

**Category:** Physics

**Table Number:** H1102

**Student Name:** Jeffrey Hutchings

**Team Members (if any):**

**Project Title:** Stirling Engine

**Abstract:** Stirling Engine Jeffrey Hutchings Riverton High School, Riverton, Utah The purpose of this project was to determine if a beta-type stirling engine would run the same with the hot and cold sides switched as if they were kept on the original sides. I became interested in stirling engines when my physics teacher showed my class some examples and I had a few questions about them, of which this is one. The question will help me determine if it would be necessary to add a reverse gear in a car fitted with this type of engine. To test whether a stirling engine would run with switched hot and cold sides I used a professionally made stirling engine owned by Riverton High Schools physics teacher, Mr. Justis. I tested the engine with normal hot and cold sides, and then switched the sides. The stirling engine did run backwards, but much slower. I believe that if the connecting point of on of the pistons were moved 180 degrees it would run just as fast. To make this work in a car it would be more plausible to put a reverse gear in, rather than need to switch the connecting points of the pistons.

**Category:** Physics

**Table Number:** H1103

**Student Name:** Alyssa Skousen

**Team Members (if any):**

**Project Title:** Musical Wine Glass

**Abstract:** The experiment Musical Wine Glass compared the musical note output from a crystal wine glass filled with three different liquids. Traditionally, a crystal wine glass when filled with water and rubbed around the rim with a wetted finger produces a frequency or note. This frequency is the result of the crystals in the wine glass vibrating, creating the sound we hear. I took this idea to the next level and decided to use different types of liquids and volume amounts to see how the frequency would change. It was hypothesized that the thicker the liquid used, the higher the pitch would be. Because of their thicker properties and non-toxicity, corn oil and corn syrup were used as variables and compared to the results of the water. Each note was tested using a chromatic tuner and the results were logged. After conducting the experiment, it was discovered that the thicker the liquid, the higher the pitch. The corn syrup, being the thickest, produced the higher pitch. This happens because it is harder for the crystals in the glass to vibrate, thus, slowing down the vibration rate, or frequency.

**Category:** Physics

**Table Number:** H1105

**Student Name:** Michelle Wasserbaech

**Team Members (if any):**

**Project Title:** Polarization of Light

**Abstract:** Question: At what angle of reflection is a beam of light polarized the most? Procedure: set up laser, reflecting mediums (glass, water, diamond, mirror), polarizing filter and photometer so it is possible to change the angle of incidence with the reflective material remaining level measure angle of incidence and amount of light reflected from the surface with polarizer axis vertical and horizontal (repeat measurements) move laser and photometer to change the angle of incidence try many angles between 0 and 90 degrees

calculate degree of polarization (difference of intensities from two orientations of polarizer filter divided by sum of intensities find angle of maximum polarization for different reflective mediums & compare measurements with Brewsters angle; calculate Brewsters angle using indices of refraction (found online)

Results: The light reflected off the water, glass, and diamond became almost 100% polarized. My measurement of the angle of highest polarization was very close to the calculated Brewster angle. However, the mirror did not appear to strongly polarize the reflected light.

**Category:** Physics

**Table Number:** H1106

**Student Name:** Michelle Russell

**Team Members (if any):**

**Project Title:** Relationship between size of lense and depth of field

**Abstract:** My question was how does the size of the camera lenses affect the depth of field. I predicted that there wouldn't be a large change in the data, and that there wouldn't be any change in the data. I then set up a subject for the photo, and put paper markers progressively one foot away. I then took pictures with four different lenses. After I took the pictures I looked at them on the computer and determined how many of the paper markers had good clarity and were in detailed focus. I then graphed the data and found that the 70-300mm lens (the largest) had much better clarity in the depth of field. My conclusion was that the larger the lens the greater the clarity of the depth of field.

