



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) David V. Aldrich	Project Number J0201
Project Title A Look at Pneumatic Power	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to find a 1-1 relation to the psi and wieght lifted.</p> <p>Methods/Materials I first built a Lego system to measure and use the pressure to lift different wieghts. 2.0 Lego Mindstorm Accutire tiregauge 2x Lego pneumatics Lego jumbo gray basesoard lego train transformer</p> <p>Results I found a 4-1 relation in the psi to wieght lifted.</p> <p>Conclusions/Discussion I was wrong about the 1-1 relation but found a 4-1 relation.</p>	
Summary Statement I used lego to create a system that would measure psi and lift wieghts.	
Help Received Parents buying equipment	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Tripti Bhattacharya	Project Number J0202
Project Title Keep the Noise Down!	
Abstract Objectives/Goals The purpose of my experiment was to determine whether there was a relationship between the density of a material and the intensity of sound it blocked. Methods/Materials To conduct this experiment, I bought tiles of plastic, wood, glass, and stone all of the same thickness, and found their density. I then constructed a soundproof box of wood. I placed a five minute recording of a drill in one end and a sound meter on the other side. I then placed the material in between the two at a fixed distance. By turning on the tape, I was able to measure the amount of sound let through the material and calculate the amount of sound blocked out. I performed a series of four trials for each of the materials. Results The densest material blocked out the most sound, while the least dense materials blocked out the least sound. Conclusions/Discussion Using a form of statistical analysis, I was able to determine that there was a definite correlation between density and the intensity of a sound that a material blocks. This seems to suggest that denser walls are more soundproof than other walls.	
Summary Statement My project attempted to see whether there is a relationship between the density of a material and the intensity of sound it blocks	
Help Received Father helped construct the soundproof box, teacher(Mr. Francis Lee) taught me the statistics	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jonathan D. Bregman	Project Number J0203
Project Title As Good As It Gets	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To discover what makes an air cannon accurate and what affects the accuracy.</p> <p>Methods/Materials I designed and constructed an air cannon using PVC pipe. I had 3 interchangeable barrel, 9, 18, and 36 inches in length. I fired the cannon several times with the same projectile and with different barrel lengths and pressures, and recorded where the projectile hit a target placed 36 feet away. At the same time, using a speed measuring device that I built, I calculated the speed.</p> <p>Results The 18 inch barrel consistently proved to show the fastest speed and to be the most accurate. The 9 inch barrel was the second fastest and the second most accurate followed by the 36 inch barrel.</p> <p>Conclusions/Discussion The measured speeds were much less than calculated speeds due to air leakage past the projectile. Frictional losses and air leakage within the cannon were measured and had minimal effects. There was a larger spread in the y direction than the x direction for the position of the projectile on the target due to variations in the speed of the projectiles.</p>	
Summary Statement What affects the accuracy of an air cannon.	
Help Received Father supervised firing of air cannon, mother helped with display layout.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Seth W. Brown	Project Number J0204
Project Title Investigating the Relationship of a Basketball's Air Pressure to Bounce Height	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to investigate the relationship of air pressure to bounce height, using a basketball. I believe at a variable held constant, which is the height a ball is dropped from; a positive correlation will exist between the manipulated variable - the air pressure in the ball, and the responding variable, which is the height the ball bounces.</p> <p>Methods/Materials The experiment was conducted using three different brands of 24cm diameter basketballs. A sports pump with a PSI gauge and a pump needle was used to inflate the balls, to nine air pressures between 0 to 20 PSI. Each ball was dropped from a fixed height (the underside of a breakfast bar) onto a firm surface (the kitchen tile floor). An oversized centimeter grid was placed behind the area where the balls were to be dropped, for recording bounce height measurements using a video camera. Using the camera's playback frame-by-frame mode, each ball's maximum bounce height was determined. Each ball was dropped at the various air pressures five times each. The average height of each ball at each air pressure was calculated, converted from PSI to kg/sq. cm, and graphed.</p> <p>Results Increasing the air pressure in the basketballs, did result in increasing the balls' bounce heights. The graphed results showed an acute linear correlation in bounce height from 0 to 5 PSI. A less acute, but still significant linear rise occurred from 5 to 15 PSI. Between 15 and 20 PSI, with 20 PSI being almost the maximum air the balls could hold, the height the balls could bounce increased only about 1 cm, the least significant amount of change.</p> <p>Conclusions/Discussion The goal of this experiment was to improve my basketball game by finding out what is the best air pressure for a basketball, because a basketball's bounciness is important in dribbling and rebounding. The International Basketball Federation says a properly inflated ball rebounds to 62 +/- 6% from the height from which the ball is dropped. Based on this information and my data, the balls should be at ~7.5 PSI. The follow-up experiment might be to evaluate dribbling and rebounding at the recommended range of inflation written on the basketballs of 7 to 9 PSI, to see if 7.5 PSI is the best air pressure, or if increasing the air pressure and thus increasing bounciness, improves or hinders my game.</p>	
Summary Statement Investigating the relationship of air pressure to bounce height, using a basketball.	
Help Received Mother helped with some typing and videotaping.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Maxwell P. Bunker	Project Number J0205
Project Title How Cool Is Your Computer?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Heat has a negative effect on a computers performance and life. The objective of my testing was to find the most effective cooling system, thus increasing the performance and life of the computer.</p> <p>Methods/Materials The computer I used was a Dell GX1 Pentium III. I ran 3DMARK PRO, a benchmark test that stresses the computer by doing #looping# tests, the effect of these tests work the computer components and increase the temperature. Using a digital thermometer I took the temperature at four different component locations in the computer: 1. The Hard Drive; 2. CPU chip; 3. Video Card; 4. The air temperature inside the PC case. The different cooling systems I used are: 1. 2COOLPC (a product that redirects air inside the case); 2. System Blower(blow outside air into case) ; 3. Cool Master (a heatsink/fan for the cpu); 4. Hard Drive Cooler (for the hard drive); 5. Original Components; 6. Original Components without the air shroud; 7. Combination of all the cooling systems. After each test I let the computer return to the normal room temperature (70-73'). I repeated the test 3 times to insure accuracy.</p> <p>Results The results were pretty definite. The product, 2CoolPC, was the overall individual winner. It had the lowest temperatures recorded for 3 of the 4 components. It was beaten only by the 'hard drive cooler' product at lowering the temperature of the hard drive, and then by only .2 degrees. The combination of using all the cooling products 2CoolPC, Hard drive cooler, and system blower lowered temperatures marinally better than using the 2CoolPC product alone.</p> <p>Conclusions/Discussion My results showed that the single best cooling system was the 2COOLPC-cooling product. The ideal temperature inside your PC is roughly 5 degrees higher than the ambient room temperature. If the temperature in your case exceeds 110 degrees Fahrenheit, then your PC could be in trouble. That#s because for every 18-degree increase above 110 degrees, the component life of your PC is reduced by half! Once a month or so you should clean your case fans (dust is an enemy too). Now you know how cool my PC is, what about yours?</p>	
Summary Statement I tested different cooling systems to see which one would have the greatest effect on a computers' temperature	
Help Received Dad helped get fans and software on internet.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Alessandro Castelli; Andrew Earl	Project Number J0206
Project Title How Backpacks Affect Your Posture	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose for this project is to prove how backpacks affect your posture so that people know that there are risks involved in wearing a backpack.</p> <p>Methods/Materials For this project we used a Roller Backpack and a regular pack using both straps and the same pack using only one strap over just one shoulder.</p> <p>Results The results were that the roller backpack caused the least pain out of all three while wearing the backpack over one shoulder caused the most pain.</p> <p>Conclusions/Discussion Our results ended up being exactly the same as our prediction which proves all backpacks can be dangerous in some way. With everything we have done our conclusion is that people should try roller backpacks.</p>	
Summary Statement Finding out which backpack affects your posture the most.	
