



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Emily R. Auten</b>	<b>Project Number</b> <b>J1201</b>
<b>Project Title</b> <b>Mammals under the Moon</b>	
<b>Objectives/Goals</b> The purpose of my project was to determine how the moon phase affected the overall number of animals passing through the Scotts Creek Watershed. My hypothesis stated as the fullness of the moon decreased, the number of animals seen would increase.	
<b>Abstract</b> <b>Methods/Materials</b> Four Bushnell Wildlife Cameras were set up in various locations along the Scotts Creek Watershed for a 6 month period (July 2014 - January 2015) to collect data. The locations were chosen based on the likelihood for high animal activity. The data was collected and entered into the computer, and the photos were analyzed to determine the presence of a mammal and its species. The data was organized according to camera location, photo number, species, temperature, date, time, and moon phase (full, waxing gibbous, first quarter, waxing crescent, new, waning crescent, third quarter, and waning gibbous). The data was then graphed correlating moon phase and all species, and moon phase with specific species showing the highest frequency of activity.	
<b>Results</b> Four wildlife cameras captured a total of 535 animal photos during various phases of the moon over a 6 month period. Twelve different species were identified in the photos, with bobcat, deer, skunk, and fox having the highest sample size. During the full moon, 19 photos were taken; There were 59 photos in waxing gibbous phase, 46 in first quarter, 76 in waxing crescent, 87 in waning crescent, 49 in third quarter, and 20 in the waning gibbous phase. There were 179 photos (33.5%) taken in the new moon phase which is approximately one third of all photos taken.	
<b>Conclusions/Discussion</b> In this study, 535 animal pictures from 4 different wildlife cameras placed in the Scotts Creek Watershed were analyzed for mammal activity in conjunction with the moon phase over a 6 month period. The study found that as the moon became darker, or closer to the new moon, there was a higher frequency of animal movement captured by the cameras. In fact, 33.5% of the total animal pictures taken were during the new moon phase.	
<b>Summary Statement</b> My project looked at how the phase of the moon affects animal movement.	
<b>Help Received</b> Swanton Pacific Ranch allowed use of the wildlife cameras on their property.	



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<b>Name(s)</b> <b>Mahnur A. Bharucha</b>	<b>Project Number</b> <b>J1202</b>
<b>Project Title</b> <b>Cat vs. Cat: Prevalence of Intestinal Parasites in Shelter and Domestic Cats</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This experiment was conducted to determine which type of cat, cats in shelters or indoor house cats, have a greater prevalence of <i>Toxocara Cati</i> (Roundworms), <i>Ancylostoma</i> (Hookworms), and <i>Dipylidium Caninum</i> (Tapeworms). This is vital because these intestinal parasites are zoonotic, or transmittable to humans. I want people to be aware of these dangers and take better care of their cats. I hypothesized that shelter cats would have a greater prevalence of the three parasites than the indoor house cats.</p> <p><b>Methods/Materials</b> 20 fecal samples, 10 from shelter cats and 10 from indoor house cats, were collected. A swab was used to check the feces for any tapeworm segments. In order to check for roundworms and hookworms, the fecal flotation method using a sodium nitrate solution was conducted under the supervision of Cal Poly's Veterinary Lab. The sodium nitrate solution is denser than the parasite ova, so if the fecal sample had any parasites ova, it would rise to the surface where a cover slip was placed. Then this cover slip was transferred to the microscope slide and viewed for any hookworm and roundworm eggs.</p> <p><b>Results</b> 10% of shelter cats were infected by roundworms. Also, 10% of shelter cats were infested by hookworms. However, none of the shelter cats were infected by tapeworms. Surprisingly, 20% of domestic cats were infested by roundworms. Moreover, no indoor cats were infected by hookworms and tapeworms. A total of 2 cats were infested from each of the two sources.</p> <p><b>Conclusions/Discussion</b> Overall, I saw a 20% prevalence in shelter cats and a 20% prevalence in domestic cats as well. My hypothesis stated that based on fecal exams of shelter and domestic cats, shelter cats would have a greater prevalence of roundworms, hookworms, and tapeworms. The results showed that my hypothesis was incorrect. I was surprised by this because I thought that domestic cats would be better cared for.</p>	
<b>Summary Statement</b> Comparing the prevalence of intestinal parasites in shelter and domestic cats.	
<b>Help Received</b> I used Cal Poly's lab equipment under the supervision of Professor Michele Rash.	



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<b>Name(s)</b> <b>Aidan M.S. Burke</b>	<b>Project Number</b> <b>J1203</b>
<b>Project Title</b> <b>Sound Wave Shape and Hearing Frequency Range in Adolescents</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I have always been interested in sound, and I had just discovered synthesized waveforms. My goal was to investigate if synthesized sound waveforms might affect the ability to hear higher frequencies. My hypothesis was that synthesized waveforms might allow the subject to hear higher frequencies. I felt that my project was important because it might somehow allow hearing aids to help the elderly hear higher frequencies.</p> <p><b>Methods/Materials</b> In my experimentation, I tested 80 subjects aged 9-14 for their hearing range with sine, square, triangle, and sawtooth waveforms. In my procedures, I used a pair of headphones, a frequency generator, a logbook, a pencil, and a playback device. For my procedures, I plugged the headphones into the frequency generator and asked the subject to raise their left hand when they heard a tone, I then played frequencies with various sound wave shapes at intervals of 1,000 Hz, beginning at 8,000 Hz and ending at 21,000 Hz. I logged when the subject stopped hearing the tone, the subject's age, and gender.</p> <p><b>Results</b> On average, the 38 males heard up to 17,000 Hz for sine waves, 21,000 Hz for square waves, 20,000 Hz for triangle waves, and 21,000 Hz for sawtooth waves. The 42 females exhibited the same averages. Subjects listening to square, triangle, and sawtooth synthetic waveforms heard significantly higher frequencies than for the sounds emitted as sine waves.</p> <p><b>Conclusions/Discussion</b> My hypothesis that the synthesized waves would enable my subjects to hear higher frequencies was supported. the subjects on average heard an 18% higher frequency range with the triangle waves and a 24% higher frequency range with the sawtooth and square waves. The synthesized waves are believed to emit more harmonics, but the harmonics are of even higher frequencies than the original tone. it would be interesting to test adults to see if the test results are similar.</p>	
<b>Summary Statement</b> The goal of this project was to investigate if synthesized sound waveforms might affect the ability of human test subjects to hear higher frequencies.	
<b>Help Received</b>	