**Category:** Physics

**Table Number:** H1108

**Student Name:** Benjamin Smith

**Team Members (if any):**

**Project Title:** Antenna Radiation Patterns

**Abstract:** Measuring the patterns in which radio antennas radiate electromagnetic radiation. Predicted some antennas tested would be omnidirectional, or radiating equally in all directions, while others will not be. Recorded signal strength of signal from another radio, rotated antenna 360 degrees in a circle and plotted the measurements on a polar graph.

**Category:** Physics

**Table Number:** H1110

**Student Name:** Bryce Heer

**Team Members (if any):**

**Project Title:** Leyden Jars

**Abstract:** I was testing to see if there was a certain amount of charge a Leyden jar could hold. My hypothesis was that from my research there seemed to be no certain stopping point so I thought there was no amount that it would stop getting charged. My procedure was to charge by rubbing PVC and a wolf fur glove for 5 sec. then 15 sec. and finally 30 sec. and charge the jar for each time period for 1 5 and 10 charge cycles. My results were that as far as I had tested there was no stopping point for the amount of charge a Leyden jar could hold

**Category:** Physics

**Table Number:** H1112

**Student Name:** Seth Mason

**Team Members (if any):**

**Project Title:** Do You c What I c'?

**Abstract:** Question: Can I prove the speed of light is faster than previous calculations, by including the known velocities of the Earth, Sun, Milky Way Galaxy, Local Group, and Virgo Supercluster? Hypothesis: I believe the speed of light is about 700 km/sec faster than currently determined. Methods & Results: I found the velocities of various celestial objects in relation to the Great Attractor. Then I calculated both the least and the greatest possible velocity vectors. I calculated these vectors into the speed of light.

**Category:** Physics

**Table Number:** H1113

**Student Name:** Sean Klindt

**Team Members (if any):**

**Project Title:** Exposure Time Vs. Photon Count

**Abstract:** The question for this project stated, How does the length of an exposure, affect the noise of that exposure? The procedure for this project was quite meticulous and painstaking. A straightforward, plain and simple procedure that was followed is described below. All needed materials were obtained. A digital SLR camera was set up in a dark room. For fifteen different second amounts, each being tested five times, the camera shutter (no lens was attached, body cap was on) was held open for the certain length of time. The exposures were then put onto a computer to be edited and analyzed. The software program that was used to change the exposures into the correct format is called GIMP (GNU Image Manipulation Program). All seventy-five of the exposures were changed from JPEG to the fits format (Flexible Image Transport System). This was the format they needed to be in to be dealt with in the next software program that was to be used. The second software program is called IRAF (Image Reduction and Analysis Facility). This program took each set of five exposures and combined them into one. So now there were only fifteen exposures to deal with instead of seventy-five. These then went through an intense process to reduce the images to the dark current that was in each of the exposures. The project showed that as the length of an exposure increases, the dark current, or photon count in that exposure will increase as well. The stated hypothesis was correct.

**Category:** Physics

**Table Number:** H1115

**Student Name:** Robert Hansen

**Team Members (if any):**

**Project Title:** Gyroscopes: Forces in Motion

**Abstract:** My problem statement is: How does the rotational speed of a gyroscope (Rotations per Minute, independent) affect the force needed to pull the gyroscope out of its plane of motion (Newtons, dependent)? I hypothesized that the rotational speed of a gyroscope would not affect the displacing force. In my research, I found that a gyroscope could be suspended by one end of the rotating axis, when the axis is parallel to the ground. Because of this, I was able to suspend the rotating gyroscope with a string attached to one end of the axis and pull down with a constant force on the other end of the axis. I measured the displacing force using a force probe, and recorded the results. I conducted forty-five total trials, with 15 different trials each in three different rotating speed sets: slow, medium, and fast. I then created a scatter plot of the data using LoggerPro software. The results were that the rotational speed did affect the displacing force, disproving my null hypothesis. The rotational speed has a linear relationship with the displacing force, with the force increasing approximately one Newton for every four rotations per minute the speed increases.