Help Received Had student volunteers assist in doing the study.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Yanosh D. Cerovcevic	Project Number J0207
Project Title Hydraulics: Weigh Lifters	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if hydraulics is strong enough to lift heavy loads.</p> <p>Methods/Materials Materials to build a hydraulic press are purchased from local hardware stores. Liquids were used in the application to test affect of volume and viscosity of the liquid on the height the load would be lifted. Pressure gauge was used to measure the pressure in the hydraulic press. The pump was used to add more liquid in the hydraulic press.</p> <p>Results The results showed that the height of the object lifted depends on the viscosity of the liquid and the amount of liquid in the hydraulic press.</p> <p>Conclusions/Discussion Hydraulics is strong enough to lift heavy objects.</p>	
Summary Statement My project is about Hydraulics.	
Help Received My father helped me to assemble the hydraulic pump.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Anthony Y. Chong	Project Number J0208
Project Title Electromagnetic Brakes	
Objectives/Goals This experiment was designed to show the advantages and/or disadvantages of an electromagnetic brake (as compared to a friction brake).	
Abstract Methods/Materials A wheel was constructed by attaching a paper disc by an axle to a small motor. In the first part of the experiment, the wheel was covered with aluminum foil. A strong magnet was held up to the spinning disk of aluminum to induce an eddy current in the foil. The induced current opposed the motion of the disk, creating a brake like effect. Next, a mechanical brake was applied to the wheel to compare the braking efficiency. The goal of the second part of my experiment was to create a generator from the electromagnetic brake. The wheel was covered diagonally with four strips of aluminum foil. Copper wire brushes at the terminals of a voltmeter made contact with the aluminum strips. As the wheel spun, the voltmeter measured any voltage in the strips. The magnet was applied to the wheel five times to test the amount of generated voltage.	
Results In the first part of my experiment, I was able to demonstrate a working electromagnetic brake. This brake consistently slowed the wheel faster than a friction brake. In the second part, I consistently measured an output of over 11 millivolts.	
Conclusions/Discussion My experiment showed that an electromagnetic brake would be very advantageous, as it has great braking efficiency and has the potential to regain energy lost in braking. When used in a large vehicle, these regenerative brakes could generate large quantities of electricity to be re-used by the vehicle, instead of being lost as heat. Furthermore, these electromagnetic brakes would reduce break wear, a common problem with many cars.	
Summary Statement This project demonstrated the feasibility of a regenerative electromagnetic brake.	
Help Received Father helped solder wires and took me to a surplus store to pick out materials.	



CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

Name(s) Stephen Chu; Robert Paolini	Project Number J0209
Project Title Torque and Speed	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals What is the relationship between the torque and speed of a vehicle?</p> <p>Hypothesis: If gear ratio (input to final drive) values increase, then the speed of a vehicle will decrease and the torque will increase.</p> <p>Methods/Materials Materials: Lego robot, ruler, spring scale, robot programmer, bicycle, car alternator, capacitors, power supplies, drive belt, meters, spring scale, light bulb. Method: A robot was constructed with changeable gear ratio and programmable control of its run time. Its speed and torque were measured for the different gear ratio values. Separately, a bicycle experimental apparatus using the above materials was built to investigate how torque and speed are used in real life. The rear wheel was connected to the alternator via the drive belt. An adjustable DC power supply was used to supply the field current (electromagnet) in the alternator. An opto-interrupter was used to detect the rotation of the alternator by connecting it to an oscilloscope. This setup allowed the alternator speed to be monitored as Hz. The voltage and current of the field winding (input) and stator winding (output) were also monitored. A spring scale was used to measure the static torque at the pedals over the range of field currents and gear ratios. For an electrical load on the output, a light bulb was used. Data was collected for input voltage and current, input torque, output voltage and current, gear selection, and alternator speed. Using a spreadsheet, calculations could be made using standard engineering formulas, like Ohms Law, to explore the entire range of operation of the bicycle apparatus.</p> <p>Results The data for the robot showed that when the gear ratio value increased, the torque increased but the speed decreased. The relationship showed that the torque and speed were inversely proportional. The results for the bicycle showed that when the pedal to the generator ratio or the electromagnetic charge on the generator increased, the torque required to rotate the pedals increased. The data also showed that when the rpm or the electromagnetic charge on the generator increased, the amount of power produced also increased. Again the torque and speed had an inverse relationship.</p> <p>Conclusions/Discussion Both the robot and bicycle supported our hypothesis, which was if the gear ratio values were increased, then the speed of a vehicle will decrease and the torque will increase. Generating electricity is hard work.</p>	
Summary Statement Our project is about finding the relationship between torque and speed and applying it to a real life example.	
Help Received Dad helped with the providing and supervision of tools, transportation, and mentoring for project planning. Moms helped with transportation, food, and proofreading the report.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Christine Dempster; Elizabeth Leire	Project Number J0210
Project Title Pressure's On!	
Abstract Objectives/Goals "Pressure's On!" was designed to support whether a dressage saddle or a multipurpose saddle would create the least amount of pressure points on a horse's back. Methods/Materials In order to test our hypothesis, we placed bubble wrap between the saddle and the saddle pad. We did five tests for each saddle, riding for approximately twenty-five minutes on each trial. We then removed the bubble wrap and went over any popped bubbles with fabric paint in order to increase visibility. Lastly we photographed and logged our results. Our materials included one horse, one rider, one dressage saddle and one multipurpose that fit the horse and the rider, a camera, fabric paint, and small-bubbled bubble wrap. Results Our project supported our hypothesis. The dressage saddle created much less pressure points on the horse's back than the multipurpose saddle did. Conclusions/Discussion Since the dressage saddle distributed the rider's weight evenly, it created less pressure points in the horse's back than the multipurpose saddle. The dressage saddle allows the horse to preform his or her tasks more easily, comfortably, and efficiently.	
Summary Statement Pressure's On! proved that the dressage saddle creates less pressure points on the horse's back than the multipurpose saddles.	
Help Received Mr. and Mrs. Leire helped with transportaion and provided indoor arena when raining. Mr. and Mrs. Dempster for providing ideas and helping with the display board. Stamps and model horses were provided by Bridget Leire and Kelsey Laity D'Agastino. Michelle Restivo for some illustrations in our	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Kevin M. Diefendorf	Project Number J0211
Project Title The Robe Warmer	
Objectives/Goals To ease the transition from warm bed to cold breakfast table.	
Abstract	
Methods/Materials Materials: staple gun, mannequin, robe, needle, thread, timer and electric blanket. Method: the electric blanket was secured to a torso mannequin. A timer was added to the electric blanket cord. Finally, a robe was placed on the Robe Warmer.	
Results Several test trials were done for the Robe Warmer. After thirty minutes at the high setting, the robe was heated to a very comfortable temperature.	
Conclusions/Discussion The Robe Warmer is an appliance that would comfort people as they move from their warm bed and begin their morning routine. The Robe Warmer would also have an energy saving benefit. Using the Robe Warmer could allow people to lower their thermostats and result in energy conservation.	
Summary Statement The Robe Warmer is an appliance, controlled by a timer, that will heat a robe to a comfortable temperature when the morning alarm clock rings.	
Help Received I borrowed the mannequin from a local tuxedo store, my Father helped and supervised me with the staple gun.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Justin S. Endo	Project Number J0212
Project Title "Set-It-and-Forget-It" Automatic Fish Feeder	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my project was to invent a fish feeder to automatically feed fish once a day. I call it the #Set-it-and-forget-it# automatic fish feeder. I made it for people like me who have fish, yet who are either so forgetful or busy, they don't feed their fish. After my market research, I realized that there wasn't any fish feeder that was sold at the price range of \$15-\$25. A majority of the prices ranged from \$30 to \$200. My goal was to create a reasonably priced (\$15-\$30) fish feeder that would feed fish once a day for three weeks.</p> <p>Methods/Materials I first brainstormed multiple designs for a fish feeder. Next I made a more detailed design of the three best but different concepts. I objectively selected the best of the three using a design review process and a trade-off analysis. I made a detailed the design and then made a prototype out of cardboard. I figured out what worked and didn't work. I had to make four iterations of my design. Three of them were fixing the scooper. The last one was adjusting the funnel. The materials I chose to make my product were inexpensive and looked good. The materials were 1/4 inch foam board, 1/2 inch diameter polypropylene pipe, plastic funnel, and 2 inch PVC pipe. I did a market survey of potential customers.</p> <p>Results I tested the final product for three weeks. It dispensed 1/5 a teaspoon per day (about a pinch of food). I surveyed 16 people, ages from 10 to 60, married, retired, or in a family, to see if there is a market for my product. I took the total number of families and the total number of single people in San Carlos to be potential customers. Then I used ratios and cross-multiplying to get my final answer. I calculated that I could sell 9,389 units in San Carlos. After researching other competitors, I concluded that there isn't any other product like mine. All other products are a lot more expensive or don't feed as long. I tested it for three weeks on my aquarium tank.</p> <p>Conclusions/Discussion My invention, the automatic fish feeder, is a success. I got it to meet all my requirements. I was also able to complete a market analysis too. I learned that if I did sell my product, I would be able to make \$126,375.94. I learned how to use AutoCAD and Solid Works successfully and learned a little more about engineering and the process of making and selling an invention.</p>	
Summary Statement My proect is about a mechanical automatic fish feeder.	
