



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Emily E. Bardo	Project Number J1001
Project Title Thermostat of a HayBurner	
Objectives/Goals My objective was to test whether feeding hay would affect a horse's internal body temperature. My hypothesis was that the horse's internal body temperature would rise with the consumption of hay.	
Abstract Methods/Materials I tested twenty horses before and after feeding hay to test my hypothesis. First I took the horse's internal body temperatures using a livestock thermometer. Then I fed the horses and waited for two hours for them to eat the majority of the hay. After they had eaten I took the horse's temperatures again, to see if digesting the hay created heat. In my control group I didn't feed the horses in between taking their temperatures, but waited the same amount of time (two hours), to see if it was really the hay that was raising the horse's temperature, and not a diurnal cycle.	
Results In this study I found that a horses temperature does rise with the consumption of hay. Here are my results. On average when the horses consumed hay, their internal body temperature rose .2 F to .3 F; the temperatures were normally between 99° F and 100° F. In my control test, the temperatures of twelve horses decreased (60%), five didn't change (25%), and three horses temperatures went up (15%). In my regular tests, nine decreased (6%), eighteen stayed the same (13%), and one hundred and thirteen increased (81%).	
Conclusions/Discussion My results did support my hypothesis because the horse's temperatures did rise when they consumed hay. In conclusion when you feed a horse hay, their internal body temperature rises. I believe the reason for this is; hay creates heat when it is digested because it is quite fibrous so it is hard to digest. The benefit to the horse owner is, they will know that if they want to keep their horse's temperature up on a cold day, they need to feed the horse more hay. If I were to do any further studies, I would test to see if a horse's temperature rises if you give it grain. I might also do an evening test to see if I get the same results.	
Summary Statement My project was to test if feeding a horse hay would effect their internal body temperature.	
Help Received My parents helped me brain storm the project topic. Mr. Pittenger, my science teacher, helped me think through my variables, control group, and what type of graph to use. My mom mail ordered the digital veterinarian thermometer I used. Dad helped me write the legal release forms for the horse owners.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Tyson E. Bodkin	Project Number J1002
Project Title Murderous Mice: A Study of Peromyscus maniculatis on the San Mateo Coastside	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to identify differences in the population of peromyscus maniculatis (deer mice) inhabiting a humanly populated area of San Mateo County compared to an area of San Mateo County without human population. This project will help to determine if there is any threat from deer mice to humans from diseases they carry, such as plague and hantavirus.</p> <p>Methods/Materials Two areas in San Mateo County were selected and permission was obtained in order for my experiment to be conducted. On Day 1, 75 traps were placed, and mapped in two areas: populated and unpopulated. In each area, three traplines were set with 25 traps in each trapline. On Day 2, the traps were checked in numerical order and flagged if mice were caught. We geared up in safety clothing and laid out our identifying materials. Mice were transferred from their traps and identified relative to their species, sex, and developmental stage. After the mice were identified, they were released back into the areas they were caught.</p> <p>Results A total of 41 mice were caught: 25 (61%) in the non-populated area and 16 (39%) in the populated area. The capture rate was higher in the non-populated area where 33% of the traps had mice, compared to the populated area where 21.3% of traps had mice. In the populated area, 14 of 16 mice (87.5%) were deer mice, compared to the non-populated area, where 9 of 24 mice (37.5%) were deer mice.</p> <p>Conclusions/Discussion The prevalence of deer mice was more than double in the populated area (85.5%) compared to the non-populated area (37.5%). However, more numbers of mice were found at the non-populated area. The high prevalence of deer mice in the populated area suggests that humans may be at increased risk of becoming infected with deadly diseases carried by the deer mouse, such as hantavirus. The lack of species diversity in the populated area is likely due to environmental factors, such as habitat.</p>	
Summary Statement Differences in the prevalence of deer mice in humanly populated compared to unpopulated areas of San Mateo County.	
Help Received Mother helped type small amount of report and assisted with graphics. Materials and technical background for mouse trapping were provided by the San Mateo County Mosquito Abatement District (SMCMAD). Trapping was conducted under the supervision of Dr. Chindi Peavy, vector ecologist at	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Tierney R. Burke	Project Number J1003
Project Title Tell Tale Footprints: Determination of Stature from Foot Length in Forensic Cases	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project is to study the relationship between the human foot length and the individual's height. It examines if the size of a footprint at a crime scene can be used to assess the approximate height of the individual, and narrow the possible suspects considered as crime perpetrators.</p> <p>Methods/Materials A sample of 22 individuals (11 male, 11 female) was used to draw inferences about the general population. Measurements of foot length, height, and shoe size were evaluated. The "best-fit" line was drawn through the scatter plot (foot length versus height) to determine if a correlation between foot size and height was observed. Shoe impressions in the soil were made, and plaster of paris molds prepared.</p> <p>Results The predicted percent for the ratio between foot size and height was 15%. The actual range for the percent foot size/height was 13.9 to 16.7% (variation range of -1.1 to +1.7). The equation from the plot of foot length versus height ($y = 60.424 + 4.246*x$) found that the relationship was 15.2%. The equation from the plot of shoe size versus height ($y = 137.096 + 3.761*x$) found the relationship was 17.5%.</p> <p>Conclusions/Discussion The foot measurement yielded important predictive information about the individual's height. Valuable assistance in solving crimes is gained through comparing shoe impression casts with actual shoes. Identifying marks and wear patterns can be used to match the shoe with the print to the exclusion of all others. Bones, and impressions left by foot bones, are key in solving many crime cases.</p>	
Summary Statement The observation of footprint impressions at a crime scene can be important evidence that links a suspect with a crime.	