**Category:** Physics

**Table Number:** H1117

**Student Name:** Brayden Skousen

**Team Members (if any):**

**Project Title:** Harmonic Resonance on Open Strings of the Piano

**Abstract:** My question was which notes on the piano make an open string vibrate the best (longest). To test this I would hold down a specific key on the piano (in the first test it was C2) just enough so the damper leaves the string and it can vibrate, but not enough that the hammer hits the string and makes it vibrate. This was my open string. Then for each test note, I would strike the test note and quickly release it, timing how long it made the open string vibrate. I would do three trials for each test note, with the test notes spanning an octave above the open string (in the first test it was from C3-C4). I found that test notes that are harmonics of the open string make the open string vibrate best and non-harmonics don't make it vibrate well, which agreed with my hypothesis.

**Category:** Physics

**Table Number:** H1119

**Student Name:** Andrew Olsen

**Team Members (if any):**

**Project Title:** How Many Btu are in Different Kinds of Nuts

**Abstract:** I built a calorimeter using a large metal can, a BBQ skewer and a smaller can and burnt different kinds of nuts in it, measuring the increase of temperature of water in a can above the flame. By measuring the increase of temperature I was able to determine the amount of energy in the nuts measured in Btu.

**Category:** Physics

**Table Number:** H1120

**Student Name:** Abby Thorne

**Team Members (if any):**

**Project Title:** Arch vs. Lift

**Abstract:** In this project it was questioned whether the arched shape of a wing would affect its lift. This question is based on the Bernoulli principle, which shows that the arched wing causes the air that goes over the top part of the wing travels farther and faster, creating less air pressure on the wing surface causing it to be sucked up. It was hypothesized that the wing with the highest amount of arch would create the greatest amount of lift versus a smaller wing. This was tested by shaping different sizes of arched wings from styrofoam. These wings were threaded through fishing line that was hung from a header of an unfinished room and pulled taught to the floor by weights. An air blower was set on a box and blown towards the wing; it was then measured how high the wing lifted. Part of the hypothesis was correct in that the smallest wing would have less lift. However, the wing with the highest amount of arch did not have the greatest amount of lift; the second smallest wing did. It is believed that the largest wing did not do as well as expected because of the added weight factor, and the drag factor in which the air was unable to split and go around the wing due to its great height. This shows that too much arch on a wing can be detrimental to its lift.

**Category:** Physics

**Table Number:** H1122

**Student Name:** Gensen Bowden

**Team Members (if any):**

**Project Title:** Conducting Sound

**Abstract:** Question: How does the volume of different sounds differ through solids, liquids, and gasses?

Hypothesis: It is hypothesized that a sound will be loudest when traveling through a solid material. Materials: Balloons, decibel meter, speaker, electric piano, water, salt, balloon pump, vegetable oil, rice, helium, air from lungs, and flour. Procedure: 1) Fill each balloon with a different material, 2) Place the speaker at one end of the balloon. 3) Set the decibel meter to measure for 10 seconds. 4) Place the meter at the other side of the balloon. 5) Hold down the piano key and start the meter. 6) Hold down the key for the entire 10 seconds. 7) Record the maximum level of sound measured. 8) Repeat for each balloon six times for the three different notes. Data Analysis: To look at the data, first I put all of the information into tables organized by the pitch of the sound, then by the state of the material in the balloon. I also took the averages of the numbers for each state and sound, and put those numbers into a table. I then put all of the information into graphs, one graph for each table. From the graphs, I could look at the information and decide which states did the best in each pitch. Data Results: I found that the solid materials conducted the sound the best for all of the pitches. The averages for the solids were 104.44 dB, 101.11 dB, and 100.55 dB.