Help Received My dad helped me with the cutting of the PVC pipe and my mom helped the layout of my board.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Christy L. Goulet	Project Number J0213
Project Title How Well Do Smoke Detectors Work When They Get Older?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was to determine whether age affects how fast the smoke detector goes off. I am also seeing if they still work if you don't clean them. I thought the newer ones would go off faster than the older detectors.</p> <p>Methods/Materials Four smoke detectors were used that had different ages were used. One was brand new, one was 2 years old, one was 10 years old, and one was 20+ years old. I burnt paper, plastic, and cloth in a metal pan twice each material for three distances. The distances were right under the detectors, 1 1/3 meters away, and 3 meters away. The time range was recorded, and the order that the detectors went off was also recorded. None of the detectors had ever been cleaned. All new batteries that were all the same brand were put in each detector.</p> <p>Results Total the brand new one went off the most first, then the 10 year old one went off the most then the 20+ year old one went off the most next, and the 2 year old went off the most last. For the paper test the 2 year old went off most first. For the plastic test the brand new went off the most first and the 2 year old went off the most last. For the other tests they varied more.</p> <p>Conclusions/Discussion I don't think the age of the detectors matters. The detectors still worked even though they had never been cleaned. I still think people should clean them because a few seconds could make the difference in a fire.</p>	
Summary Statement To determine whether age affects the speed it takes for smoke detectors to go off.	
Help Received Dad helped take the range the detectors went off and the order. My parents checked for spelling and grammar errors in my report.	



CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

Name(s) John T. Grasel	Project Number J0214
Project Title Characteristics of Winning Pinewood Derby Cars	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I want to see which characteristics (variables) have a significant effect on the race time of Pinewood Derby cars. I think that weight will have the greatest effect. Also, I think that a streamlined car with polished axles and the maximum amount of weight, placed in the rear, will be the fastest car.</p> <p>Methods/Materials In Part I, I made eight Pinewood Derby cars that each weighed 137 grams. The eight cars were constructed to have every combination of the independent variables of axle polishing (polished vs. as-received), aerodynamics (block vs. wedge), and weight placement (front vs. rear). I raced the cars on a Pinewood Derby track and recorded their times using an electronic timer. Next, I adjusted the weight of the eight cars to 143 grams. I then raced the new cars and recorded their times. In Part II, I constructed another car and raced it over a wide weight range (45 to 190 grams) without applying graphite to the axles. I then repeated that experiment using the same weight range and also graphite on the axles.</p> <p>Results For Part I, the average race time was 2.886 +/- 0.007 seconds. The best car (a wedge with polished axles and 137 grams in the rear) ran 0.04 seconds faster than the average car time. The slowest car (a block with unpolished axles and 137 grams in the rear) was 0.04 seconds slower than the average car. By using the experimental design in the range initially studied, I was able to find out that aerodynamics took off 0.008 seconds from the average time, axle polishing took off 0.025 seconds, a higher weight took off 0.008 seconds, and having back weight placement took off 0.008 seconds. From Part II, weight greatly affected the car's time up to 120 grams, but weight didn't make a significant difference afterwards. Graphite subtracted 0.8 seconds on the 45 gram car, and 0.2 seconds on the 145 gram car.</p> <p>Conclusions/Discussion With these results, I now have the information needed to create the ultimate Pinewood Derby car. I recommend building a car that is as close to 143 grams as possible, and certainly with polished axles. All else being equal, it can't hurt to make it wedge-shaped and put the weight in the rear although my results don't show that these variables are very significant. Finally, always apply a generous amount of graphite and spin it into the axles to get a speedy car.</p>	
Summary Statement I systematically studied which variables affect a Pinewood Derby car's race time.	
Help Received My mother taught me the basic concepts of Statistical Experimental Design. My father helped me set up the Pinewood Derby track and electronic timer.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Nicholas J. Hennrikus	Project Number J0215
Project Title What Type of Shin Guard Is the Best at Preventing Soccer Related Tibia Fractures?	
Abstract Objectives/Goals My project was to determine what property of the shin guard best prevents tibia fractures. Methods/Materials I chose four commercial shin guards of varied padding and hard coverings plus a self made shin guard. I constructed model legs using boards 1 inch thick by 2.5 inches wide, stuffing and a stocking. I covered the leg with the different shin guards and dropped different weights from progressive heights, calculating the force and kinetic energy of the falling weights and documenting fracture incidence. Results I found that the one inch foam padding prevented the most fractures, preventing fractures up to 24.6 joules of energy. Those shin guards that were composed mostly of hard plastic performed the worst, allowing fractures at 20.0 joules of energy. Conclusions/Discussion I concluded that the shin guard with the most padding was the most effective at preventing fractures. My initial hypothesis that the biggest and heaviest shin guard (Umbro) would prevent the most fractures was incorrect. I therefore recommend to parents and athletes that they purchase shin guards that have the most padding.	
Summary Statement My project is about determining what properties a shin guard should possess in order to prevent tibia fractures.	
Help Received My mom and dad helped me find the literature and helped me understand the physics behind the project. My brother helped me make charts and graphs on the computer. My teacher helped me organize my project and gave me tips on the presentation of the project.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Andrew M. Hernandez	Project Number J0216
Project Title Are Expensive Paintballs More Accurate?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project is to find out if the expense of a paintball matters in their accuracy. I believe that the more expensive paintballs are in fact less accurate then the non expensive paintballs.</p> <p>Methods/Materials I took one paintball gun and checked its velocity to make sure that the velocity would not change. Then I put the gun in a stationery stand and fired two types of paintballs at the target, expensive paintballs and non expensive paintballs. Then from the accuracy of the paintball I determined if the more expensive paintballs were more acurate or not.</p> <p>Results The expensive paintballs were not accurate, while the non expensive paintballs were accurate.</p> <p>Conclusions/Discussion In conclusion, I found out that expensive paintballs are not more accurate then non expensive paintballs but they are in fact less accurate.</p>	
Summary Statement My project is about the accuracy of a paintball determined by its price.	
Help Received My science teacher helped me with my procedure and my background Information.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Robert W. Holtermann	Project Number J0217
Project Title The Influence of a Golf Ball's Bounce on the Distance It Will Travel	
Abstract Objectives/Goals The objective of this experiment is to determine if a golf ball's bounce influences the distance it will travel. I thought that a golf ball's bounce influenced the distance it would travel. Methods/Materials Thirty-six golf balls were used in this experiment. Each golf ball was tested 20 times for height of bounce and distance of ball flight. Results The tests run on each golf ball show that a golf ball may bounce high but not travel very far. Conclusions/Discussion My hypothesis was not supported by my data. The results show that a golf ball might bounce very high but not travel very far. The reason that these golf balls might go very high and not travel very far is because of their core. The slight variations in their cores may cause a golf ball to travel very far but not very high.	
Summary Statement The influence of a golf balls bounce on the distance it will travel.	