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<b>Name(s)</b> Stacylynn Castaneda; Evelyn Powell	<b>Project Number</b> <b>J1204</b>
<b>Project Title</b> <b>Obedience with Dogs</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Our project was to determine which dog was more obedient, a Chihuahua or a Doberman. We believed the Doberman was more obedient than the Mexican Hairless Chihuahua and also better at tricks. We choose this topic because we want to know if breed plays a role in obedience.</p> <p><b>Methods/Materials</b> Our materials were: two dogs of different breeds, pencils/pens/paper for recording data, dog treats, and balls. To do our researcher we presented each dog individually with four tasks each, one at a time. The tasks were: lay down, sit down, and stand up, and retrieve ball. At the end of each task a treat was given if the task was done correctly.</p> <p><b>Results</b> The Doberman correctly completed three out of the four tasks, while the Mexican Hairless Chihuahua correctly completed two out of the four tasks.</p> <p><b>Conclusions/Discussion</b> Although the Doberman was more obedient, we don't think it was because of the breed. The Doberman was obedience trained at a young age, while the Mexican Hairless Chihuahua was not. This proves that breed is not as important as the age you train your dog. Our hypothesis was correct, but we discovered something different.</p>	
<b>Summary Statement</b> This project reseaches a possible link between dog breed and obedience.	
<b>Help Received</b>	



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<b>Name(s)</b> <b>Faith E. Castillo</b>	<b>Project Number</b> <b>J1205</b>
<b>Project Title</b> <b>How Sweet It Is, or Is It? Measuring Glucose in Fruit.</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this project was to determine the sweetness of five fruits based on the taste in order from highest to lowest, compared to the reading of glucose strips. My hypothesis for this project was that if I separately blend a banana, mango, strawberry, apple, and orange, and then test for their glucose content using a glucose testing strip, the banana would have the greatest glucose content and the orange would have the least. (In the order from least to greatest: banana, mango, strawberry, apple, and orange.) This hypothesis was based upon what my sense of taste concluded was the sweetest fruit.</p> <p><b>Methods/Materials</b> To test this, I blended 3 Tbsp. of fruit with 300ml of water, poured the mixture into a cup, and stirred a Diastix glucose strip in it for 30 seconds. Immediately after, I took a picture of each strip and continued this process for a total of 30 tests.</p> <p><b>Results</b> By comparing the pictures of the test results with the Diastix scale, it proved my hypothesis wrong. My sense of taste was not as accurate as the Diastix and although the banana was the sweetest, the resultant order of sweetness, following the banana, was the orange, apple, strawberry, and then mango.</p> <p><b>Conclusions/Discussion</b> Using my sense of taste to determine the sugar content of fruit was definitely not as accurate as using a more scientifically based measure. Even though my hypothesis was incorrect, I still achieved my goal of determining the fruit's approximate glucose content and I hope that this will encourage other people, such as diabetics, that can't have too much sugar, to evaluate the sugar content of they consume everyday.</p>	
<b>Summary Statement</b> This project is about comparing the sweetness of fruit by taste to it's approximate measurement in a glucose test.	
<b>Help Received</b>	



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<b>Name(s)</b> <b>Jonathan A. Daniels</b>	<b>Project Number</b> <b>J1206</b>
<b>Project Title</b> <b>Texting while Walking: Dangerous or Not?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my experiment was to find out if texting while walking has an effect on balance and coordination. It was hypothesized that if one walks while texting, it will not have an overall effect on balance and coordination.</p> <p><b>Methods/Materials</b> 25 students in grades 4th through 8th walked through the cup course once without texting and I second time while texting a list of items that can be found in their bedroom. The amount of time it took to finish the course, the number of cups hit, and the number of items texted were recorded.</p> <p><b>Results</b> The completion time on the cup course increased by 144% while walking and texting. The number of cups hit on the cup course increased by 552%. The number of items texted increased with the amount of time to complete the course. It was observed that subjects walked slower, swayed, and lost balance while texting.</p> <p><b>Conclusions/Discussion</b> My hypothesis was incorrect. Texting while walking does have an effect on balance and coordination. This loss of balance and coordination could result in physical injuries. Thus one should limit texting while walking in areas where balance and coordination are important such as busy cities and busy streets, sidewalks, subways, stairs, train tracks, and tourist attraction places to name a few.</p>	
<b>Summary Statement</b> I measured subjects texting while walking an obstacle cup course to determine if balance and coordination would be effected.	
<b>Help Received</b> Teacher helped set up the course in the classroom; Dad helped with making the graphs; mom helped with the typing .	