**Category:** Physics

**Table Number:** H1124

**Student Name:** Erin Hansen

**Team Members (if any):**

**Project Title:** Timbre: The Shape of Sound

**Abstract:** Problem: How does amplitude of a sound wave, measured on an arbitrary scale of sound pressure, affect timbre, the shape of the wave? Null Hypothesis: It is hypothesized that amplitude has no effect on timbre. Alternate Hypothesis: It is hypothesized that a greater amplitude will result in a greater difference in timbre. Problem: How does amplitude of a sound wave, measured on an arbitrary scale of sound pressure, affect timbre, the shape of the wave? Method: Measure the sound pressure and graph against time. Do this for 5 pitches of Cs on a keyboard at 3 different volumes with 5 trials each. This is a total of 75 graphs. Average the 5 trials for each variable on a graph of averaged data. This is a total of 15 averaged graphs. Graph each averaged curve for a data point on a graph, so that each pitch has a graph showing three curves for the three volumes represented on the same scale. Compare the shape of the averaged waves at different volumes for each pitch. Results: The lowest and highest volumes had inaccurate results due to the nature of the timbre of the wave. The other volumes data supported the alternate hypothesis that a greater amplitude has greater effect on the change in timbre

**Category:** Physics

**Table Number:** H1126

**Student Name:** Ben Strong

**Team Members (if any):**

**Project Title:** Surface Tension with Solution v. Temperature

**Abstract:** This project is designed to find out what solution (sugar, salt or soap water), and at what temperature will achieve the best surface tension. It was predicted that sugar water at room temperature would be the solution with the greatest surface tension. It was found that sugar was in fact the best solution but 25 degrees Celsius was the best temperature.

**Category:** Physics

**Table Number:** HT1101

**Student Name:** Joshua Furnell

**Team Members (if any):** Tyler Milden

**Project Title:** Electromagnetic Coil Guns

**Abstract:** We wondered how the gauge of wire and the number of BBs shot would affect the distance an electromagnetic coil gun could shoot a BB. We built three coil guns according to instructions on JeffHove.com. Each gun utilized a different gauge of wire. We also varied the number of BBs we used. Our results showed that the thinner gauge wire shot further, contrary to our hypothesis. The hypothesis about fewer BBs being shot would cause the BBs to go further was correct. However, the thinner gauge wire is more prone to soldering itself to the circuit board.

**Category:** Physics

**Table Number:** HT1101

**Student Name:** Tyler Mildon

**Team Members (if any):** Joshua Furnell

**Project Title:** Electromagnetic Coil Gun

**Abstract:** We wondered how the gauge of wire and the number of BBs shot would affect the distance an electromagnetic coil gun could shoot a BB. We built three coil guns according to instructions on JeffHove.com. Each gun utilized a different gauge of wire. We also varied the number of BBs we used. Our results showed that the thinner gauge wire shot further, contrary to our hypothesis. The hypothesis about fewer BBs being shot would cause the BBs to go further was correct. However, the thinner gauge wire is more prone to soldering itself to the circuit board.

**Category:** Physics

**Table Number:** HT1104

**Student Name:** Andrew Shaw

**Team Members (if any):** Catherine Westberg

**Project Title:** got Frisbee?

**Abstract:** My partner, Catherine Westberg, is submitting our Abstract. Please refer to her registration in order to view our Abstract.

**Category:** Physics

**Table Number:** HT1104

**Student Name:** Catherine Westberg

**Team Members (if any):** Andrew Shaw

**Project Title:** got frisbee?

**Abstract:** We planned to make a frisbee launcher with controllable amounts of spin and force to use in testing our problem of: Which factor - spin or force - will cause the frisbee to travel a greater distance when invreased? Using a computer fan and a variable voltage supply unit for spin, and an air compressor for force, we ran the experiment, launching the same frisbee at variable combinations of spin and force. When the spin was constant and the force was increased, there was an average difference of 2.6742 meters, but when the force was constant and the spin was increased, there was an average difference of 0.4308 meters. These results support the conclusion that the amount of force on the frisbee has a greater impact on the distance it travels than the amount of spin has.

