touching the water. The spheres lasted the longest because they had less surface area and not as much of the candy was touching the water.

Category: Physical Science - Physics

Student Name: Levi Smith

Team Members (if any):

Project Title: Fog and Light

Abstract: What is fog? How do you measure light? What color shines best through fog? And, how would you use this knowledge in the real world? These are some questions I am going to answer for you. Through my research I learned that fog is a cloud that is close to the ground or water. Condensation causes fog. Fog is a dense cloud of water droplets. I also learned that you can measure light in several different ways. Lux, Footcandle, and Lumen are some ways to measure light. Lux and Footcandle measure the amount of light that falls on a surface. Lumen measures the total amount of light from a light source. For my experiment I wanted to find out what color light shines best through fog. My hypothesis was that if I shine light through fog, then the yellow light would shine through the brightest, because yellow light is used for car's fog lights and lighthouse lights. For my experiment, I created the fog using a fog machine. I put different colored cellophane over the lens of a flashlight and positioned it to shine through the fog. I put a light meter in front of the fog machine and flash light. Then I put a box over the experiment to block the outside light. The color that shines through fog the best is clear light. Second is light blue. Third is yellow. Fourth is purple. Fifth is red. Sixth is green. In doing this experiment, I have learned what fog is, how to measure light, and what color shines best through fog. I came to

the conclusion that it would be best for cars' fog lights, and lighthouse lights to use clear lights because clear light shines best through fog.

Category: Physical Science - Physics

Student Name: Conner Smith

Team Members (if any): Conner Smith, Trevor Otterson, Chris Gustman

Project Title: Mousetrap Vs Rubber band Catapult

Abstract: Question: Which would shoot farther? A rubber band catapult or a mousetrap catapult?

Hypothesis: We thought the mousetrap catapult would shoot farthest due to its strong metal spring powerful enough to kill a mouse. We didn't think a rubber band catapult would have much power. Methods: Each of us chose and built a catapult. We tested the catapults to see which could shoot farther by launching marshmallows. We put the catapults beside each other. We loaded them and launched them. We measured the distance where the marshmallow landed and wrote it down. We shot them 2 more times each and wrote down the distance. Trevor's 1st Launch went 37 feet. For his 2nd Launch, he slid the arm down on his catapult to see how it would change the distance. It went 9 feet farther: 46 feet. For the 3rd Launch, he slid it up higher than it was at first. It went 7 feet shorter: 39 feet, the shortest distance. Conner's catapult didn't have any adjustments. Launch#1 was 32 feet. Launch#2 was 43 feet. Launch #3 was 38 feet. Chris' 1st launch went 36 feet. His rubber band broke after launch #1. He added another and twisted it more than the original. On Launch #2, it went 43 feet- 7 feet farther. Launch #3 was 34 feet. Conclusion: Our Hypothesis was wrong! We thought a mousetrap's spring would provide more thrust than a rubber band. Possibly, the weight of the materials (burden) on the mousetrap catapult caused less thrust.

Category: Physical Science - Physics

Student Name: Olivia Snow

Team Members (if any):

Project Title: Heat Conduction of Metal and Plastic - Can this Information Cut Home Energy Bills?

Abstract: The purpose of this experiment is to test how heat is conducted through metal and plastic, and to determine if this information is helpful in reducing home energy bills. For my experiment I will test three types of metal tubing: copper, stainless steel, and aluminum; as well as one type of plastic tubing: polyethylene. Copper and polyethylene tubing were selected because they are common materials used in home plumbing. Based on stainless steel and copper being the heaviest material, my hypothesis was that these two materials would be the best conductors of heat. To test my hypothesis, I cut copper, stainless steel, aluminum, and plastic tubing into pieces 30 cm in length and placed them in a cooking pot with boiling water and measured the amount of heat conduction during a 3 minute period using a digital temperature probe. I tested each sample 3 times making sure the water temperature was always boiling and the temperature probe was always 20 cm away from end of the tubing that was inserted into the water bath. At the conclusion of my experiment I determined that copper was the most effective conductor of heat, followed by aluminum, and then stainless steel. Plastic or polyethylene was the least effective at transferring heat by conduction. I also determined from my experiment that using plastic tubing instead of copper tubing in home construction would conserve energy by reducing heat loss in hot water plumbing.