Help Received Father helped build mechanism. Mother helped test bounce.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Kelly H. Hutchinson	Project Number J0218
Project Title Injury Free Is the Way to Be! Effectiveness of Various Protective Shin Guard Materials	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective in this project is to find out which shin guard material protects the shin the most from an impact forced upon the shin, by measuring the depth of each indentation in the green floral foam. The objective is to test shin guard materials to find the most protective material out of Yellow Sponge, Flexi Foam, Gel, Black Foam, Two sponges, and White Foam. An additional objective is to see if open celled or closed celled materials are more protective.</p> <p>Methods/Materials Materials: Red wood, ABS pipes, Plaster of Paris, Machine bolts, Lag bolts, Nuts, Green Floral foam, Marbles, Plastic transparent shin plate, Soccer shoe, Velcro strap, Two dumb bells(2,265 grams each), Flexi foam, Gel, Yellow sponge, Black foam, White foam, Two sponges, Drill, Hammer, Saw, Knife, Pipe cleaners, Vaseline. Methods: A soccer shoe hits a shin plate that has a material strapped to the back of it with a marble taped on to the material that sits on top of the green floral foam. When the soccer shoe with the weights on the back hits the shin plate it causes the marble to be forced into the foam, therefore, leaving an indentation that is later filled with Plaster of Paris. The indentations, after they are dried are taken out of the depression in the green foam and measured. This process is repeated five times for each of the six materials being tested.</p> <p>Results The Gel was the most efficient while the sponge materials were the worst. The Gel material had an overall indentation average of 1.47 cm. The Flexi Foam average was 2.52cm, the Two Sponges was 2.84, White Foam average was 2.86 cm, Black Foam was 2.32cm, and the Yellow Sponge was 2.98 cm. All materials combined averaged 2.51cm, the open celled materials average 2.71 cm, and the closed materials average was 2.31 cm.</p> <p>Conclusions/Discussion The conclusion to this project was that Gel was the most protective shin guard material. After Gel, Black Foam was the next most effective, then Flexi Foam, White Foam, the Two Sponges, and least effective was the Yellow Sponge. Additionally proven was that the open celled materials were less protective than the closed celled materials.</p>	
Summary Statement The objective of my project is to determine which shin guard protects the shin the most from an impact forced upon the shin, by measuring the depth of each indentation in the green floral foam.	
Help Received I got help from Peter Logan, a contractor, who helped build the kicking machine. My mom helped proof read my lab report.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Dane W. Jackson	Project Number J0219
Project Title Organic Heat	
Abstract Objectives/Goals My project was to determine if the length of pipe will affect the temperature of water heated inside a compost pile. I suspect that the the longest pipe will heat the water to the highest temperature. Methods/Materials Three lengths of ppe were buried in the compost pile, a 100 foot , 200 foot , and a 300 foot black poly pipe. Each pipe was pumped full of water and were checked three different times for the temperature. Results The 300 foot pipe heated the water to the highest temperature followed by the 100 then 200 foot pipe. Conclusions/Discussion My conclusion is that the length of pipe does affect the temperature of water when it is heated. Anybody could do this project who has a compost pile which if hooked up to the water heater could save money on the electricity bill.	
Summary Statement My project was to determine if the length of pipe would affect the temperature of water when it is heated.	
Help Received Dad helped putting the pipes together and burying them; Brother helped writting the conclusion.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ross D. Kenworthy	Project Number J0220
Project Title Golf Physics: How Will the Distance a Golf Ball Flies be Affected by the Weight of the Club Hitting It?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Since I enjoy playing golf, my objective was to determine how the distance a golf ball flies would be affected by changing the weight of the golf club hitting it.</p> <p>Methods/Materials To have a consistent swinging arm or golf club, my Dad & I designed and built "The Swinger". This is a large 4 foot swinging arm that allows an identical, repeatable swing every time. With a can on the end to hold different weights, I could easily change weights while keeping the swing consistent. I marked with nails where the golf balls landed & measured the distance. I used the same ball the entire experiment and hit it 5 times, averaging the distances, before changing the weight.</p> <p>Results The distance the balls flew varied with the different weights, but not necessarily as I expected. None of the balls flew as far as I guessed they would with increased weight. In fact, changing the weight of the club had very little affect on the balls flight.</p> <p>Conclusions/Discussion Based on my research prior to conducting the experiment, I thought a golf ball hit with twice the weight would fly approximately 20% further(about 30 inches). My hypothesis was not correct, as the balls all flew within 6 inches of eachother. I now know using a heavier club won't help my golf game.</p>	
Summary Statement How will the distance a golf ball flies be affected by the weight of the club hitting it?	
Help Received My Dad helped plan & build the swinging arm; my grandfather, who loves golf, shared his advice about wedges.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Kaycee J. King	Project Number J0221
Project Title Inertia and Momentum: How Does Weight Distribution Affect Momentum?	
Abstract Objectives/Goals I determined the most effective placement of weight on a 1.2 ounce car to cause the farthest distance of travel on two tracks. Methods/Materials Two tracks were built, one with a 30 degree and one with a 25 degree incline at the beginning of the track. The car, exactly 5 ounces with the weight, had five positions along the body of the car to hold the weight. Twenty runs for each of the 5 positions were performed. The distance traveled with each run was recorded, the average calculated, and results determined. A comparison of the weight placement, the slope of the track, and the distance traveled was made. Results On the 30 degree track, the fifth position (farthest back) had the longest average run at 177.45 inches but position four (on top of the axle) averaged 176.3 inches. On the 25 degree track, the farthest distance run, on the average, was also in the fifth position at 164.8 inches but the fourth position was significantly less. Analyzing the results of both runs indicate that the farthest position in the 25 degree track (fifth position) was significantly more effective than other back positions on distance traveled, than for the back positions of the car in the 30 degree track. Conclusions/Discussion My hypothesis, that weight placement should be in the back of the car for the longest distance traveled, was correct for both conditions. The experiment also found, however, that it is most critical with a flatter incline (25 degrees) to place the weight in the very back. With a steep incline (30 degrees), weight placed either on top of the axle or behind it were both effective for distance traveled. These results could be quite helpful in car design to create the most fuel efficient car possible.	
Summary Statement My project sought to determine the most effective placement of weight on a small car for the farthest distance traveled.	
Help Received My dad built the track to use for my experimental runs. My teacher showed me how to make graphs and identify specific details.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Lindsay R. Kipnis	Project Number J0222
Project Title Spin to Win: A Dreidel Discussion	
Abstract Objectives/Goals My objective was to discover if I could alter the laws of probability by weighting one side of my dreidel before spinning it. I believed that when I weighted one side of my dreidel, the probability of the dreidel landing with that side up would increase because the weight would force the dreidel to stop spinning with the weighted side up. Also, the more weights I put on one side, the more the dreidel would land with that side up. Methods/Materials I spun different dreidels until I found one that was well balanced. I then added weights, one at a time (up to three), to get my results. I spun my dreidel two hundred times at each weight level making sure to follow the reliability factors discussed in my journal. I glued the washers to the Gimmel side of the dreidel because that is the side that I wanted to come up. Results I discovered that I could alter the laws of probability, but not in the way I expected. I thought adding the weights to Gimmel would increase the amount of times Gimmel would land up because the weight would force the dreidel to land with the Gimmel side up. As I added weight, I discovered that these predictions were incorrect. Instead, Hey, the side to the left of the weighted side, landed up most often and adding weight only exaggerated the results. Conclusions/Discussion I tried to think about why Hey landed up most often and decided it had to be due to the spinning motion. Adding weight to one side must have changed the outside shape of the dreidel, which changed the momentum as the dreidel slowed. When I spun the dreidel, the motion seemed to throw the weighted side past landing down. The Gimmel side landed on the right and therefore the Hey side landed up. My goal was to figure out how to weight a dreidel so the Gimmel side landed up most often. When I weighted Gimmel, Hey landed up the most often and Hey is to the left of Gimmel. Therefore, I now predict that if I want Gimmel to come up most often, I would need to weight Nun because Gimmel is one side to the left of Nun. To continue my experiment in the future, I would like to weight Nun and see if I am correct.	
Summary Statement My project is to determine if, by adding weights to one side of a dreidel, I can affect the probability that the dreidel will land with that side up.	