**Category:** Physics

**Table Number:** HT1107

**Student Name:** Walter Hansen

**Team Members (if any):** Riley Densley

**Project Title:** Energy From Spark Discharges: Amazing Overunity or Experimental Error?

**Abstract:** "For many years scientists have attempted to create a device that can put out more energy than the purchased energy required to sustain it"an overunity system. Such a device theoretically taps energy from an outside source as a common heat pump does. In 2002 a team of scientists in Belgrade

**Category:** Physics

**Table Number:** HT1107

**Student Name:** Riley Densley

**Team Members (if any):** Walter Hansen

**Project Title:** Energy From Spark Discharges

**Abstract:** Same as Walter Hansen

**Category:** Physics

**Table Number:** HT1109

**Student Name:** Harley Buxton

**Team Members (if any):** Stephanie Hubbard

**Project Title:** Jumping Krispies

**Abstract:** Our question is which types of fabric generates the most static electricity. Our Hypothesis states We believe that the silk will produce the most static electricity because of our experience with slips and skirts that are made from silk. We also think that silk will produce more static than the other fabrics because of its positive charge." The experiment includes: wooden blocks

**Category:** Physics

**Table Number:** HT1109

**Student Name:** Stephanie Hubbard

**Team Members (if any):** Harley Buxton

**Project Title:** Jumping Krispies

**Abstract:** Our question is which types of fabric generates the most static electricity. Our Hypothesis states We believe that the silk will produce the most static electricity because of our experience with slippers and skirts that are made from silk. We also think that silk will produce more static than the other fabrics because of its positive charge." The experiment includes: wooden blocks

**Category:** Physics

**Table Number:** HT1111

**Student Name:** Katie Stromberg

**Team Members (if any):** Heidi Stromberg

**Project Title:** Tidal Wave Madness

**Abstract:** Our experiment to see if the depth of the water affected the velocity of the wave was an overall success. We tried several different depths of water and even tried to see if there was a limit to how fast the wave could go. Of course, by just using our one container, 9 cm was the deepest we could experiment with without spilling water all over the place. We discovered that the deeper the water was, the faster the wave traveled. Our hypothesis was incorrect because we thought that the deeper depths would have slower velocities. We also noticed that as the water got deeper, the amplitude of the waves decreased. This made sense because tidal waves (tsunamis) are hard to detect if you're sitting in a boat out in the deep ocean. One thing we would do differently if we were to do this project again would be to test different sizes of containers. We would also like to try to find a more square one next time so that we wouldn't have to measure each individual length for each depth.

**Category:** Physics

**Table Number:** HT1111

**Student Name:** Heidi Stromberg

**Team Members (if any):** Katie Stromberg

**Project Title:** Tidal Wave Madness

**Abstract:** Our experiment to see if the depth of the water affected the velocity of the wave was an overall success. We tried several different depths of water and even tried to see if there was a limit to how fast the wave could go. Of course, by just using our one container, 9 cm was the deepest we could experiment with without spilling water all over the place. We discovered that the deeper the water was, the faster the wave traveled. Our hypothesis was incorrect because we thought that the deeper depths would have slower velocities. We also noticed that as the water got deeper, the amplitude of the waves decreased. This made sense because tidal waves (tsunamis) are hard to detect if you're sitting in a boat out in the deep ocean. One thing we would do differently if we were to do this project again would be to test different sizes of containers. We would also like to try to find a more square one next time so that we wouldn't have to measure each individual length for each depth.

**Category:** Physics

**Table Number:** HT1114

**Student Name:** nolan harris

**Team Members (if any):** Nolan harris, riley lambourn, daniel obray

**Project Title:** circulat motion

**Abstract:** what is the relationship between speed and the lenght of the radius. our hypothesis was that the speed would stay the same be cause the power source is a constant.our method was using a cart propeled by a fan calculate the speed of the cart. so we measured the time it took for the car to travel three times around in a circle and then find the total distance traveled (the circumference) and then using that information calculate the speed. we found that the longer the string, the longer the distance

**Category:** Physics

**Table Number:** HT1114

**Student Name:** Riley Lamborn

**Team Members (if any):** James O Bray, Nolan Harris

**Project Title:** Circular Motion

**Abstract:** Determine the relationship between an object's speed traveling in a circle and the radius that it's going around. Hypthesis: speed will not change regardless of radius. Method: a car with a fan as means of propulsion is attached to a ring stand with a piece of string. The string is adjusted to specified length: this is the radius. Car is started and timed for three revolutions. This process is repeated three times, then the radius is changed and procedure repeats. The radius was changed six times over the duration of the project. Results: the longer the radius was, the faster the car was going. Like a wheel turning, the outside edge must turn faster than the inside to keep the radius a straight line.