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<b>Name(s)</b> <b>Grace J. Davis</b>	<b>Project Number</b> <b>J1207</b>
<b>Project Title</b> <b>Does Age Affect Human Reaction Time?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My objective was to determine whether or not age affects human reaction time. My hypothesis was that the age group 12-15 would have the fastest reaction time. I thought this age group will be the fastest because this age group is young and I believe that the older the subject is, the slower the reaction time. I also thought that the reaction time will remain relatively the same for all age groups until the age group 55-70. <b>Methods/Materials</b> I began by collecting 15 subjects in each of four groups, ages 12-15, 25-40, 40-55, and 55-70. Then I had the subject sit down in a chair. I then held the ruler in front of the subject, with subject's index finger and thumb at the 0 cm mark. After three practice drops, I dropped the ruler five times per subject, having the subject catch the ruler as quickly as he/she can. I then recorded the point at which the subject caught the ruler. I repeated these steps for each subject in each age group. Finally, I analyzed the data to determine whether age affects human reaction time. <b>Results</b> Four of my graphs show the point in which the ruler was caught by each subject. For each subject, five bars are clustered together with each bar representing one out of the five trials. Graphing each trial eliminated the issue of the significant variation in each trial within the same subject. My final and fifth graph shows the average of each age group. The average graph shows that the age group 12-15 had an average reaction time of 16.6, the age group 25-40 had an average of 15.6, the age group 40-55 had an average of 20.1, and the age group 55-70 had an average of 20.4. <b>Conclusions/Discussion</b> My hypothesis appears to be incorrect. I hypothesized that the age group 12-15 would have the fastest reaction time, but according to my data, the age group 25-40 had the best and lowest reaction time average, as measured by the average distance the ruler fell before it was caught (15.9 cm). The second part of my hypothesis, that the older age groups would have reaction times that remained relatively the same, was partially correct because the average distance the ruler fell for the two older age groups was 20.1 cm and 20.4 cm. Although the difference was small, I think this was the result of my experiment because the brain of a human is not fully developed until age 25. The subjects in the age group 25-40 have a fully developed brain and as a result their nervous system is at its greatest potential.	
<b>Summary Statement</b> My experiment determines whether age affects human reaction time in various age groups and the importance of this knowledge in our society.	
<b>Help Received</b> Many teachers acted as subjects in my experiment.	



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<b>Name(s)</b> <b>Audryanna Fisher</b>	<b>Project Number</b> <b>J1208</b>
<b>Project Title</b> <b>Stress Test</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective/goal of this experiment was to see if stress can affect body temperature. I did reach that goal, but it wasn't exactly determined by myself. It was mostly determined on how the test subjects reacted to the stress test.</p> <p><b>Methods/Materials</b> My important materials was a board, basal thermometer, stopwatch and timer, a journal to record data, and a pencil.</p> <p><b>Results</b> My results ended well. I found that the temperatures didn't spike drastically, they went up a mere 0.1+ degrees. Although Kurt did have a spike of 2.0+ higher, I suppose it would depend on whether he or she would have high blood pressure.</p> <p><b>Conclusions/Discussion</b> I found that my hypothesis was incorrect. Stress can and can not affect body temperature, it depends on the person you are testing.</p>	
<b>Summary Statement</b> My Project Summary is talking about how stress can affect body temperature drastically, or if at all.	
<b>Help Received</b> My Grandmother ( participant ) helped me calculate my data, give me transportation, and she gave me inspiration to keep proceeding with this project.	





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<b>Name(s)</b> <b>Max Froch</b>	<b>Project Number</b> <b>J1209</b>
<b>Project Title</b> <b>Creating Images that Represent Both Monocular and Binocular Vision of an Average Sized Equus ferus caballus</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In this experiment I created a model and developed images that represent both monocular and binocular vision of a Clydesdale horse.</p> <p><b>Methods/Materials</b> I created a model of the Clydesdale horse's body habitus using sheets of cardboard to recreate the exact placement of the horse's eye. I then used a GoPro camera to take the pictures of what the model can see.</p> <p><b>Results</b> In trial one I measured that the right and left eye's field of vision was 133 degrees and the binocular vision was 63 degrees. I also measured that the entire visual field in trial one was 204 degrees. In trial two, I measured that the right and left eye's field of vision was 119 degrees; the binocular vision was 45 degrees, and the full field of vision was 190 degrees. In trial three, I measured that the right eye's field of vision was 145 degrees and the left was 132 degrees. The binocular vision was 63 degrees, and the entire field of vision was 243 degrees. I calculated an average degree in full visual field to be 212 degrees.</p> <p><b>Conclusions/Discussion</b> Some errors that affected these results were that the wind moved the string after the limits of the image were established as well as it was difficult to be sure the mounted camera was positioned at the 45 degrees this ungulate animal's eye is usually positioned, which narrowed both the total visual field and binocular visual field. I could improve these errors by first attaching the string to stakes hammered into the ground. I could also have use a fixed (immobile) angle mount which would have eliminated this variability in result and improved the accuracy of the experiment.</p>	
<b>Summary Statement</b> I tried to create images that represent both monocular and binocular vision of an average-sized Equus ferus caballus.	
<b>Help Received</b> My mom drove me to the store to collect supplies needed.	



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<b>Name(s)</b> <b>Alessandra S. Garza</b>	<b>Project Number</b> <b>J1210</b>
<b>Project Title</b> <b>How Does the Age of Athletes Affect Heat Dissipation?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my project was to determine if there would be differences in the facial temperatures of secondary school students and elementary school students after exercise.</p> <p><b>Methods/Materials</b> An infrared camera (FLIR ThermoCAM EX320) was used to take infrared images of secondary school and elementary school aged subjects after exercise. The images were then processed to obtain average temperatures of the pterygoid plexus capillary bed in the cheek (a principal site for excess heat dissipation by radiation). Thermal patterns of the region were also recorded.</p> <p><b>Results</b> Differences in the average temperatures, the range of temperatures, and the thermal patterns after exercise were observed between the two age groups.</p> <p><b>Conclusions/Discussion</b> The differences observed suggest that the elementary school age group may be dissipating more heat through radiation than the secondary school age group.</p>	
<b>Summary Statement</b> This project examines one of the main mechanisms of thermoregulation (radiation) to determine if there is a difference in how excess body heat is dissipated between young children and young adults.	
<b>Help Received</b> My father helped me figure out how to operate and download image data from the infrared camera.	