Help Received My mother helped me by letting me discuss the stages of my project with her, my dad supervised me while gluing the washers onto my dreidel, and I discussed my results in a telephone conversation with my dad's friend, Dr. Larry Wilen.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Patrick M. Knisely	Project Number J0223
Project Title Lifting with Gears	
Objectives/Goals Determine if gears will affect how much weight you can lift with a pulley	
Abstract	
Methods/Materials Materials: · Pieces from a K#NEX set; · Gears, pulleys and motors from a K#NEX set; · String; · Plastic bucket; · Rocks; · Kitchen scale; · Plastic cup. Methods A. Build a K#NEX frame B. Build a K#NEX cradle C. Install a direct drive Motor D. Put a Pulley on the Drive Shaft E. Put rocks in the cradle F. Record the weight G. Start the Motor H. Add weight in increments until the motor can lift no more I. Record the final weight J. Add a set of gears between the motor and the drive shaft K. Repeat steps E-J	
Results Each added gear set allowed the motor to lift more weight. · Direct drive - 945 grams · One gear set - 1,295 grams · Two gear sets - 2,690 grams · Three gear sets - 3,590 grams	
Conclusions/Discussion The more gears you add the greater the weight that can be lifted. Gears act like pulleys and ropes by reducing effort.	
Summary Statement My project is about using gears to increase lifting ability.	
Help Received My dad helped me by getting the books and helping build the frame.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Andy C. Leong	Project Number J0224
Project Title Roller Coaster Madness	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was to determine which modification to a roller coaster car would make it travel the fastest: make it aerodynamic, heavy or neither.</p> <p>Methods/Materials One car was constructed. This car was able to become modified by adding 30 grams of weight and a foam "lid". By only building one car, I eliminated almost all possible variables, because all the cars were riding on the same wheels. The body of the car was built out of 1 cm thick foam poster board and the wheels and axels out of Legos. The ramps I tested it on (I had two: an incline and a decline) were constructed out of slot car tracks.</p> <p>Results The car with added weight averaged out to be much faster than the other two cars, while the car with no modifications consistently had the slowest times and the aerodynamic car reached times than the "no-modification" car.</p> <p>Conclusions/Discussion My conclusion is that the shape of a car makes a difference in its speed, but not as much as its weight. The ideal roller coaster car would be aerodynamic AND heavy.</p>	
Summary Statement The effect of air resistance and weight on roller coaster cars.	
Help Received Friend helped release car in trial runs.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Taylor B. Lucas	Project Number J0225
Project Title Got The Right Angle: Electricity from Solar Panels	
Abstract	
Objectives/Goals To find out what angle a solar panel should be at get the most energy (in watts) from the sun during one day in December.	
Methods/Materials Test Fixture (Pine boards screwed together); Solar Panel, 1.5 Watts with output wires attached; Voltage/amp meter; Computer with Excel spreadsheet; Record logs on paper; Pencil; Protractor; Compass; Watch Methods: 1. Set up test fixture on table facing south. 2. Place the solar panel on the fixture. Start measurements at 12 pm. 3. Use the Voltage/ Amp meter to take 100 measurements each at 45°, second at 35°, and the final measurement lying flat on table. 4. Enter data into an electronic spreadsheet. 5. Calculate the average wattage of the measurements for each angle. 6. Analyze the data compared to the hypothesis.	
Results The hypothesis stated that the 35° angle would put out the most wattage with an average of 1.90 watts. That was untrue; the 45° angle put out the most wattage at 2.04 watts. The flat panel (0° angle) put out an average of 1.24 watts. The 35° put out an average of 1.9 watts. So, the 45° angle put out a 7.4% greater wattage than the 35° angle with a 10° difference in angle. The 35° angle put out 53% more wattage than the flat panel. The voltage of the three angles remained relatively the same. The amperage is what varied with the different angles. Since the wattage is the product of the voltage and the amperage, the wattage therefore varied with the angle and the change in current (amperage).	
Conclusions/Discussion The experimenter concludes that the hypothesis was partially correct. The solar panel at the 45° angle did better than the 35° angle. This is due to the season that the experimenter ran the experiment. In the northern hemisphere (where San Diego is located) the sun is at its lowest angle in the winter. This experiment was conducted in December. So, this explains why the 45° angle yielded more wattage. So, the experimenter hypothesizes that in the summer, when the sun is at a greater angle, the wattage will be greater when the panel is at a lower angle between 0° and 35°.	
Summary Statement The wattage output of a solar panel will vary with the angle of it to the sun.	
Help Received Father helped build test fixture and look over paper; Mother helped put board together.	



CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

Name(s) Joseph C. Mazzella	Project Number J0226
Project Title What Are the Effects of Cooking Oils on Ball Bearing Performance?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In my project, I hope to determine whether cooking oils could be used as lubricants. I wanted to see if they could compare with modern day mineral oil lubricants. If they could, if a person ran out of lubricant, they would not have to rush to the store, they could just use some cooking oil from the house on their item in need of lubrication. It would be cheaper and more environmentally safe.</p> <p>Methods/Materials I used three different oils in my project. I used two different cooking oils and one mineral oil. For my cooking oils I used Canola Oil and Olive Oil. My Mineral oil was the control group. For my tests, I put all three of the oils onto skateboard ball bearings separately. I then put the ball bearings onto the skateboard and rolled it down a .5meter tall ramp. I measured the distance from the end of the ramp to the spot where the front wheel stopped its motion. I did this 100 times for each oil, which totalled to 300 tests/rolls. I then averaged the rolls and measured the performance of the rolls according to that.</p> <p>Results After all of my rolls were completed, I got my averages. My first set of rolls were with my Mineral Oil, the control group. The average of the Mineral Oil was 2.68 meters long. My second group of tests were with my Canola Oil. The average of the rolls of my Canola Oil, was 3.76 meters. The third group of tests were with my Olive Oil. The Olive Oil went on average 3 meters long per roll. In order from longest to shortest rolls on average, it went from the Canola Oil, to the Olive Oil, to the Mineral Oil.</p> <p>Conclusions/Discussion The results of my tests were very interesting. When it showed me that the vegetable oils did better than the Mineral Oil, I was awed. I had read that up until the 19th century, cooking oils were used as lubricants, and I wondered why they stopped using them. With further research I soon found out the reason why people no longer used cooking oils. Under immense heat and pressure, cooking oils deteriorate and break down. Even though cooking oils broke down this way, they could still be used in many household items. People could use these oils in things like skateboards, bikes, or even door hinges. These oils are environmentally safe and would prove as good lubricants. People would still have to make sure though that they did not put these oils into machines, especially cars. This could cause accidents and even serious crashes.</p>	
Summary Statement My project was to determine whether cooking oils could be used instead of modern day mineral oil lubricants.	
Help Received My mother helped my organize my board; My brothers helped me with my tests; My father helped me grammatically correct my reports; My teacher helped guide me in my format.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ryan W. McMorrow	Project Number J0227
Project Title Do Sound Walls Work?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of the experiment is to learn if sound walls, at neighborhoods adjacent to freeways, increase or decrease the freeway noise.</p> <p>Methods/Materials A digital sound meter was used to calculate the noise level in decibels at neighborhood#s beside freeways. Various distances between 0 and 1000 feet were tested. At every distance, the min, max, and average were recorded. The test sites were located on a road that was perpendicular to the freeway. Three different test locations were used; one with two parallel sound walls, another with one sound wall, (tests were conducted on the same side as the wall) and the last with no sound walls.</p> <p>Results I discovered that with two parallel sound walls the noise levels after 250 feet increased. The noise level after 250 feet, with two sound walls, was greater then with no sound walls or one sound wall. Until around 500 feet from the freeway two sound walls had the greatest noise level.</p> <p>Conclusions/Discussion This increase in noise could have been caused by three different factors; reflection off the opposite wall, wind, and the inversion layer. The results showed that the experiment had a purpose. The results could help build better and more efficient sound walls. Ways to increase the efficiency of sound walls include curving the top of the sound walls inward toward the freeway, (Lessoning the reflections over the wall) and putting sound absorptive materials into the sound walls (The noise would be absorbed instead of reflected)</p>	
Summary Statement Sound walls were tested to see if they affected noise levels in neighborhoods adjacent to the freeway and other neighborhoods further away.	
Help Received Dad drove me to the test sites. Mom and Dad helped correct my work.	



CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

Name(s) Anthony T. Nguyen	Project Number J0228
Project Title Active Noise Control: Reducing Noise by Adding Noise	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine the effectiveness of active noise control as functions of noise frequency, noise type, and the distance between the noise and anti-noise sources. I also proved the principle of active noise control using an active noise control electric circuit board and headphones. My hypothesis is that active noise control is most effective with low frequency, and that the noise type and distance will not affect the performance of active noise control.</p> <p>Methods/Materials Materials used include a test chamber made of wood and acoustic foam, 2 speakers, a noise level meter, a sound synthesizer, and electronic components for my circuit board. Tests were conducted using noise and anti-noise sources of different frequencies (200 Hz to 1000 Hz) and different types (sine, sawtooth, squarewave, daily noises). To test the effect of distance, the speakers were separated from 2 inches to 8 inches. The sound level with and without active noise control is recorded as a function of frequency, noise source, and distance between the noise and anti-noise source. The electronic circuit board was tested with headphones to reduce background noises while listening to music.</p> <p>Results At two inches separation, the 200 Hz has an average of 30% reduction in noise intensity. Also, the sine and sawtooth function displayed similar patterns in cancellation. As the frequency increases, the percent of reduction decreases. At eight inches separation, the effect of frequency and wave shape is less significant and the average percentage of reduction is reduced as well. The test with the analog circuit shows about a 5-dB decrease in the background noise. 71% of those surveyed know about noise pollution. However, only 37% correctly answered how active noise control works.</p> <p>Conclusions/Discussion Active noise control is more effective with low frequency noises than high frequency noises. The shape of the noise source affects the results of active noise control. The sine and sawtooth function behaved similarly because of their similar shape. Also, active noise control performs better at shorter distances rather than father distances. Finally, people are aware of active noise control and noise pollution, but they are not aware about the details behind these topics. In conclusion, active noise control is affected by the frequency and shape of the noise and by the distance between the noise source and anti-noise source.</p>	
Summary Statement Active noise control works well with low frequency noises and small distances between the noise and anti-noise, therefore headphones are the best application of active noise control.	
Help Received My mother helped format various materials. My father helped build apparatus and edit the report.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Laila M. Nikaien	Project Number J0229
Project Title The Effect of Insulation on the Distillation Process	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my experiment is to determine whether or not insulation materials increase the distillation rate of water.</p> <p>Methods/Materials The experiment includes two identical model distillers with one of the distillers was wrapped in a R-6 Value fiber glass material. The inside of both distillers were painted black to maximize the amount of solar heat absorbed. I then placed the distillers outside , filled both distillers with the same amount of tap water, and placed a glass pane over each distiller. This glass pane condenses the evaporated water and leads the water into the catch basin. The catch basin is placed under the edge of each glass pane. Two tiles were placed at the back end of each distiller to cause the distiller to slant. Data regarding the distilled water, outside temperature, and water temperature were recorded over a period of four days.</p> <p>Results The experimental data collected over a period of four days for the insulated and non-insulated pans show that the insulated distiller produced a total of 180.6 milliliters of distilled water and the non-insulated pan produced a total of 57 milliliters of water. Therefore, the insulated pan produced about three times more distilled water than the non-insulated pan.</p> <p>Conclusions/Discussion After I analyzed the data collected during the experiment, the result of this data led me to conclude that insulation materials do increase the distillation rate. I also concluded that the insulation material was the one variable that resulted in the greater abundance of distilled water.</p>	
Summary Statement The purpose of this experiment is to determine how insulation materials effect the distillation process.	
Help Received My father provided me with helpful tips about the experimental setup. My mother and father provided me with the materials needed to complete this project.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Cameron M. Noland	Project Number J0230
Project Title Which Temperature Is WD-40 the Most Effective in ABEC-5 Black Holl Ball Bearings?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment is to discover at what temperature WD-40 lubricant is the most effective on ABEC-5 Black Ball bearings for roller-skate wheels.</p> <p>Methods/Materials Fabricated industrial plastic racing cars were built in order to simulate a roller-skate wheel. This was need in order to be able to heat and test ball bearings. The cars were made of screws, spacers, fabricated industrial plastic, and ABEC-5 black-hole ball bearings. The racetrack was made of particleboard, pine wood, and crown staples. All sets of ball bearings were sprayed with WD-40 and assembled before heating and cooling. After each ball bearing had reached its desired temperature, the bearings were cooled to room temperature. Bearings were placed in the car and raced. One set of bearings was heated to 120°F in the oven. A second set was left at room temperature. The third set of bearings were placed in the freezer until the temperature reached 32°F. After this, the cars were placed on the track and cars were timed and visually placed in order. After each race, cars were moved over on the track to a different lane. The race were conducted 60 times each day for nine days.</p> <p>Results The bearings, which was heated consistently, reached the bottom of the track first with an average time of 2.57 seconds. The bearing, which remained, at room temperature, was second with the average time of 2.84 seconds. The car in which the bearing was frozen reached the bottom of the track with an average speed of 3.65 seconds.</p> <p>Conclusions/Discussion In conclusion, my hypothesis was incorrect that room temperature would perform at a faster rate than the other types of treated bearings. The WD-40 lubricant preformed better when the ball bearing was heated to a temperature of 120°F. The average difference of speed between the fastest and slowest cars was 1.08 seconds. I found that heating the WD-40 was more effective for use with roller-skate equipment. The WD-40 viscosity became thin; thus making the bearing run more efficiently.</p>	
Summary Statement This project is about the effects of the the temperature of WD-40 and its use in ball-bearings.	
Help Received My father helped me build the race track and the race cars.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Emily A. Ogawa	Project Number J0231
Project Title What Contaminants Introduced to Oil Affect Lubricity the Most?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my project was to show that adding substances to oil affected how slippery the oil was.</p> <p>Methods/Materials These two experiments used eight contaminants. They were salt, sugar, used 10-40 wt. Oil, water, pulverized charcoal, charcoal ash, sand and soil. There was also a controlled trial done with 30 wt. Oil. I mixed one teaspoon of each contaminant with 4 ounces of the 30 wt. Oil. I tested the amount of force needed to pull a 1 pound weight across a 12 inch plexiglass surface covered with an oil solution with a force measurer gauge. Forty trials were completed for each oil mix and control. In the second experiment I determined at what angle the one pound weight slid on the plexi glass surface as I tilted it. The plexi glass was again covered with the same oil mixtures and control as were tested in the first experiment.</p> <p>Results Salt created the least amount of friction in both experiments. My first experiment showed that charcoal ash required the most amount of force to pull the one pound weight across the plexi glass. The second experiment showed that the pulverized charcoal needed the most amount of lift for the weight to fall.</p> <p>Conclusions/Discussion In conclusion to these experiments I found that most of the contaminants that had a more uniform size and shape did not seem to effect the oil as much as the contaminants without uniform size. In addition to this I think that the contaminants with a more uniform size had a ball bearing effect making the weight slide more easily on the plexi glass surface. The charcoal ash apparently had no ball bearing effect on the oil because it may have acted more like a paste when it was added to the oil.</p>	
Summary Statement Finding out what substances effect oil lubrication.	
Help Received Mother helped write down numbers for results, and also helped me edit my writing. My advisor printed out flow chart, table of experiment results, and graphs.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Meghan A. Olsen	Project Number J0232
Project Title Super Shoes	
Abstract Objectives/Goals My engineering goal was to create a mop that would outperform a regular mop, but could be worn on the body. Methods/Materials Material: One old pair of tennis shoes, two blocks of pressed wood, two floor scrubbers, two dish brushes, six feet of plastic tubing, two bottles, one package of Velcro, one old belt, one bottle of Pine-Sol, one bottle of Mr. Clean, 50 surveys. Method: I put seven different things on tile and linoleum floors and tested my shoes against a regular mop using two different floor cleaners. Results My Super Shoes work as well as a regular mop. The only problem was that there was still residue from the food after the food dried. The bottoms of the pads also got dirty from the chocolate sauce. Conclusions/Discussion My conclusion is that my Super Shoes do work, but they don't outperform a regular mop. I think that they would help people with bad backs because they don't make you bend over as much.	
Summary Statement I invented a mop that can be worn on the body.	
Help Received Mother helped type report.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Brian W. Peterson	Project Number J0233
Project Title Going, Going, Gone: The Corking of Wooden Baseball Bats	
Abstract	
Objectives/Goals My project was to determine whether Professional Baseball players are receiving better performance by corking their wooden baseball bats.	
Methods/Materials Three wooden baseball bats of the same kind, shape, and weight were filled with a different material, steel, aluminum, wood, and cork. A ball was attached to a string and dropped from three different fixed points onto each baseball bat.	