Category: Physical Science - Physics

Student Name: Jenna Stephens

Team Members (if any): Mia Quintero

Project Title: What's Crackin'?

Abstract: Crack! Have you ever dropped a weight onto your tile floor only to have it fracture? Well, after learning about this science experiment you won't have that problem again. This project will show you the best materials for your environment. For this science experiment, my partner and I compared different materials (Styrofoam, mirror, ceramic tiles, thick and thin vinyl tiles) at 68°F and the 0°F. By dropping a 2-pound weight onto each item, we tested its fracture characteristics. Before we started the breaking of the materials, however, we made up our question and hypothesis. Our question was, Which of the five different materials will break the easiest at different temperatures? Since we both looked at the question differently, we had different hypotheses. My hypothesis was, The material will break into the most pieces in this order: warm Styrofoam, cold mirror, cold Styrofoam, warm mirror, warm ceramic tile, cold thick vinyl tile, cold ceramic tile, warm thick vinyl tile, warm thin vinyl tile, and lastly, cold thin vinyl tile. Although my hypothesis was somewhat correct, the five different materials really broke in the following order: warm mirror, cold mirror, cold thick vinyl tile, cold ceramic tile, warm ceramic tile, and warm thick vinyl tile. The warm Styrofoam, cold Styrofoam, warm thin vinyl tile, and cold thin vinyl tile did not break. After learning about my science project, I hope you know what kinds of materials are best to use in your home!

Category: Physical Science - Physics

Student Name: Wyatt Streich

Team Members (if any):

Project Title: The Effects of sound through solid Materials

Abstract: My name is Wyatt Streich, my 6th grade science fair project is on The Effects of Sound through Solid Materials. I did my first test with a decibel reader to read different noise levels at my local school, busy street and then right next to a weed blower. After my first test reading, I decided to do the experiment at my mom's work. I wanted to do several different kinds of test with different sound objects and to see how loud they might be heard through different types of walls. I wanted to know what sound would make the biggest and smallest noise through a solid material wall. I used several sound objects: a whistle, a guitar with an amplifier, hand clapping, normal talking, and banging a pot with a wooden spoon. I decided to do the experiment through different solid materials which included, a solid wall, a window, a blanket wall, a foam wall, and a paper wall. Each room was measured with the decibel reading of each sound object being played, while an assistant stood on the other side of the wall measuring the sound as it was being played through the wall. I was surprised by the sound of normal talking, because it didn't get the lowest on the decibel readings. The final results of the loudest noise was that of the pot and the wooden spoon which had the highest decibel reading which was heard through all the solid materials walls.

Category: Physical Science - Physics

Student Name: Celeborn Stringham

Team Members (if any):

Project Title: Electric Fruit

Abstract: My question was: Which fruit or vegetable best conducts electricity? My hypothesis was: "If the produce is high in acid then it will be a good conductor." The materials I needed were: lemon orange celery broccoli tomato lamp nails and power outlet. 1.I stripped the cord.2.I connected the nails.3.I put them into the broccoli.4.I plugged it in.5.I recorded the results.6.I unplugged it.7.I took the nails out washed them and put them in the lemon.8.I did this until all the produce was tested on. I collected the data and rated the produce's lightbulb brightness on a scale from 1 to 10.My hypothesis was correct.