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<b>Name(s)</b> <b>Payton R. Giammona</b>	<b>Project Number</b> <b>J1211</b>
<b>Project Title</b> <b>The Eyes Have It: Peripheral Vision</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My project was to determine if I tested subjects with brown, green/hazel, and blue eyes on their ability to identify motion, shapes, and colors, the subjects with the blue colored eyes will see the test objects earliest.</p> <p><b>Methods/Materials</b> A peripheral-vision testing protractor was constructed. Test objects were made to identify motion, shapes (circle, square, and triangle), and color (red, blue, and yellow). Each subject was tested on all the objects by slowly moving the sticks from zero degrees on each side toward the center at 90 degrees. The subject focused on an object straight ahead (90 degrees) on the testing protractor. The results were recorded at the degree mark where the subject first identified the stick.</p> <p><b>Results</b> There was a total of 22 test subjects ranging in age from 13 to 74. The eye colors tested were brown, blue, and green/hazel. In the 13 to 14 age group, almost every eye color had consistent scores except for the ability to recognize a triangle with the left eye. The 28 to 45 year-olds did not have the brown eye color, but the green/hazel and blue eyes had many similarities. However, the blue eyes could see the color yellow better than the green/hazel eyes. Then the two eye colors switched when they saw the color blue with their right eye. The final age group was 58 to 74. Their scores were all over the grid and noticeably higher than the other age groups.</p> <p><b>Conclusions/Discussion</b> After all the teenagers and adults were tested with their varying eye colors, the results turned out to be inconclusive. None of the eye colors was more successful in identifying the test objects. Instead of eye color making a difference in how well someone can see using their peripheral vision, age was mainly a factor. As eyes age, peripheral vision narrows. This leads to the hypothesis being incorrect.</p>	
<b>Summary Statement</b> My project tested to see if eye color affected peripheral vision.	
<b>Help Received</b> My mother helped with the typing and taking me to test subjects. My grandmother helped with making the testing protractor.	



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<b>Name(s)</b> Meiwan M. Gottschalk	<b>Project Number</b> <b>J1212</b>
<b>Project Title</b> <b>Red, Yellow, Blue, and Green, Which Color Is Most Easily Seen?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to determine which color (out of red, yellow, green, and blue) a child could see most readily using their peripheral vision. Research done on this says that blue and yellow are seen more easily with your peripheral vision, and yellow can be mistaken for white, so it was expected that blue would be seen more readily.</p> <p><b>Methods/Materials</b> Twenty subjects were seated, one at a time, under a large protractor made to measure the degree at which a color card was first recognized. A color card was moved from behind the subject around to the front at the rate of 5 degrees per 2 seconds until the subject said they could distinguish the color on the card. This was repeated three times on each side for each color tested.</p> <p><b>Results</b> After experimenting on twenty children, the results showed that green was seen first with the right eye and blue was seen first with the left eye. Results on the left eye shows that blue and red were the top two most easily seen and green was the least easily seen. On the right eye green and blue were the top two most easily seen and red was the least easily seen.</p> <p><b>Conclusions/Discussion</b> The results partially supported the hypothesis. Blue was seen more readily on the left eye. These results can be used to help improve pedestrian safety by having people wear bright blue or green clothing to be more visible to drivers.</p>	
<b>Summary Statement</b> The project shows which color a child can see most readily using their peripheral vision.	
<b>Help Received</b> Interviewed Dr. Marcus Appy about the project subject and had my teacher proof-read my work.	



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<b>Name(s)</b> <b>Ethan X. Gutierrez</b>	<b>Project Number</b> <b>J1213</b>
<b>Project Title</b> <b>Homeopathic Remedies That May Kill Cancer</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goal of my project was to try to find at least one homeopathic remedy that had the strength to slow down the growth of cancer or even kill cancer cells.</p> <p><b>Methods/Materials</b> Some of the basic materials that I used were items, such as pipets, lab coat, safety glasses, petri dishes, cell counter, gloves, centrifuge and a fume hood. The method to my project was to use active ingredients from foods as my homeopathic remedies. I separated the cancer cells into several smaller petri dishes. I then added one of the active ingredients to one of the petri dishes of cancer cells. I repeated this process with each one of the compounds. After observing the cells over several weeks, I put the cancer cells into the cell counter to see if the number of cancer cells increased or decreased.</p> <p><b>Results</b> From my four homeopathic remedies, I found that two of the active ingredients had the capability of slowing down the growth or killing the cancer cells. My other two compounds did not fair as well; they did not kill the cancer cells, but they also did not increase the number of cancer cells.</p> <p><b>Conclusions/Discussion</b> The two compounds that I found that were effective on cancer cells came from flax seed and turmeric. The active ingredient in flax seed was Enterodiol and the active ingredient in turmeric was Curcumin. These two active ingredients destroyed the cancer cells.</p>	
<b>Summary Statement</b> The focus of my project was to find homeopathic remedies that had the strength to kill cancer cells.	
<b>Help Received</b> Dr. William Lowry at UCLA supervised my project in his laboratory.	