Results The cork filled baseball bat made the ball rebound back the farthest. Then the aluminum, wood, and the steel.	
Conclusions/Discussion According to my final results, the cork bat rebounded the farthest. I now know that cork and aluminum have more elasticity than wood. Maybe the idea of corking a bat is right, but cheating isn't	
Summary Statement Does corking a baseball bat make a better hitter?	
Help Received Machine shop for holes in bat	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Lindsey R. Preovolos	Project Number J0234
Project Title It's to the Wall, at the Wall, and It's Gone	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective for my project is to see which brand of softball travels the furthest. My hypothesis is that the Worth brand will travel the furthest.</p> <p>Methods/Materials To conduct this experiment I had to build a machine that would hit the balls with the same amount of force each time. I used six 12" softballs manufactured by Dudely, Rawlings, Easton, Worth, and Wilson. Each ball was hit eight-teen times, and all of the distances were recorded. The average of the distances was found to see which brand traveled the furthest. The machine was built out of wood, primarily 2" X 4"s. It also has an 11" spring, 3" X 5" metal plate, and many screws and nails of differnt lengths.</p> <p>Results The results ended up being that the Rawlings brand of softball traveled the furthest, followed by Easton, Worth, Wilson 17, Wilson 15 and Dudely.</p> <p>Conclusions/Discussion The results from my experiment proved my hypothesis wrong, the Worth brand did not travel the furthest.</p>	
Summary Statement My project is to try to figure out which brand of softball travels the furthest.	
Help Received Father helped build the machine, and helped record data. Mother helped with backboard. Teacher helped organize all materials.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Zach R. Schmidt	Project Number J0235
Project Title Gone with the Wind Turbine	
Objectives/Goals The purpose of this project was to find out which wind turbine design generates the most electricity. The variables I chose were a Two-Bladed Horizontal Axis Wind Turbine (HAWT) and a Four-Bladed HAWT.	
Abstract Methods/Materials I built the wind turbine blades out of balsa wood and used a small 3 Volt hobby motor for the generator. I also soldered a network of 5 switches and 5 Ohm resistors so that as more resistors were switched on, the resistance decreased, which increased the electrical load on the generator. A gearbox was also added to increase the speed of the motor, since the motor was designed to spin at 11,000 RPM. The wind turbine was tested in a wind tunnel made of cardboard and powered with a 3 speed household fan. Measurements were made using a Digital Volt Meter (DVM). Determining electrical power from the measurements was done by using Ohm's Law, which states: to find power (Watts) you divide Volts squared by Ohms. The variables in this test were: 2 blade designs (2 and 4), 3 wind speeds, 3 gear ratios, and 6 resistor loads, for a total number of measurements of 108.	
Results The two bladed turbine produced more electricity than the four bladed one with a gear ratio of 1:1 and 4:1 because it was lighter. But it could not start up with a gear ratio of 16:1 at wind speeds of 12 and 18 mph because it did not have enough torque to rotate. The four bladed turbine produced more electricity than the two bladed one with a gear ratio of 16:1 because it had more torque than the two bladed turbine.	
Conclusions/Discussion According to my results, my hypothesis was both correct and incorrect. Different turbines work better than others in different conditions. This is probably why wind turbine manufacturers are always coming up with new wind turbine designs for different conditions. I also concluded that the power curves for wind power and electrical power have the same shape for the wind speeds that I tested.	
Summary Statement The purpose of this project was to find out whether a Two-Bladed Horizontal Axis Wind Turbine (HAWT) or a Four-Bladed HAWT wind turbine design generates the most electricity.	
Help Received Mother helped edit and type report. Father helped finance the project and supervised the research.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jonathan P. Schrantz	Project Number J0236
Project Title Derby Cars: How to Ace the Race	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project was designed to determine what car shape with various weights goes the fastest. The hypothesis is that small, heavily weighted cars go the fastest.</p> <p>Methods/Materials Three unique car shapes were made. One car was shaped like a rectangular brick. Another car was aerodynamically shaped like a brick with sanded edges and a dome top. The third car was shaped like a plate and was small, perfectly flat, and had sanded edges. The cars went down a ramp and up another side and the Delta H was recorded. Delta H is the height the car started at minus its highest height on the other side. The lower the Delta H, the farther up the ramp the cars went. The cars were tested with different weights. They were tested with no weight, 42.85 grams of additional weight, and 85.7 grams of additional weight. Ten tests were done with each car with each amount of weight. Therefore there were 90 total tests. The car axles were polished to reduce the amount of friction. They were also lubricated before each set of testing to reduce friction.</p> <p>Results According to the laws of physics the small plate like shaped car with the most amount of weights should go the fastest. The laws of physics were shown to be true and the small aerodynamic car with the most amounts of weights went the fastest.</p> <p>Conclusions/Discussion Derby cars that are streamlined and have greater mass go faster than any type of cars.</p>	
Summary Statement This project was designed to determine what derby car shape with various weights goes the fastest.	
Help Received Father helped with project set-up	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Anton N. Sepetov	Project Number J0237
Project Title The Movement of Objects through a Congested Area: Traffic Jams and Traffic Flow	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objectives are to find the factors that influence traffic flow, to find out how to increase traffic flow and to decrease the number of traffic jams, and to describe traffic flow in terms of physics.</p> <p>Methods/Materials Both a physical model and calculations were used to meet the project objectives. A mechanical model imitating traffic flow was built. 3.175 mm brass balls were used to imitate the cars and aluminum walls mounted on a board imitated different types of roads. A single lane track, a double lane track, and a double lane track that turns into a single lane track and back into a double lane track (DSD) were built. 20,30, and 40 balls were released in the single lane track and 40, 60, and 80 balls in the double lane track. These were compared to see on which of the tracks the balls would roll first into the reservoir area. For the corresponding number of balls, ten trials were made. The single lane track was compared with the DSD track by releasing 20, 30, and 40 balls in ten trials each. The numbers of cars that pass a certain point on a road in an hour (road throughput) for different speeds of the cars were calculated by using algebraic calculations. The purpose of this was to determine the speed that cars need to be traveling in order to have the most cars pass through in a given time period.</p> <p>Results For the double lane and single lane experiment, the double lane track had the balls roll into the reservoir area first most of the times (eight out of ten). For the single lane and the DSD lane experiment, the single lane track had the balls roll into the reservoir area first most of the time (seven out of ten). For the calculations, it was found that when the velocity of the cars is too high, the road throughput decreases. The road throughput is maximum at an approximate speed of 20 mph.</p> <p>Conclusions/Discussion From the mechanical model, it was concluded that if you have a mountain or something that acts as an obstruction, and you want to build a DSD lane road, traffic flow may decrease and traffic jams will occur. From the calculations, it was concluded that if cars travel at a high speed, less cars will be able to go through the road in a certain amount of time. The reason for this is that as speeds increase, the cars must maintain larger distances between them. In this project, I learned how to understand traffic flow better by using physical principles and mathematical calculations.</p>	
Summary Statement In this project, a mechanical model was built and calculations were made to describe traffic flow and traffic jams.	
Help Received Mother and Father helped in monitoring experiments and gave advice; Neighbor helped with the project board.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) John M. Shinaver	Project Number J0238
Project Title Assessing the Ability of Various Materials to Absorb Sound	
Abstract Objectives/Goals The objective of my project is to determine which common insulating materials possess the best sound absorbing and sound reflective qualities. My goal was to devise a simple test apparatus that would allow a standard way for me to test different materials so that I could accomplish my objective most accurately. Methods/Materials I used eleven different insulating materials (not counting my control - which was no insulator at all); I used a testing chamber constructed of plastic three litre soda bottles, felt, and plastic mesh; and I used a decibel meter. I used an audio tape recorder on which I recorded ten different sounds. I then played each of these sounds, five times each, through the chamber containing each different insulating material (and my control). The decibel meter was at the output end of the chamber, and I recorded each reading. Results I found that different insulating materials had different sound absorbing/reflective qualities. I found that one of the best sound absorbers was common ceiling insulation of the type that is sprayed into the ceilings or ordinary homes. I also found that different types of sounds, even played at the same volume, produced different results with different materials. Conclusions/Discussion I found that my original hypothesis - that materials of a lighter, less dense, nature would absorb sounds less effectively -- was true. My second hypothesis - that sounds of a lower pitch would be absorbed by the materials much more than sounds of a higher pitch were not entirely correct. The lower, deeper sounds were not absorbed as well as I expected.	