Help Received	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Laura M. Bustillos	Project Number J1004
Project Title Left, Left, Left, Right,... Left? Are Most Horses Left Handed or Right Handed?	
Abstract Objectives/Goals The objective of my project was to find whether most horses were left handed or right handed. I believed that most horses were left handed and I wanted to see if this was true or not. Methods/Materials I used 25 horses to do my experiment. I rode each horse over a jump to see which lead they were most comfortable with. If the horse was in a right lead canter (a canter where the right leg leads in front) this would mean that the horse was right handed. If the horse was in a left lead canter (a canter where the left leg leads in front) this would mean that the horse was left handed. To be sure of this, I jumped each horse 10 times. Results Out of the 25 horses, 7 of them were right handed and 18 of them were left handed. Conclusions/Discussion My objective was proven and my hypothesis was supported. My results proved that my hypothesis was correct. Most horses are left handed. When I tried to get each horse in the opposite lead in which they were most comfortable with, I found it was quite difficult and it didn't look as attractive as when they were in their natural lead.	
Summary Statement I first thought that most horses were left handed, so I tested it out and found that my hypothesis was correct and that most horses are left handed.	
Help Received My friend Alex Stratman helped me by jumping 5 of the horses.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ian J. Charlton	Project Number J1005
Project Title What You DO NOT See - and Why You Don't See It	
Abstract Objectives/Goals The purpose of my project was to measure the perceived blind spot OF each eye. The perceived blind spot is an extension of the blind spot IN the eye at the point where the Optic Nerve enters the back of the Retina. My Hypothesis was that, at an individuals arms length, the perceived blind spot was between 3 and 4 centemeters. Methods/Materials I designed my own blind-spot test sheet and tested 25 subjects at random. The results of the testing were tabulated and analyzed. Results On an average basis, the data supports my hypothesis. The average width of the perceived blind spot was in the 3 to 4 centemeter range. I discovered a wide range of widths, and my data indicated that the right eye had a larger perceived blind spot than the left eye. A distribution analysis of my test results does not support my hypothesis. Conclusions/Discussion I consulted an Optomotrist, Dr. Bette Gould, who knew of no reason why the width of the right eyes blind spot would be significantly different than the left eyes'. She did suggest that my testing may have been flawed if I did not ensure that the test sheet was centered directly in front of the subject. Were I to repeat this test I would correct this oversight. Most people are not aware that they have a blind spot, since it does not normally impact what we see with both eyes. Once aware of their blind spots, people are intrested in knowing that it should remain the same for all of their life unless they have eye damage or damge to the optic nerve.	
Summary Statement My project was about measuring and analyzing the perceived blind spot of each eye.	
Help Received My parents helped with loading my test data into our home computer. They also helped with my presentation material and with the project layout. I interviewed Dr. Bette Gould who provided some expert advise and a sample of an "Amster Grid" which shows the actual size of the blind spot IN each eye.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Deanna C. Duncan	Project Number J1006
Project Title Which Characteristics Make a Difference in Your Peripheral Vision?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine if peripheral vision is affected by the variables of gender, athletic history, eye color, glasses, handedness, brightness of light, and an object's color.</p> <p>Methods/Materials A vision protractor was made from cardboard and measuring tapes. Parent consent and individual surveys were obtained from fifth, sixth, and seventh graders. The peripheral vision of these twenty students was tested using the peripheral vision protractor. Both eyes of each subject were tested in bright light and dim light using four colored shape printouts. Vision results were measured in centimeters. A total of sixteen test runs per subject equaled 320 total test runs. Results were graphed and compared.</p> <p>Results Brightness of light and the object's color had the greatest affect on peripheral vision. Bright light made it easier for people to see color. The object's color had an impact on the subject's peripheral vision. In both dim and bright light, red was the easiest color to see.</p> <p>Conclusions/Discussion Brightness of light improved peripheral vision as compared to dim light. The most difficult color to see in bright light was green. Subjects often confused the color green with gray. Both of these colors resulted in the lowest averages because of this mistake. For both eyes, red objects were easier to see in both bright and dim light.</p>	
Summary Statement My project explores the personal characteristics and testing conditions that produce differences in peripheral vision.	