Category: Physical Science - Physics

Student Name: Jane Taylor

Team Members (if any):

Project Title: Musical Pitch

Abstract: I love music, I sing I dance and I play the harp. Part of my musical practice is learning to read hear and recognize notes on a musical scale. This year I decided to combine my science fair experiment with something I love, music. I decided to ask the question: does playing an instrument affect a person's musical pitch. First I would ask students to sing a C on a musical scale. I used an instrument tuner to record the note they sang. I would ask if they played an instrument and how long they have played. My hypothesis states that if a person plays a musical instrument then they will have a better sense of pitch. Through the collection of data and questioning students I found that only 50% of those who play a musical instrument could sing close to a C on the musical scale. Less than 25% of those who do not play a musical instrument could sing close to C. Although 50% is not a strong result, I thought there would be more students who could sing closer to C, it is better than those who don't play a musical instrument. Therefore my hypothesis is correct, weak, but correct. In conclusion I have learned that if you play an instrument it can affect your musical pitch.

Category: Physical Science - Physics

Student Name: Jessica Tedrow

Team Members (if any):

Project Title: The Effect of Color on the Heat Retention of Water

Abstract: My science fair project consisted of choosing a project, conducting an experiment, and coming to a conclusion. I decided to test the effect that color has on the heat retention of water. The first question that I had was, "Which color will retain the most heat after a ten minute period?" My hypothesis is that the measuring glass with the black construction paper wrapped around it will retain the most heat. To conduct my experiment I wrapped five of the six measuring glasses with different colored pieces of construction paper. Then I brought water to a boiling point {212 degrees [D] Fahrenheit [F]} and poured an equal amount of boiling water into the measuring glasses. Then I wrote down the times when the water reached specific temperatures. All of the measuring glasses temperatures started at the boiling point. The glass wrapped in yellow construction paper dropped to 140 DF. The blue dropped to 148 DF. The purple finished at 140 DF. The red dropped to 152 DF. The glass that I just left clear dropped to 136 DF. Lastly the glass wrapped in black finished at 156 DF. As you can see my hypothesis was correct

Category: Physical Science - Physics

Student Name: Sienna Wagstaff

Team Members (if any):

Project Title: The Soldier Hollow Experiment

Abstract: The question that I started out with was, Why does my dad always beat me down Soldier Hollow tubing hill? My hypothesis is: I think that he always beats me down because he weighs more than me. So we went down to Soldier Hollow tubing hill and asked if we could have a lane to use for people to go down for my project. They also let us use their radar gun to get the speed. Our materials are: a tubing hill (Soldier Hollow) tubes people of different weight and a radar gun. The procedure we used was that we went up two different days. We went up one warm day and one cold night. We measured 60 participants each day including weight and speed. The controls of the project were: No running start No dragging of feet/arms Participants stated their weight (not measured) the speed was measured by the same radar gun and the temperature was measured during the experiment. We put the information on a graph with a trend line. Our results were that on a cold day usually the more you weigh the faster you go but on a warm day the information is more scattered. I got different results because when the weather is warmer there is a stronger resistive force which in this case is friction. My conclusion is that in slushy conditions if you weigh more it doesn't help you very much. In icy conditions usually the more you weigh the faster you go.

Category: Physical Science - Physics

Student Name: Stewart Wells

Team Members (if any):

Project Title: Overcoming Tension

Abstract: My project asks, does the surface area affect the surface tension? To test whether or not it does I made a scale with a piece of wire on one end and a cup for weight on the other. I used water for the weight. The water dropper I used took 20 drops to equal 1 ml and 1 ml is equal to 1 gram. I used the scale to test the amount of surface tension there is on 4 different surface areas. To do this rest the wire hanging from the scale on the surface of the water. Add weight to the cup on the end of the scale until the wire pulls free from the surface. Count the number of drops it takes to pull the wire free and record the number. Use the number of drops required to find the weight required to pull the needle free. To find the surface tension multiply the weight it took to pull the needle out of the water by 9.83×10^{-3} . Do this to take away what gravity does. Use this number for F in the equation $F = 2sd$. (F= force in newtons, s=surface tension per unit length, d=length of the wire in meters and 2 because of the 2 surfaces of the water.) The data I had proved my hypothesis wrong and proved that surface area does affect surface tension. It also told me the bigger the surface area the more surface tension something has.