**Category:** Physics

**Table Number:** HT1114

**Student Name:** J. Daniel O Bray

**Team Members (if any):** Riley Lamborn and Nolan Harris

**Project Title:** Circular Motion

**Abstract:** This experiment was designed to answer the following question; what is the relationship between the radius of rotation and the speed of the object. It was hypothesized that the radius of rotation would not have an affect on the speed of the rotating object. In our testing, we attached string to a ring stand and to a fan powered car. The car was propelled by the fan, and the string ensured that the car traveled in a circle with a known radius. The length of the string was varied to collect the data necessary to answer the question. It was discovered through this testing that the radius of rotation and rotational speed of the object are directly related in that an increase in one causes and increase in the other.

**Category:** Physics

**Table Number:** HT1116

**Student Name:** Tanner Rawle

**Team Members (if any):** Tanner Rawle & Spencer Iverson

**Project Title:** Aerodynamics of Javelins.

**Abstract:** We have always been interested in ancient siege machines. My partner and I wondered what the most effective javelin head for the ballista was. So we came up with the question, which javelin head would have the least air resistance?" Both of us hypothesized that a sharpened head would produce the best results

**Category:** Physics

**Table Number:** HT1116

**Student Name:** Spencer Iverson

**Team Members (if any):** Spencer Iverson, Tanner Rawle

**Project Title:** Aerodynamics of Javelins

**Abstract:** The Aerodynamics of Javelins is our group project. For this project, we combined our interest in aerodynamics and siege engine physics. The question was Which javelin head shape would give the least amount of air resistance, therefore travel the farthest distance? Our hypothesis was that the pointed airfoil would offer the least air resistance through the fluid. The conclusion matches our hypothesis, the pointed javelin traveled (on average) farther than the rounded or the flat tipped javelins.

**Category:** Physics

**Table Number:** HT1118

**Student Name:** Jacob Howell

**Team Members (if any):** Mitchell Tracy, Michael Rencher

**Project Title:** Auditorium Acoustics

**Abstract:** Through participating in band for years we asked the question, do different positions from the stage affect the different sound levels in the Riverton High School Auditorium? This was tested by taking the decibel levels of different seats throughout the auditorium from a constant sound. From the results in can be seen that the decibel levels did progressively get lower as the position from stage was increased, but it didn't consistently have lower readings as the seats got closer to the wall. It can be inferred that this was because of the reverberated sound coming off the wall.

**Category:** Physics

**Table Number:** HT1118

**Student Name:** Michael Rencher

**Team Members (if any):** Mitchel Tracy, Jacob Howell

**Project Title:** Auditorium Acoustics

**Abstract:** We wanted to know if sitting in different seats throughout our high school auditorium would provide different sound levels and to find out what areas had those different levels. We believed it would get more silent the farther you got from the stage. We put a tuner machine on the stage which made a loud consistent sound and we sat in every fourth seat to measure decibal range. We were mostly correct except we found areas near walls were louder.

**Category:** Physics

**Table Number:** HT1118

**Student Name:** Mitchell Tracy

**Team Members (if any):** Jacob Howell, Michael Rencher

**Project Title:** Auditorium Acoustics

**Abstract:** Through participating in band for years we asked the question,, do different positions from the stage affect the different sound levels in the Riverton High School Auditorium? This was tested by taking the decibel levels of different seats throughout the auditorium from a constant sound. From the results it can be seen that the decibel levels did progressively get lower as the position from stage was increased, but it didn't consistently have lower readings as the seats got closer to the wall. It can be inferred that this was because of the reverberated sound coming off the wall.