Help Received Mother helped edit writing, father helped use Excel for graphing, Project Advisor reviewed project binder	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Matt S. Ferrante	Project Number J1007
Project Title The Water is Hot, How Are Your Vitals? A Study of the Effects of Hot Tubs on Blood Pressure, Pulse, and Body Temperature	
Abstract Objectives/Goals The purpose of my experiment is to determine if hot tubs have the same effects on the vital signs of a prepubescent compared to a pubescent teenager or adult. Methods/Materials To derive results; 12 females under the age of 13, 8 females over the age of 13, 17 males under the age of 13, and 6 males over the age of 13 were tested. During the testing, a sphygmomanometer, a thermometer, and a hot tub were used. Subject's vital signs were taken, and they sat, shoulders under the water, in a 103 degree hot tub. After 15 minutes, their vital signs were taken, and again after another 10 minutes. After this test, subjects got out and waited 10 minutes and had their vital signs taken again. Results When in a hot tub, the subjects' systolic blood pressure dropped after 15 minutes, then remained steady during the next ten minutes. After getting out, it rose to slightly above normal; diastolic blood pressure dropped, remained steady, and after getting out rose to slightly below normal. Pulse and body temperature rose, continued to rise, and after getting out, dropped to slightly above normal. The youths under the age of 13 had a larger change in body temperature and pulse, whereas adults had a larger change in blood pressure. Gender, on the other hand, had no serious impact. Conclusions/Discussion Hot tubs have varied effects on the blood pressure, pulse, and body temperature of humans. Hot tubs do not have the same effects on prepubescents as on pubescent teenagers and adults; however, hot tubs have the same effects on the vital signs of males and females.	
Summary Statement My project showed how a hot tub effected the vitals of different age and gendered people.	
Help Received Mother helped read thermometers when testing multiple subjects at the same time.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Abraham Guerrero; Scott Mendoza; Sumner Thomas	Project Number J1008
Project Title Deer Deer Me	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To find deer population in Anderson Valley.</p> <p>Methods/Materials 1. To sample randomly throw a rock. 2. Two students pull string taut. 3. Students walk in circle, while keeping taut. Count the pellet groups in the plot. 4. Do another transect at the same site. Record the information. 5. The area of the circular plot is .01 acres we sampled $X = \text{plots}$. Example: $.01 \times 20 = .2$. 6. How many fecal pellet groups counted by group? 7. We must now convert the number of fecal pellet groups found on Internet Example: $.2$ acres to the number found on one acre. Example: (Total pellet groups or) $100 / .2 = 800 / 1.0 = (\text{total acreage sampled})$. 8. Deer defecate 13 times a day, so divide 13 into the total pellet groups per acre to find (deer days) use per acre. 9. We are trying to calculate the number of deer per square mile. There are 640 acres in a square mile. 10. Because there are 365 days in a year# Example: $365 / 24960.00 = 68.38$ or 69 deer per sq. mile.</p> <p>Results We took 20 transects or plots. $.01 \times 20 = .2$ acres (A circular transect is .01 acres.) We found 35 fresh pellet groups. We must change $.2$ acres into 1 acre. 35 fresh pellet groups divided by $.2$ acres equals 175 fresh pellet groups over 1 acre. Deer defecate about 13 times a day $175 / 13 = 13.46$ round up. There are 640 acres in a sq. mi. $14 \times 640 = 8960$ "Deer days use per sq. mi. in Anderson Valley" There are 365 days in a year. $8960 / 365 = 24.54$ round up to 25 deer per sq. mi. We estimate there are about 25 deer per sq. mi. in Anderson Valley. In Price County there were estimated to be 17-25 deer per square mile.</p> <p>Conclusions/Discussion Our hypothesis was that we believed that there would be about 10 deer per sq. mi. We thought this because deer are very territorial and are usually seen in groups of ten. Our results were 25 deer per sq. mi. We got our hypothesis wrong because we were thinking that there would be 1 group per sq. mi. There really are about two groups of deer per sq. mi.</p>	
Summary Statement We estimated deer population using circle transect plots and fecal pellet counts.	
Help Received Our parents provided transportation to project site.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) MacKenzie M. Hart	Project Number J1009
Project Title Contracting Pupils: Are Cat Eyes Faster than Human Eyes?	
Abstract Objectives/Goals The objective of my project was to determine whether or not the pupils of cat#s eyes contract faster than the pupils of human#s eyes when exposed to light. Methods/Materials My test subjects were three humans and three cats. The equipment used was a Sony DCR-TRV900 digital video camcorder. I focused the camera on each subject#s eye to clearly see the pupil. I turned off the light to allow the pupils to dilate. I turned on the light and recorded the subject#s pupil as it contracted. I conducted five trials for each of the subjects. When all trials were complete, I played back the recorded video to watch the pupils contract frame by frame and recorded the contraction times. I averaged the results for each test subject. Then, I averaged the results for all cats and for all humans. Results The average response time of the cat#s pupil to the light turning on was 4.7 frames. Human#s average response time to the light turning on was 5.1 frames. The time it took for cat#s pupils to complete contracting was 37.1 frames. The time it took human#s pupils to complete contracting was 39.1 frames. Conclusions/Discussion Cat#s pupils and human#s pupils contract approximately at the same rate and have a similar response time to light.	
Summary Statement I researched whether or not cat#s pupils responded faster to light than human#s pupils.	