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<b>Name(s)</b> <b>Prathik Kakarlamudi; Aditya Udgaonkar</b>	<b>Project Number</b> <b>J1214</b>
<b>Project Title</b> <b>Can We Measure the Concentration of Glucose in Our Eye Tears by Simple Means?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> About 347 million people worldwide have diabetes. More than 80% of diabetes deaths in the world occur in low income countries because of lack of awareness. Current testing methods of measuring glucose are complex, expensive and invasive. The objective of this project is to find out if we can measure the concentration of glucose in tears by simple, non-invasive and affordable means. If so, we also would like to determine if there is a measurable difference between diabetic/non-diabetic participants. Our study tests the idea of glucose in tears as an alternative.</p> <p><b>Methods/Materials</b> The two methods we used to measure the glucose are Brix Refractometer and Diastix Reagent Urine Strips. We researched that a simple optical device (Refractometer) can measure sugar percentage in fluids on a brix scale. We then used a Refractometer to base line if fluid samples (water, sugar solution, soda, wine etc..) have sugar content and if yes, how much on the brix scale. The data showed fluid samples had sugar to various degrees on scale. Next we tested tears from participants of various ages ranging from age 2 to 75 years, who are non-diabetic/diabetic. We dropped the second method since the urine strips didn't work as they react only to Ketone acid which is not present in eye tears.</p> <p><b>Results</b> From the base line data we gathered on various fluids, we conclude that the Refractometer does fairly and consistently detect the varying sugar content. Now for the second and important part of our project based on the limited sample set of 16 participants across various ages who are non-diabetic/diabetic. We can say that tears have glucose content in the range of 2.5% to 5.0% on the Brix scale. 9 (56%) participants who are identified as non-diabetic had the reading less than 3% on the brix scale. The remaining 7 (44%) who are diabetic had reading above 3.2% on the brix scale.</p> <p><b>Conclusions/Discussion</b> From the gathered data we concluded that tears have glucose and can be measured by simple, non-invasive and affordable means. The data also tells us that diabetic participants have a higher percentage of glucose as compared with non-diabetic participants when measured on brix scale. We would like to continue this study with large population of participants and also correlate our brix scale reading with actual blood glucose levels.</p>	
<b>Summary Statement</b> To measure the concentration of glucose in human eye tears by simple means.	
<b>Help Received</b> Thanks to our teacher for mentoring us and our parents for driving us around to gather data.	



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<b>Name(s)</b> <b>Krish Kapadia; Anjay Saklecha</b>	<b>Project Number</b> <b>J1215</b>
<b>Project Title</b> <b>Determining the Efficacy of Different Methods to Assess the Level of Dehydration Using Human Saliva</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> After playing sports or exercising, people slowly become exhausted and dehydrated, depending on the amount of water consumption pre-exercise. The purpose of our project is to detect if one is dehydrated by collecting data on saliva using five different tests (volume, area of blot, ketones, pH, and iodine amylase). Based upon reading the literature, our hypothesis is that by using a combination of tests on saliva, we can determine if an individual is dehydrated.</p> <p><b>Methods/Materials</b> We recruited 10 human subjects who were asked to spit into a graduated cylinder to record their pre-exercise saliva. The subjects completed the predetermined exercise (run on the treadmill to reach maximum heart rate for the person's age). Immediately after, we asked the subject to spit into another cylinder to record the post-exercise saliva. Ten minutes after drinking water, they spit once more to record post-hydration saliva. During that time, we analyzed the post-exercise saliva and measured volume, pH, and presence or absence of ketones, measured the area of the blot on blotting paper, and checked for presence of amylase using an iodine test. For our iodine solution test, we set up 4 micro-centrifuge tubes, and put a small quantity of potato in each. The first tube was our control, as it contained one drop of iodine and no saliva. In the second, we added 1 mL of pre-exercise saliva and a drop of iodine. In the third tube, we added 1 mL of post exercise saliva and one drop of solution. In the fourth tube we added 1 mL of post hydration saliva and one drop of iodine.</p> <p><b>Results</b> The pre-exercise saliva samples served as the baseline for each of our subjects. Comparing their post-exercise samples to each individual's baseline, we detected a trend in some individuals. We observed the ketones were positive, pH was acidic, blot size and volume decreased, and salivary amylase decreased. After hydration, their levels returned to baseline.</p> <p><b>Conclusions/Discussion</b> This data supports our hypothesis of determining dehydration using saliva. Testing a larger sample size of human subjects over a longer duration of time would increase the power of this study. This data can be used to support the use of saliva as a medium to assess dehydration in the home, in athletic fields, and in medical settings as a simple and economical method to evaluate one's level of dehydration.</p>	
<b>Summary Statement</b> We aim to determine the efficacy of different tests in assessing the level of dehydration using saliva from young athletes before and after exercise.	
<b>Help Received</b> Parents helped print the slides; the mentor helped edit the abstract; friends served as subjects and provided saliva.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Katherine G. Knapp</b>	<b>Project Number</b> <b>J1216</b>
<b>Project Title</b> <b>Can You See Me Now? Does Peripheral Vision Change in Adolescence?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this project is to determine if peripheral vision changes in adolescence. I hypothesize that around the age of ten, due to growth of the lens, a change will occur in the peripheral field.</p> <p><b>Methods/Materials</b> I constructed an apparatus for testing the peripheral field using protractors to measure the angle between the forward-looking vision of the subject and an object at the end of rotating arms of the device. Approximately 50 subjects were tested (additional testing in progress), both male and female, ranging in age from 7 to 14 years. Each subject was tested twice for both eyes and the measurements gathered were used to find the peripheral field for each subject.</p> <p><b>Results</b> In the subjects I tested, there appeared to be a slight negative change in the peripheral field starting at the ages of 9 and 10, as I had hypothesized. The field seemed to grow as the subjects aged from 7 to 10, where it reached its peak, then seemed to get smaller as the subjects ages grew from 10 to 14.</p> <p><b>Conclusions/Discussion</b> Beginning at the ages of 9 or 10 years, the lens grows and thins, while the other components of the eye, such as the cornea, do not grow. This causes the eye to decrease in power for a short time while the lens is growing. In the subjects ageing from 7 to 9, their lenses had not started growing yet, allowing there peripheral to be better. In the subjects aged 10 to 14, their lenses were growing causing their peripheral to be slightly worse. Based on growth patterns of the eye, the peripheral field should start to come back to where it was at the ages of 9 or 10 at a later time, but this did not show in the age group tested.</p>	
<b>Summary Statement</b> Measuring and determining the change in peripheral vision in a population of subjects between 7 and 14 years old.	
<b>Help Received</b> My father helped me to use the Excel spreadsheet program to graph my data and to help copy the graphs for my project board and report.	