Category: Physical Science - Physics

Student Name: Griffin West

Team Members (if any):

Project Title: Does the temperature of a ball affect its bounce?

Abstract: I decided to study how temperature affects a ball's bounce. I hypothesized that the colder the ball was, the higher it would bounce. I used 5 different balls for this experiment. I tested the height of their bounce at room temperature, a cold temperature, and a hot temperature. I used a freezer and an oven to help me change the temperature of the ball. I found that the temperature of a ball does affect its bounce. Most of the time, the warmer the ball, the higher the bounce, and the colder the ball, the lower the bounce.

Category: Physical Science - Physics

Student Name: Isaac Wheeler

Team Members (if any):

Project Title: Mervan How much will it improve the mileage?

Abstract: My project is called Mervan- How much will it improve the mileage? I wanted to find out how much it will improve the gas mileage, or mpg, if I were to strap a large tail onto our van. My question is, How much will it improve the gas mileage if we add a large tail to our van? The hypothesis I had was that the tail would improve the mileage by a few mpg, and that the highest speeds would not get as good mileage as more medium speeds. The way we tested how much it would improve it is we went to a remote, long road and selected a certain 3-mile stretch and drove down it. Our van has a small computer that can calculate average mpg since the last time it was reset. We used mile markers to know the stretch of road. We tested speeds 75, 65, 55, 35, and 15 mph. We drove past the mile marker one way and turned around. We got to the right speed, then set it to cruise control. As we passed the marker, we reset the computer. When we got to the other marker, we wrote down the average mileage for that test. We first did all the speeds with the tail/streamlining, then all the speeds without. My results, when averaged and graphed, have the no streamlining tests just below the with streamlining tests and both have a peak at around 40 mph.

Category: Physical Science - Physics

Student Name: Megan Whitefield

Team Members (if any):

Project Title: Fun with Electromagnets

Abstract: The purpose of my project was to find out which would increase the power of the electromagnet more: adding additional loops of wire around the bolt or increasing the strength of the battery powering the magnet? In order to test the hypothesis I gathered the following materials: a 1.5 volt battery, a 6 volt battery, a 12 volt battery, wire, a bolt, and paperclips. The battery power was tested by looping the wire 50 times around the bolt, connecting the wire to the battery, and testing the strength of the battery by picking up as many paper clips as possible. The results were recorded and the process was repeated two more times for a total of three tries for each battery. I then increased the number of loops around the bolt to 100 then 135 and tested the strength of the magnet three times once more for each battery. The results showed the power of the magnet increases dramatically by increasing the number of loops around the bolt. The data also showed that the strength of the magnet either remained unchanged or increased only slightly by increasing the power of the battery. This supported my hypothesis that increasing the number of loops has the greatest impact on the strength of the magnet.

Category: Physical Science - Physics

Student Name: Nathan Young

Team Members (if any):

Project Title: Bombs Away! The Launching of a Catapult

Abstract: Launching things is a fascination for many people. A Roman onager catapult is a traditional catapult that works by twisting ropes around the launching arm (a torsion spring), pulling the arm back, and releasing it to launch a projectile. **Question:** Which number of turns on the torsion spring, what angle of the throwing arm, and what weight of projectile will get a catapult to throw its projectile the farthest? **Hypothesis:** The tightest torsion spring (most turns of the rope), the widest angle, and the heaviest projectile will result in the furthest throw distance of the catapult. **Methods:** The hypothesis was tested by launching a projectile from a small wooden onager catapult. The torsion rope twists were varied and the throw distance was measured. A second test was done launching the same projectile with a constant torsion spring and varied launch angle. A final test was performed with a constant torsion spring, a constant launch angle, and projectiles of various weights. **Results:** The tightest torsion spring and widest launch angle did provide the farthest distance the projectile was thrown. However, it was the lightest, and not the heaviest projectile that went the farthest. Part of my hypothesis was proven incorrect.