Help Received Mom and dad helped me hold the cats and work the camera; Mom loaned me the camera and helped with Adobe Photo Shop; Dad helped me with Microsoft Excel and with analyzing the data.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Andia Heydari; Megan Theiman	Project Number J1010
Project Title Do Leonrado DaVinci's Golden Measurements Remain Constant over One Year's Growth? (A Two Year Study)	
Abstract Objectives/Goals Objective: The purpose of this project is to determine if Leonardo DaVinci's Golden Measurements remain constant over one year's growth. Methods/Materials Method and Material: We used a centimeter measuring tape to measure 13 body features of 100 6th graders and 13 body features of 100 8th graders, recording the measurements on a table. Next, we compared the data that we found last year to this year's data to find out if their measurements remained constant over one year's growth. Results Results: We found out that the 7th /8th grader's proportions remained more constant over one year's growth than the 5th /6th grader's proportions. Conclusions/Discussion Conclusion: Our hypothesis was not supported by the results. We predicted that the 5th/6th grader's proportions would have remained more constant over one year's growth rather than the 7th/ 8th graders'. Instead, facial features in 5th/6th graders came closer to Leonardo DaVinci's Golden Measurements rather than the body proportions.	
Summary Statement A comparison of Leonardo DaVinci's Golden Measurements over a one year's growth in junior high students.	
Help Received We received help from our science teacher, Mr. Steve Duerr. He helped with the design of the experiment and he helped us make our graphs in Microsoft Excel. Also, our language arts teacher, Mrs. Erica Andrews, helped edit our report.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Caitlin J. Jordan	Project Number J1011
Project Title Stranded: An Analysis of Marine Mammal Rescues on the North Coast	
Abstract Objectives/Goals My objective was to aggregate data elements from files of rescued marine mammals (pinnepeds) at the North Coast Marine Mammal Center for the years 1997 through 2001. I wanted to analyze the data for seasonal and annual trends as well as patterns in the strandings for species and ages of the animals. I expected to see an increase in reported rescues each spring during the pupping season because pups and their mothers are vulnerable during the spring months each year. Methods/Materials I read every file of the animals rescued by the staff of the North Coast Marine Mammal Center in Crescent City, California. The files contain information entered by the Center veterinarian and each of the staff members who cared for the animal. I collected data on the date of rescue as well as the animal's apparent age, species, sex, condition at discharge and discharge disposition. I made graphs of the data elements and looked for patterns and trends over time, age groups, and among species. Results The files primarily included rescues for three species: <i>Phoca vitulina</i> , <i>Zalophus californianus</i> , and <i>Mirounga angustirostris</i> . The graphs show both an increase of rescues and an increase in the number of pups rescued during the spring months. I also noted overall increases in the reported rescues during some years, especially during the winter and spring of 1998. I noted that during that period, the increase in rescues of one species, the Northern Elephant Seal (<i>M. angustirostris</i>), was not as great as the observed increase in rescues for California Sea Lions (<i>Z. californianus</i>) and Harbor Seals (<i>P. vitulina</i>). Conclusions/Discussion Spring seems to be a time of increased rescues on the North Coast. The youngest animals are the most vulnerable but human interaction is also more likely when the weather improves in spring. Unusual sea and weather conditions due to the "El Nino/Southern Oscillation" conditions during 1998 may have contributed to an increase in marine mammal rescues. The ENSO phenomenon includes changes in the thermocline in near shore waters that may affect the ability of some species to feed.	
Summary Statement I aggregated data on date, species, age, sex and outcome for marine mammals rescued by the North Coast Marine Mammal Center during the years 1997 through 2001 and looked for patterns and trends.	
Help Received The North Coast Marine Mammal Center gave me access to all of the files for each animal rescued from 1997 through 2001 and staff helped me understand the contents of the files.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Aditya Kashyap	Project Number J1012
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Project Title
Effect of Various Concentrations of Glucose in Solutions on the Oral pH of Humans and Does Genetics Affect the Outcome?

Abstract

Objectives/Goals
To find a threshold concentration of glucose in a solution under which it has no effect on oral pH. To find if genetics can affect how prone one is to tooth decay

Methods/Materials
-----Material----- 16 Families; 50 people; pH strips with 0-14 level range; 100 ml of water; as much glucose as needed; graduated cylinder; measuring cup
-----Procedures----- Give your test subject water with concentrations of glucose at 10%-90%. Ask your test subject to rinse their mouth with the solution and wait for approx. 2 minutes. Make them spit it out into a sink and now, take the oral pH level of your subject and record your result. Also, record which family the test subject is a member of, if any. Repeat steps 3-8 with the different "glucose-concentrated" solutions (25%, 33%, 50%, 65%, 75%, 85%, and 90%. Be sure to make them with water thoroughly so no glucose from a previous test is left in their mouth, which might affect the results of the next test. For the family members, who are all brothers and sisters, also analyze the condition of their teeth and find out how many fillings they have.

Results
The threshold concentration of glucose in a glucose mouthwash is 50%, under which there is no effect on the oral pH level of humans. Also, I found out that after consuming a glucose concentration of 90%, 60% of the test subjects were at a medium degree of proneness, or a 50% chance of tooth decay. Each family and its family members had a unique pattern of reactions to glucose, while there was no consistency amongst random individuals or among families.