**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> Addie McIlroy; Emily Van Noord	<b>Project Number</b> <b>J1217</b>
<b>Project Title</b> <b>Therapy Paws</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Our objective is to see if Therapy Dogs have a paw preference of left or right paws, because according to our research, right pawed dogs have higher success rates in training programs.</p> <p><b>Methods/Materials</b> We used 10 therapy dogs, dog treats, a jar, and string. We ran 4 tests with 4 trials on each test. Test 1 was Shake: Putting out both our hands to see which paw the dog would shake with; Test 2 was Treat Trap: Put a treat in a jar to see which paw they would use to remove it; Test 3 was Walk Forward: Stood away from the dog and called "COME" and recorded which paw they stepped with first; Test 4 was Something on the Nose: Placed a string on the dog's nose to see which paw was used to remove it.</p> <p><b>Results</b> The overall results for the 4 tests on 10 dogs showed: 50% were left pawed, 40% were right pawed, and 10% were ambilateral.</p> <p><b>Conclusions/Discussion</b> Our data that we collected indicated that our hypothesis was wrong. We concluded that more therapy dogs are left pawed. Our data showed out of 10 dogs tested: 50% were left pawed, 40% were right pawed and 10% were ambilateral. To improve this experiment we could try different tests because some dogs are trained not to use their paws. We could also use other "helping" dogs such as Hearing Dogs and Guide Dogs.</p>	
<b>Summary Statement</b> Our project is about figuring out if Therapy Dogs have a paw preference, and which paw they prefer.	
<b>Help Received</b> One mom arranged the dog visits, both moms provided transportation and bought the board and board supplies.	