**Category:** Physics

**Table Number:** HT1121

**Student Name:** Parker Bluth

**Team Members (if any):** Josh Larson, Will Christensen

**Project Title:** The coefficient of friction for different running shoes

**Abstract:** During the winter season athletes from Riverton High School are always running in the halls for conditioning, and would like to see what shoes have the best coefficient of static friction. It was found that the shoes with the best static friction were the red Nike running shoe. To find this researchers put different weights in the shoe and pushed the shoe with a force sensor and graphed the results with data studio. This research has given the athletes the best shoe to be running on the school tile while conditioning for sports. The Starbury basketball shoes had the most friction because it was a basketball shoe, and basketball players need the friction because they are always cutting and changing directions on the court.

**Category:** Physics

**Table Number:** HT1121

**Student Name:** William Christensen

**Team Members (if any):** Parker Bluth and Josh Larson

**Project Title:** The coefficient of friction for different running shoes

**Abstract:** During the winter season athletes from Riverton High School are always running in the halls for conditioning, and would like to see what shoes have the best coefficient of static friction. It was found that the shoes with the best static friction were the Red Nike running shoe. to find this researchers put different weights in the shoe and pushed the shoe with a force sensor and graphed the results with data studio. This research has given the athletes the best shoe to be running on the school tile while conditioning for sports. The starbury basketball shoes had the most friction because it was a basketball shoe, and basketball players need the friction because they are always cutting and changing directions on the court.

**Category:** Physics

**Table Number:** HT1121

**Student Name:** Josh Larson

**Team Members (if any):** Parker Bluth and Will Christenson

**Project Title:** The coefficient of friction for different running shoes

**Abstract:** During the winter season athletes from Riverton High School are always running in the halls for conditioning, and would like to see what shoes have the best coefficient of static friction. It was found that the shoes with the best static friction were the Red Nike running shoe. to find this researchers put different weights in the shoe and pushed the shoe with a force sensor and graphed the results with data studio. This research has given the athletes the best shoe to be running on the school tile while conditioning for sports. The starbury basketball shoes had the most friction because it was a basketball shoe, and basketball players need the friction because they are always cutting and changing directions on the court.

**Category:** Physics

**Table Number:** HT1123

**Student Name:** Meghan Carpenter

**Team Members (if any):** Adelheid Hulme

**Project Title:** Half A Million Musical Waves

**Abstract:** Our Question was Do different qualities of Violins produce different qualities of sound waves? We thought there would definatly be a difference because you could hear the difference. We knew the owner of a violin workshop and very graciously let us use all the way from a \$500,000 violin to a \$300 Student Violin. We hooked up a pick up microphone to each violin and played the 3 octives of the note A" while an oscilloscope to capture the waves in a viewable format. We learned alot about sound waves and how they worked

**Category:** Physics

**Table Number:** HT1123

**Student Name:** Adelheid Hulme

**Team Members (if any):** Meghan Carpenter

**Project Title:** Half A Million Musical Waves

**Abstract:**

**Category:** Physics

**Table Number:** HT1125

**Student Name:** Jason Ash

**Team Members (if any):** Logan James

**Project Title:** Altering Sticks

**Abstract:**

Central Utah Science & Engineering Fair 2009  
Senior Division

---

**Category:** Physics

**Table Number:** HT1125

**Student Name:** Logan James

**Team Members (if any):** Jason Ash

**Project Title:** Altering Sticks

**Abstract:** Both Jason Ash and I are on the American Fork drum line. As a drum line we tape our sticks to make improve the sound. We wondered how layers of tape affected the sound, as well as how cutting the stick would affect the sound of a drum. We also wanted to see the same variables using a cymbal. We believed that adding mass to the stick in the form of tape would increase the decibels and removing mass would decrease. We also believed the cymbal would be the same but longer. We used Audacity to measure the sound waves in decibels and hertz. We used the same stick for every test. Finally we tried kept the computer in the same spot so as not to alter the readings.