Also, I found out that the few Asian families all were less prone to tooth decay than the other American families because their normal pH level was higher than others and their pH levels never dropped lower than 6.5, almost a normal level.

Conclusions/Discussion
Also, now that people know that an 85% or 90% glucose solution can increase the chances of tooth decay, I think people should find out what the glucose concentration of their mouthwash is. If it is higher than 75% then perhaps they should stop using it in order to decrease their chances of a cavity. Finally, now that we know that there is probably a chance that genetics has something to do with people being more prone to tooth decay than others, people can stop blaming themselves for getting cavities and not brushing.

Summary Statement
The effect of different concentrations of glucose in a solution on the oral pH of a human and can genetics determine how prone one is to tooth decay?

Help Received
Mother helped make solutions



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Jaye M. Kasper	Project Number J1013
Project Title Does A Simple Stretching Program Increase Flexibility in the V-Sit Reach?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I wanted to find out if a simple 5 minute stretching program to be done daily over 3 weeks would significantly increase a person's flexibility in the V-Sit Reach. The V-Sit Reach is a flexibility test that is performed sitting down. The subject bends forward as far as possible, with arms outstretched. The V-Sit score is how many centimeters the middle fingertip extends past the feet.</p> <p>Methods/Materials Thirty six middle school students were divided into two groups, consisting of 17 subjects in a Training group (daily stretchers over 3 weeks) and 19 subjects in a Non-Training group (who only participated in the initial and final V-Sit Tests). I measured their flexibility 3 weeks apart to obtain 2 different V-Sit scores using a 74.5 cm wide exercise mat and measuring tape with centimeters. The Training group did a 5 minute daily stretching routine that I designed. It contained 5 stretching exercises.</p> <p>Results The Training group's average initial V-Sit score was 9.4 cm and decreased 0.6 cm to make 8.8 cm for their average final V-Sit score. The Non-Training group's average initial score was 6.5 cm and decreased 2.3 cm to get 4.2 cm average final score.</p> <p>Conclusions/Discussion There were many variables that may have affected my results. Some of the questions I wondered about were: were my subjects honest in performing the daily stretching, did the weather contribute to how well subjects performed, how much physical activity did they do that included stretching before I tested them, and did my subjects in my Training group like to exercise? I would take these questions into consideration were I to redo my project. In conclusion, my results along with a T-Test showed that stretching for 5 minutes per day for 3 weeks did not significantly improve V-Sit Reach scores.</p>	
Summary Statement I wanted to see if a 3 week stretching program would significantly increase V-Sit Reach scores, but my results did not show a significant increase.	
Help Received PE teacher helped find kinesiology information	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Sarah N. King	Project Number J1014
Project Title Altitude = Ineptitude	
Abstract Objectives/Goals The object of my project is to determine the affects of altitude on the oxygen content in the blood of a human being. I hypothesized that as altitude increased, the amount of red blood cells saturated with oxygen would decrease. Methods/Materials I took ten test subjects up in an airplane to different altitudes and measured their oxygen saturation with a pulse oximeter machine. We flew to altitudes 3000 feet, 6000 feet, 9000 feet, 12000 feet, and 15000 feet to test the amount of oxygen in the subjects' blood. Results I found that as altitude increased, the percentage of oxygen saturation steadily decreased. At sea level the average percent of oxygen saturation was 97 percent and by the time we reached 15000 feet the average oxygen saturation had dropped to 74 percent. Conclusions/Discussion My hypothesis was correct. I concluded that as altitude increases, the amount of oxygen molecules in the air decreases. Since there are less oxygen molecules in the air, the amount of red blood cells occupied with oxygen is less. So as we went higher and higher in the airplane, the amount of red blood cells in our bodies that carried oxygen decreased.	
Summary Statement My project tests the affects of altitude on the oxygen content in red blood cells.	
Help Received My father flew the airplane (he already owned the airplane before I started my testing). My father also borrowed the pulse oximeter machine from the aviation center for me to use.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Catharine M. Kuber	Project Number J1015
Project Title How Do Probiotics and Housing Affect Growth Rates in Dairy Calves?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to determine how a new probiotic calf powder and plastic polymer hutches affect the growth rates in newborn calves. My hypotheses stated that if newborn calves are fed the probiotic calf powder then they will grow faster than those not fed the probiotic calf powder, and if newborn calves are housed in plastic polymer hutches their growth rate will be better than those housed in wooden hutches.</p> <p>Methods/Materials Twenty calves were tested. Five were given 1 gram probiotics per day and raised in plastic polymer hutches, and five were given 1 gram probiotics per day and raised in wooden hutches. Five were not given probiotics and were raised in plastic polymer hutches, and five were not given the probiotics and raised in wooden hutches. I tested on a weekly basis for 8 weeks. Each week all calves were measured for height, weight, and girth. They were also assessed for health using a rubric.</p> <p>Results Calves fed the new probiotic and housed in plastic polymer hutches had higher growth rates and were healthier than the calves not fed the new probiotics and raised in wooden hutches. The four groups ranked as follows: 1. Probiotics and Plastic Polymer Hutches 2. Probiotics and Wooden Hutches 3. No Probiotics and Plastic Polymer Hutches 4. No Probiotics and Wooden Hutches</p> <p>Conclusions/Discussion Dairy producers are looking for preventative health products. They are very aware of the public's perception of using antibiotics to treat sick calves, and treating the calves adds to expenses in medicine and labor. It is important to keep dairy calves healthy in their early stages. Ten percent of calves die before they reach maturity, due to poor management, poor housing, or bad nutrition. With good management, the death loss may be lowered to only three to five percent. Calves also cost a lot of money. Newborns can cost up to \$400.00. By the time a heifer is ready to calve, she is worth \$1,800 to \$2,500. For every calf that dies, the producer loses not only that asset, but also potential income. I found my hypothesis to be correct. The new probiotic proved to be a very worthwhile product as did the plastic polymer calf hutches. My project studied two variables, because I was comparing a new protocol (plastic polymer hutches and probiotic calf powder) for raising calves versus the traditional protocol (wooden hutches and no additives).</p>	
Summary Statement My project is about helping dairy producers in raising healthy, strong calves through probiotics and housing.	