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>Julian R. McLeod</b>	<b>Project Number</b> <b>J1218</b>
<b>Project Title</b> <b>The Power of a Deep Breath</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my project is to determine if deep breathing can effect blood pressure, temperature and pulse and therefore help reduce the physiological effects of stress. I believe that subjects under stress using deep breathing techniques will have a lower blood pressure, temperature , pulse and a calmer feeling compared to those who use no breathing techniques.</p> <p><b>Methods/Materials</b> Informed consent was obtained from 20 randomly chosen students from Pacific Union Elementary school, between the ages of 13 and 14. To stimulate stress in the subjects during the test, I created a card game memory test with the incentive of a candy reward achieved by completing the test quickly. I separated the students into two groups. Each group with an equal amount of girls and boys. Test group A would be sitting for two minutes in silence before the test therefore giving their body time to react to fight or flight response. Group B would be taught abdominal breathing and breathing visualization to use before and during the test. I took their blood pressure, temperature, and pulse three times throughout the study. I gathered a baseline when they first came in. Then gathered two other readings to compare and analyze. I also questioned the students obtaining their comfort level.I converted my blood pressure readings into mean arterial pressure. Mean arterial pressure or MAP is the average pressure in arteries during one cardiac cycle, it is found by using a calculation using the BP. It is considered a better indicator of perfusion to vital organs than systolic blood pressure. Then created a group average and individual average for each subject.</p> <p><b>Results</b> I found deep breathing did have an effect. Those using deep breathing in Group B had a lower group average MAP of 82 mmHg and lower pulse. Group A had a higher group average MAP of 88 mmHg and higher pulse. This shows that with deep breathing there was a decrease in MAP and pulse and without deep breathing the students fight or flight response activated. There was no significant fluxuation in temperature for either test groups. Fifty percent of the students using deep breathing physically reported to feel more comfortable.</p> <p><b>Conclusions/Discussion</b> My conclusion is with deep breathing students were able to obtain a calmer physiological and psychological state proven by lower MAP and pulse, and reported feelings. My objective was proven and my hypothesis was correct.</p>	
<b>Summary Statement</b> Can deep breathing reduce the pysiological and psychological effects of stress?	
<b>Help Received</b> My Mom taught me how to take students BP, pulse and temperature. She bought an electric BP cuff for the project. My science teacher Mr. Lane helped facilitate my experiment at school.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> Caelen G. McQuilkin	<b>Project Number</b> <b>J1219</b>
<b>Project Title</b> <b>Perfectly Pika: Extreme Temperature Moderation</b>	
<b>Abstract</b>	
<b>Objectives/Goals</b> My project goal was to find out if the activity level of the pika, <i>Ochotona princeps</i> , is affected by temperature. Pikas are small mammals that live at high elevations in the mountains. My hypothesis was that pikas are more active during a median temperature range, so that they can avoid high temperatures which are very dangerous to pikas.	
<b>Methods/Materials</b> Between September 14 and November 15 of 2014, I conducted weekly observations at an active pika site in Virginia Lakes in the Sierra Nevada mountains at 10,500 feet elevation. Pikas build haypiles (stashes of vegetation that they collect throughout the summer) in talus (slopes of broken rocks crumbling down from the peaks above). I observed pikas for an hour or more at three haypiles, using a homemade observation sheet to record 8 distinct types of pika behavior, such as haypiling and foraging. Also, to get additional pika data, I collaborated with another scientist and set up a motion-and-heat triggered camera at one of the haypiles. Simultaneously, I used 10 iButtons (thermometers) to continuously measure the temperatures pikas encounter in their habitat, such as the temperature on the haypile and in the foraging ground. Next, I calculated hourly rates for pika activity so that I could easily compare it to my hourly iButton temperatures.	
<b>Results</b> I found that pikas are the most active during a median temperature range. For example, on September 21st, haypile 2 was 11°C and my observed hourly pika activity rate was 71. In contrast, when it is hot, pikas cannot be active, or they get hyperthermia and face possible death. Pikas quickly stop haypiling, foraging, and being active when the temperature rises above their preferred range. For example, on October 3rd, haypile 2 was 21°C, and my observed hourly activity rate was only 11. When it was very cold, pikas were not as active as they would be during a moderate temperature range.	
<b>Conclusions/Discussion</b> My hypothesis, that pikas are more active during median temperatures, was correct. I connected my conclusion to the world by thinking about climate change. Since pikas are so sensitive to high temperatures, climate change will have a negative effect on them--pikas will be forced to spend less time haypiling and foraging and more time confined in the cool and safe talus matrix. With smaller haypiles, pikas will have less success surviving the winter.	
<b>Summary Statement</b> After simultaneously observing pikas in the field and measuring the temperature, I found that pikas are the most active during a median temperature range, and least active when it's hot.	
<b>Help Received</b> Dr. Connie Millar helped me find an active pika site, eliminate uncontrolled variables, lent me the iButtons, and asked me helpful questions. Ken Hickman helped me gather additional data by setting up the camera at haypile 3. My dad helped me use Excel and my parents hiked with me to the pika site.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Bailee A. Poole</b>	<b>Project Number</b> <b>J1220</b>
<b>Project Title</b> <b>Investigating if Equine Chiropractics Affects Stride Length and Flexibility</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of my science project is to determine if equine chiropractics affects stride length and flexibility. I will be testing to see if there is a change in horses' stride length and flexibility before and after chiropractic adjustments. <b>Methods/Materials</b> The materials used for my investigation included twelve horses, an equine chiropractor, a rake, and two yardsticks. First, I ranked a dirt path that was used for the horse to walk through. Next, I walked the horse through the path and measured the distance between two steps of the same foot. For my investigation, the left hind foot was used for all trials. After measuring the horse's stride length, the chiropractor adjusted the horse. Adjustments were made to the neck, upper back, lower back, poll, and all four legs. After the adjustments, the dirt path was raked again. The horse was walked through the path and I measured the length between the two steps of the left hind foot. This process was repeated for all twelve horses. <b>Results</b> After completing my investigation, I found that the chiropractic adjustments lengthened the equines' stride, therefore increasing flexibility. The average length of the equines' stride before chiropractic adjustments was 67.5 inches. The average stride length after equine adjustments was 70 inches. This means that there was an average increase of 2.5 inches, or 3.703%. <b>Conclusions/Discussion</b> After completing my investigation on whether equine chiropractics affects stride length and flexibility, I found that equine chiropractics lengthens stride length, therefor increasing flexibility. My results show that chiropractic adjustments lengthen the horses' stride in comparison to the horses' stride length without equine chiropractics. The average increase in stride length was 2.5 inches or 3.703%. This may seem like a small number, yet two and one half inches is a significant change in a horse's stride length. Because equine chiropractics lengthen the horse's stride, the horses will become more flexible after chiropractic adjustments.	
<b>Summary Statement</b> My project is determining the effects of equine chiropractics on the equine's stride length and flexibility.	
<b>Help Received</b> Mom drove me to meet with chiropractor as well as helped assemble board. Dr. Alyx Debenedetto chiropractically adjusted the horses that were used in project.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Madison L. Risk</b>	<b>Project Number</b> <b>J1221</b>