Summary Statement Testing the sound absorption qualities of various insulating materials.	
Help Received My parents and sister helped me in obtaining the raw materials and sound, and collecting the data.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Samuel J. Smith	Project Number J0239
Project Title Which Material Will Most Efficiently Reflect Sound?	
Abstract Objectives/Goals The objective of my project was to determine which types of surfaces (materials) would most efficiently reflect sound volume, as measured by a decibel meter. I believe that metal siding will most efficiently reflect sound. Methods/Materials I used the following type of materials for my surfaces: wood, metal, brick and stucco. Before testing, a pattern was measured and marked in front of each material. The pattern went from 10 feet to 40 feet directly behind the materials and along a 45 degree angle to 40 feet. A stereo with a constant sound was placed facing the material, 5 feet away and 6 inches off the ground. To make the ground surface constant a piece of carpet was placed between the material and stereo. Foam insulation panels were used to stop sound coming from the back of the stereo, another panel was used behind the decibel meter to limit background noise. Testing was done 20 times at each material and in each position. Used an average for results. Results My results conclude metal siding was the most reflective in all but two cases. One case was at 40 feet directly behind the material - brick was the most reflective. The second case was when brick was tested 30 feet behind the material and 30 feet along a 45 degree angle. The wood material was the least reflective in all cases except for one. The test on 10 feet behind the material and 10 feet along a 45 degree angle was stucco which was the least reflective. Conclusions/Discussion My objective was correct in most cases. Metal surfaces will on average reflect the highest percentage of the original input of sound. In most cases wood consistently reflected the least amount of sound. I believe the reason for the certain uprise in the decibel level for the bricks is like when Mount St. Helen's blew its top, the people closest to the mountain didn't hear it blow up as loud as the people farther away from the mountain. From my testing I learned sound doesn't travel in a straight line, it travels in a wave like the ocean. After completing this project I have a better understanding of how to setup the speakers on our schools sound system.	
Summary Statement How well will sound reflect using various wall surfaces at predetermined distances?	
Help Received parents-helped board layout and title; Music Director-loaned constant sound meter; Sound Stage spent time talking to me; Science Teacher-helped with title.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Joe V. Stella	Project Number J0240
Project Title The "ICEBOARD"	
Abstract Objectives/Goals I created my project because of my passion for skateboarding. I thought of how to invent a skateboard that could be used on ice. By interchanging the wheels to blades, this would enable kids to "skateboard" in all kinds of climates. Methods/Materials Using one of my street skateboards and the blades from my hockey skates, I exchanged the wheels for the blades. I needed to hacksaw the blades in half, file the edges, cut aluminum sleeves to mount them on the axles of the trucks, and tighten the blades down with nuts. Results Using my own idea of studded shoes for traction, I took the "iceboard" to the ice rink and proceeded to test it. I found that the "iceboard" functions on ice in much the same way that a skateboard functions on a concrete surface, allowing the rider to skate, perform turns, tricks, and stop on the ice. Conclusions/Discussion Using the necessary materials I was able to create my project and have it be successful on ice. I feel that the "iceboard" opens up many more options for people to enjoy year-round skateboarding without limitations due to weather conditions.	
Summary Statement A skateboard that is interchangeable from street surface to ice.	
Help Received My Mom typed my own words for the report, and my Dad helped me use the hacksaw.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Cory E. Stevenson	Project Number J0241
Project Title Light, Mirrors, Heat, and Water	
Abstract Objectives/Goals My goal for this science fair project was to test how mirrors effect the water production rates of solar distillers. Methods/Materials I used three solar stills, a parabolic mirror, and a flat mirror. I built both the stills and the mirrors. I placed the three stills out for 11 (24 hour) periods (aprox. 9:00pm-9:00pm) and placed the two mirrors behind two different stills. One of the stills had no mirror and was left as a control sample. I collected the data on temperatures in the afternoon (1:00pm-3:00pm) each day. I then collected the water that each still produced and recorded the data at the end of each 24 hour period. Results My results were that the still with the parabolic mirror produced on average 51% more distilled water than the control. The solar still with the flat mirror produced 22% more than the control, on average. Conclusions/Discussion I learned that mirrors do improve the water production of solar stills. Specifically the parabolic mirror helps water production more than the flat mirror and the flat mirror produced more than the control. My results supported my hypotheses that mirrors would augment the stills water production and that the parabolic mirror would increase water production the most. This experiment shows an effective way to signifcantly improve the production of drinkable water from water with sediments or contaminants.	
Summary Statement This project was to test how mirrors would affect the fresh water production of solar distillation systems.	
Help Received My father helped build stills and mirrors and helped troubleshoot my tests. My mother helped proofread my report.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Emily Jane Stover	Project Number J0242
Project Title Solar Powered Micron-Sized Contaminator Filtering Mailbox	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective is to build a system inside a regular household mailbox that can filter mail that has been "cross contaminated" by Anthrax particles. Anthrax spores are one micron in size and a typical micron filter can capture these dust like particles. A renewable energy source is used to support the system.</p> <p>Methods/Materials To design this product, I had to over come several obstacles; 1)How to get particles off envelopes 2) How to develop a filtering system 3)How to get the particles o the filtering system 4) How to power all these functions at a location removed from a homes source of electricity. The rural-type mailbox contains a perforated drum that spins much like clothes dryer. The particles fall to the bottom of the mailbox. A fan--on a timer-- blows this fallen dust to the back of the mailbox through a funnel and into a removable micron filter. The moter that spins the drum and the fan are powered by renewable solar energy. The system was tested by weighing the powder substance--baby powder was usedas a sample because it is one micron--before putting it on the envelopes. The envelopes were then spun and filtered. The powder in the filter was weighed.</p> <p>Results The system was tested 25 times with the timer set between five minutes and 30 minutes. At five minutes, zero grams of powder were recovered. At 30 minutes I was able to recover 30 percent of the powder measured in grams.</p> <p>Conclusions/Discussion The moderate success of this mailbox suggests that there are preventive methods individuals can use to remove contaminates from mail. Continued product improvements such as larger fans and more sophisticated aerodynamic designs are being tested to achieve higher success rates. I am continuing to study the cost effectiveness of the personal preventive method versus the corporate postal service's reactive method.</p>	
Summary Statement I built a filtered mailbox system that eliminates the contamination of mail by small particles containing diseases.	
Help Received Dad explained mechanical advantage. Borrowed a scale from Dad's work. Talked to engineers Eric Vaughn and Tony Fink about testing results.	



CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s) Celeste E. Wychopen	Project Number J0243
Project Title Can Young Children Open a "Child-Resistant" Bottle?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective in conducting this experiment was to challenge the assumption that #child-resistant# bottles are safe. I hypothesized that #child-resistant# bottles would not be able to prevent children between the ages of three and six from opening them. I believed that some children would possess the intelligence or strength to open these bottles.</p> <p>Methods/Materials Two identical #child-resistant# medication bottles with common #safety# caps were obtained. The parameters for my experiment included a three-minute time limit (measured with a stopwatch) and a three to six year old age range. To motivate the students to open the bottle, I told them that there was a ticket inside which they could redeem for a prize. I explained the hazards of opening medication bottles at home. The teachers reiterated this point. To increase the size of my sample (Copperopolis School has only two kindergarten/first grade classes, both of which I tested) one of the medication bottles was given to my twenty-nine year old sister, for testing outside of Copperopolis Elementary School. My sister conducted experimentation with her pre-school students with the same parameters and data recording methods that I used with my kindergarten and first grade students. The test was carried out on a total of 61 students.</p> <p>Results Twenty-one of the tested students were able to open the #child-resistant# medication bottle, proving my hypothesis correct.</p> <p>Conclusions/Discussion I have concluded that #child-resistant# medication bottles are not able to keep children from opening them and conceivably ingesting the contents. These results bring to light the need to improve #child-resistant# bottles to prevent possibly fatal tragedies.</p>	
Summary Statement How safe are "child-resistant" bottles.	
Help Received Parents assisted and instructed with word processing program; adult sister helped gather data	