Help Received Mr. John Zmich, Dr. Bob Charley, and Mr. Roland Poirier explained how the probiotics work, used calves from Mr. Jim Wilson's herd, Dr. Claude J. Phene, Ph.D., explained statistical analysis to me, Dr. Jacqueline A. Reese, DVM, provided research information, Dad helped me find research information and	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Christopher K. Mayer	Project Number J1016
Project Title Do Differences in Visual Acuity Affect Peripheral Vision?	
Abstract Objectives/Goals The objective of my project was to determine if differences in visual acuity affect peripheral vision. I propose that the subjects with myopia and hyperopia will have impaired peripheral vision compared to the subjects with 20/20 vision. Methods/Materials I tested the peripheral vision of subjects with myopia, hyperopia, and 20/20 vision. The subject population consists of 10 subjects of each visual acuity type. Using a handheld "Peripheral Vision Protractor" subjects were directed to stare at a focal object. The examiner then moves a color tab imprinted with either a circle or triangle from 0-90 degrees along the protractor and measurements were noted on when the subject initially perceives the color tab and when the imprinted shape was visualized. This procedure is repeated for all 3 colors and 2 shapes on both the right and left eye. The 3 colors I used were green, blue and red. Results The total average color recognition observed in 20/20 vision subjects was 18.3 degrees compared to 23.4 degrees for myopia subjects and 28.8 degrees for hyperopia subjects. The total average shape recognition observed in 20/20 vision subjects was 23.7 degrees compared to 29.6 degrees for myopia subjects and 34.8 degrees for hyperopia subjects. Conclusions/Discussion The results are consistent with my hypothesis and supported by my research that subjects with 20/20 vision have better peripheral vision when compared to subjects with myopia and hyperopia due to their eye's structural defects. In fact, hyperopia subjects proved to have the worst peripheral vision out of all subjects. The potential benefits of my research was to gain a better understanding of how we use peripheral vision in our daily lives. Also to potentially learn if different colors and shapes are more readily visualized, peripherally, leading to possible safety enhancement in our daily lives, i.e. sports, driving, etc.	
Summary Statement In this project, I will show that there is a corresponding loss of peripheral vision in people who have suffered a loss of visual acuity.	
Help Received I would like to thank my parents for acquiring my supplies for me. I would also like to thank the subjects who so willingly participated in experimentation.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Connor W. McCarty	Project Number J1017
Project Title Twirl Training: Can You Keep Your Balance?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project was to determine if ice skaters have faster recovery of visual acuity following full-body rotation than non-ice skaters due to an adaptation of the vestibulo-ocular reflex (VOR).</p> <p>Methods/Materials A swivel chair with a headrest was positioned 10 feet from a wall onto which was affixed a Snellen eye chart. A large black fixation dot was also posted on the wall. The subject (an ice skater or control subject) was seated with head secured and had distance visual acuity tested. Next, the chair was rotated at 1 Hz for 20 seconds while the subject attempted to focus on the fixation dot. During spinning, two words were posted 10 feet away, correlating to 20/30 and 20/50 visual acuity. Subjects were timed after spinning to determine how quickly they could read the words.</p> <p>Results The results showed that more experienced ice skaters demonstrated faster recovery of visual acuity after rotation than same-aged controls. This effect was most significant in their first two years of ice skating. The average ice skater had a recovery time of 6.3 seconds to 20/50 visual acuity, and 10.9 seconds to 20/30, while the average non-ice skater recovered to 20/50 in 10.7 seconds and to 20/30 in 15.8 seconds.</p> <p>Conclusions/Discussion These results suggest that recovery of visual acuity after VOR stimulation is a learned adaptation. This information could potentially be useful for people with abnormalities in their balance systems or VOR. Instead of having their inner ear removed or disabled surgically, as is sometimes done, patients could possibly simply "train" their inner ear through multiple stimulations of the vestibulo-ocular reflex in a type of therapy to avoid dizziness.</p>	
Summary Statement The purpose of this project was to investigate whether faster recovery of visual acuity following full-body rotation can be a learned response.	
Help Received My mother helped me in revising and editing my results and conclusion. My father helped me construct the graphs in this project. Used volunteer skaters at the Oxnard Ice Skating Rink and volunteer control subjects at Mesa Union School.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Evan T. Miyazono	Project Number J1018
Project Title A Possible Cure for Some Types of Color Vision Difficiencies	
Objectives/Goals The objective was to discover if filters and other optics could be used to improve color vision for people with protanomaly, red color deficiency, or deuteranomaly, green color deficiency?	
Abstract Methods/Materials A color deficiency test was assembled which included 24 images. Subjects A-F were willingly given this test. Upon determining the type of color deficiency for each individual, the subject was tested with Apparatus 2 (Apparatus 1 for Subject B), using colored filters of increasing percent color coverage in order to observe the rate of vision improvement. Apparatus 1 was constructed from a box with three holes, a glass plate as beam splitter, a mirror, a colored filter, a manila folder and tape. This apparatus superimposed a direct image with a reflected, filtered image. Apparatus 2 was constructed from a board with a rotating motor, on-off switch, battery, and four partially colored disks that acted as a partial filters.	
Results Apparatus 1 was unsuccessful due to apparatus imperfections. Apparatus 2, used with Subjects A,C,D,E, and F, was successful in improving each subject's color vision by the enhancement of red or green light through the filtering of other colors. Subject A improved by correctly reading first 5/24, then 8/24 images read correctly. Subject C, from 5/24 to 24/24 Subject D, from 6/24 to 23/24 Subject E, from 5/24 to 18/24 Subject F, from 4/24 to 20/24	
Conclusions/Discussion The results show that the vision of people with protanomaly and deuteranomaly can be improved or completely corrected by using filters to add a specific amount, and color of light to the subject's normal view. The next step in this experiment would be to manufacture lenses constructed for each individual, and to test those lenses. The subjects who experienced the most improvements in this experiment were enthusiastic about the possibility of trying this type of experimental lens.	
Summary Statement My experiment is about finding a cure for color deficiencies by adding together filtered and unfiltered light in specific proportions.	
Help Received Science teacher supplied optics equipment; Mother helped type report; Father assisted in finding subjects.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Ashley M. Rosenquist	Project Number J1019
Project Title pH Levels of Saliva	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine if pH levels in the saliva of various animals and humans change at different times of the day.</p> <p>Methods/Materials Six humans, four dogs, and four cats were used in testing the pH of their saliva. All of the subjects pH levels were tested every three hours, beginning at 8:00 A.M. and ending at 8:00 P.M. I repeated my experiment twice on two separate days. The various animals and humans were tested two times using this method.</p> <p>Results The average pH level in the saliva of humans was about neutral, pH of 7. While dogs and cats had pH levels that were a bit higher, therefore meaning less acid was detected in their saliva. I did discover not discover a strong trend with any of my subjects results. The pH levels in various animals and humans did change at different times of the day.</p> <p>Conclusions/Discussion My results did support my hypothesis, pH levels in various humans and animals do change at different times of the day. The human's pH levels seemed to increase in the morning and level out in the afternoon, once again rising in the evening. Dog's pH levels seemed to have a steady downward trend as the day went on. Cat's pH levels on the other hand bounced around throughout the day. The difference between human's pH levels and dogs and cats pH levels was humans were mostly neutral, while dogs and cats contained less acid in their saliva. I measure in whole increments. If I were to repeat this experiment for a third time I would use a pH meter.</p>	
Summary Statement My project is about taking various animals and humans, testing their pH levels in their saliva, to see if it varies throughout the day.	
Help Received Tim Hannah helped me generate my graphs and charts onto the computer; my mom helped me hold some of the animals while taking their pH levels with the pH strip. My science teacher, Mr. Lippmann, allowed me to use some of his pH testing strips.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Deborah E. Scatterday	Project Number J1020
Project Title Physical Activity and the Human Diving Reflex	
Abstract Objectives/Goals In performing my investigation, I hypothesized that exercise blunts the bradycardic response of the diving reflex, thus slowing the heart rate further. I desired to explore the impact of physical activity on the human diving reflex. I sought to confirm the usefulness and the validity of the diving reflex, and to study how our awareness of this innate survival mechanism could actually protect us. I also wanted to answer common questions about physical activity and our hearts ability to respond to a change in environment, such as, submersion in water. Methods/Materials I gathered my materials which were 3 buckets of water, 8 towels, and a stopwatch, and a group of 8 teenage female subjects. I took their pulse at rest, then after their head being submerged in water. Then I took their pulse after five minutes of physical activity, and again after a second submersion after the physical activity. By variable was the heart rate after physical activity, my control was the heart rate at rest. Results The heart rate at rest for the individuals I tested was 80 beats per minute. After the first submersion it was 58 beats per minute. This was a 27.5% decrease. After physical activity, the average heart rate was 107 beats per minute, and after the second submersion, the average heart rate was 89 beats per minute. This is a 16.8% decrease. Conclusions/Discussion My investigation did not support my hypothesis, though the results of my experiment were normal human reactions because in both trails, the heart rate did drop after submersion in the head in water- the parasympathetic system responding. I think my experiment is important because it confirmed that the diving reflex does significantly slow down the heart rate after the heads submersion. It is crucial for us to be aware of our body's response to certain situations and how our actions impact them.	
Summary Statement My project tested the effect of physical activity on the human diving reflex, our bodies reaction to submersion in water.	
Help Received My parents, as doctors, aided in supervising my investigation and providing useful background information.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Cody P. Sevedge	Project Number J1021
Project Title Dogs: Colorblind or Not?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was to determine if dogs could see colors. I predicted that dogs could see color because they have rods and cones the same as humans.</p> <p>Methods/Materials Materials: 5 dogs, 5 colored square stakes(red, green, white, blue, and yellow), 50 hot dogs Methods: Training Procedure-Five colored stakes were set out with a hot dog on only the red stake. Dogs were trained to go to the red stake with the food. Each time the stakes were moved around. Testing Procedures-Stakes set out without hot dog. Dogs released and recorded data of stake dog approached first.</p> <p>Results I tested all five dogs five times for a total of 25 tests. Four of the dogs tested went to the red stake 3 out of 5 times. One dog tested went to the red stake every time. All of the tests put together averaged a 68% correct response.</p> <p>Conclusions/Discussion I tried to prove if dogs could see color. In my experiment, the dogs I worked with went to the red colored stake 68% of the time. This proved that my hypothesis was correct because after training the dogs to receive food at only the red colored stake they went to that same stake even when I mixed the stakes up each time during the tests.</p>	
Summary Statement I tried to prove if dogs see color.	
Help Received Mother helped type report. Dr. J.P. Sevedge gave veterinary advice.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Haileigh K. Stainbrook	Project Number J1022
Project Title The Comparison of Internal Parasite Ova between Permanent Pasture and Rangeland Cattle	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my experiment was to compare the number of internal parasite ova in permanent pasture cattle and range land cattle. The reason I did this investigation is to help my dad determine whether permanent pasture or rangeland would produce better cattle. I incorporated this experiment into my veterinary science 4-H project.</p> <p>Methods/Materials A total of 20 fecal samples were obtained. Ten fecal samples came from permanent pasture cattle and ten fecal samples came from rangeland cattle. Each sample went through an extensive step by step laboratory procedure, then was placed on a slide and put under a microscope. I then examined the samples to determine how many internal parasite ova were present in the cattle feces.</p> <p>Results The permanent pasture cattle appeared to have a higher ova count in all of the samples collected and examined. The rangeland cattle appeared to have lower ova count in all of the samples collected and examined.</p> <p>Conclusions/Discussion In conclusion, I believe that my hypothesis was correct. My hypothesis stated that the cattle in permanent pasture would have a higher concentration of internal parasite ova than the cattle on rangeland. These conclusions could be helpful to my dad and other ranchers to have a more chemical and internal parasite free, healthier animal.</p>	
Summary Statement This project was done to learn whether the concentration of internal parasite ova was higher in permanent pasture cattle or rangeland cattle.	
Help Received Dr. LeRoy Krum allowed me to use his lab and equipment, Christine Haas helped me with my graphs and state application, my father helped me work with the cattle, and my mother took some of the pictures and helped assemble my board.	



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Drew J. Worthing	Project Number J1023
Project Title Virtual Eyesight	
Abstract Objectives/Goals The purpose of my study was to determine whether or not playing video games for a certain period of time would affect your eyesight temporarily or permanently. I think playing video games will affect your eyesight temporarily and the longer you play the more your eyesight will be affected. Methods/Materials Informed consent was obtained from my family. Using a Standard Graham Eye chart I tested each individuals eyesight before the testing began and recorded their starting values. I then tested each person before playing the video game and than had each person play N-64 Lego Racer game starting with a 10 minute time period. I than tested their eyesight immediately after completing the game.I repeated this process at 20,30,45 & 60 minute time periods.Each time study was completed on separate days. I then repeated the whole time studies to check the validity of the results. Results There was a definite change in eyesight results after each time period played for each individual. However each individual was affected at different time periods and their eyesight was only affected temporarily. All subjects returned to their pre-test values before each time period. All subjects reported of their eyes itching, burning and irritation during each period of testing. Conclusions/Discussion My hypothesis was wrong. Different peoples eyes were affected more at different times during both tests. I believe that it takes different time periods for different peoples eyes to adjust to playing the video games.The reports of eye irritation are symptoms of Eye-strain. I learned that playing video games does affect eye sight temporarily. Further studies with a larger group of subjects divided by age and over longer time periods would be needed to accurately determine long term affects.	
Summary Statement The purpose of my project was to determine if playing video games for a certain period of time would affect your eyesight temporarily or permanently.	
Help Received My mom, dad, and sister were my test subjects. My mom and dad helped with the computer and assembly of the display board. Dr. Stephen Ratty provided the eye chart. Dr. Donald Tohm provided information on administering the eye tests accurately and explained how to analyze the results.	