<b>Project Title</b> <b>Lights Out: The Effect of Chronic Sleep Deprivation Using a Nocturnal House Mouse (Year 6)</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This experiment was performed to see if changes in sleep cadence affected a mouse's learning ability. This builds on my previous five years study of the effects of artificial lighting (as a form of habitat destruction) on the learning patterns and eating habits of animals.</p> <p><b>Methods/Materials</b> Materials: 5 mice, small pool, platform, stopwatch. Methods: In a water maze, I put a platform I made out of a cup and a sheet of metal and marked the location of the platform on the side of the pool. The mice were on a normal light schedule (12 hours light and 12 hours dark. Timed tests were run for each mouse. I recorded how long it took for the mouse to find the platform. This was repeated several times. I then subjected the mice to a 24 hour setting of light. Every half hour I would go in and gently wake them up. I repeated this every day for three days. On the fourth day I put them back on the normal light settings and ran them to see if they were affected by the light. This entire procedure was repeated for a bigger pool/maze.</p> <p><b>Results</b> I recorded 180 maze runs (thirty-six for each mouse) at normal light conditions. When the timed test was similar to their natural light exposure of 12 hours per day, mice on average learned the course and ran it faster. For maze 1, the shortest time ran was 0:03 seconds. The length of time reduction ranged from 1:26 to 0:03. For maze 2, the shortest time was 0:07 The time reduction ranged from 1:08 to 0:07. When the lighting conditions were changed, the length of time that it took each mouse to navigate the maze increased. While the mice navigated each day quicker, there was an increase from the last run in normal conditions to the first run in excessive lighting conditions. The average length of time for maze 1 increased from 0:05 seconds to 0:33 seconds. The average length of time for maze 1 increased from 0:09 to 1:17.</p> <p><b>Conclusions/Discussion</b> Mice are nocturnal. However, they are very adaptable and can learn. When the light changed, the learning patterns of the mice changed as well. At 12 hours of light, the mice learned the water maze; while they learned the maze under excessive light conditions as well, it took them longer. The sleep deprivation was a factor in their ability to learn. If the learning and eating habits of the mice change, then their behavior may change. This could affect their predators and move up the food chain.</p>	
<b>Summary Statement</b> What is the effect of chronic sleep deprivation on the common house mouse.	
<b>Help Received</b> My mother created the format for the graph which I then input the data.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Kristen R. Schiavon</b>	<b>Project Number</b> <b>J1222</b>
<b>Project Title</b> <b>Can a Migratory Mule Deer Herd's Travel Routes Be Manipulated or Controlled?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My project was to see if you change the topography in a migratory mule deer herd's travel routes, will the deer adapt to the change or will they find a new travel route.</p> <p><b>Methods/Materials</b> Used trail cameras to take pictures of the deer as they traveled through the test area and highway undercrossing. Transferred images on SD cards to flash drive. Used a computer to analyze the pictures of deer that used the undercrossing.</p> <p><b>Results</b> The deer adapted to the change in topography, and used undercrossing. They were hesitant at first however after one year the deer started to use undercrossing more.</p> <p><b>Conclusions/Discussion</b> The deer herd used the undercrossing, but they were very hesitant. The deer would go through the undercrossing, but not through the entire length of the undercrossing. Also, it took the mule deer herd around a year for them to accept the change in the topography. Some images of cars were seen on the highway while deer were using the undercrossing showing that deer travel routes can be controlled for human and animal benefits.</p>	
<b>Summary Statement</b> I conducted this experiment to see if humans could manipulate or controll a migratory mule deer herd's travel routes.	
<b>Help Received</b> Used images from selected trail cameras put in place by highway 89 stewardship team members, provided by Michael Delassex University of California Cooperative Extentions State Biologist.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Nikhil Sundrani</b>	<b>Project Number</b> <b>J1223</b>
<b>Project Title</b> <b>The Effects of Air Pollution on Lung Capacity in Adolescents</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of my project is to explain the correlation and connection between air quality index, or AQI, and lung capacity in adolescents, or their FEV1 (forced expiratory volume in one second) and FVC (forced vital capacity). According to my research, there is a definite link between the two values. <b>Methods/Materials</b> In order to test my experiment, informed consent forms had to be collected from around 30 subjects. First, the AQI of each testing location was obtained. Testing required each subject to inhale and exhale through a spirometer three times from which the FEV1 and FVC of the subjects were obtained. This data was then compared to the AQI of each test site in order to determine the success of the experiment. All subjects were tested in the afternoon for consistency in data. <b>Results</b> Subjects from the test site with the worst AQI generally performed worse in the spirometry tests, with significantly lower FEV1 and FVC values. These numbers were then compared to the location with the best AQI of 20, with by far the largest lung capacity values out of any of the tests performed. All four of the sites had subjects aged 10-16; height, weight, and gender typically had similar, more generic values. Results and tests were strictly controlled, with minimal subjects failing to perform the tests correctly. <b>Conclusions/Discussion</b> My hypothesis was supported, however my tests proved that a significant difference is needed in the AQI to have a significant difference in the lung capacity function of the adolescents tested. When this difference was achieved, tests proved that the AQI seriously affected the lung capacity. This project can have an important effect on the community. As everyday citizens know that California's Central Valley (where tests were held) has unhealthy air quality, they may not know how it affects their overall lung function. Also, there is a correlation between air quality and lung function and how it affects obesity rates; it is proven that the epidemic in the Central Valley is worse than most other places in California.	
<b>Summary Statement</b> My project is about the air quality of a specific testing location and its effects and relations to the lung capacities of adolescents in the area.	
<b>Help Received</b> My expert, Dr. Kuldeep Gill, educated me on the procedure of spirometry and gave me clearance to do so, and my parent was a designated supervisor.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Radhika Verma</b>	<b>Project Number</b> <b>J1224</b>
<b>Project Title</b> <b>The Impact of Age and Gender on Vocal Ranges</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this project is to find the impact of age and gender on vocal ranges.</p> <p><b>Methods/Materials</b> In this trial, people of different genders and age groups were tested. The number of people tested was 120, fifteen boys and fifteen girls in ages 7-9, ages 13-18, ages 25-35, and ages 40+. They were tested by having to sing specific notes that were played on a keyboard. They sang notes starting from C4 and sang higher and higher until they couldn't sing the notes comfortably. That final note was marked on a data table, along with their age and gender. If the subject was under 18, they were given a permission slip to get signed by their parent/guardian.</p> <p><b>Results</b> The girls and the boys ages 7-9 sang between six and twelve notes (A4-G5). The girls ages 13-18 ranged between thirteen and nineteen notes (A5-G6) while the boys of this age group sang between eight and sixteen notes (A5-D6). The women 25-35 sang between eleven and seventeen notes (F5-E6), while the men sang in the range of six and twelve notes (A4-G5). 40+ women sang in the range of ten and seventeen notes (E5-E6), the men sang between two and six notes (D4-A4). Nineteen, or D6, was the highest note someone sang up to. The lowest note was 2, or D4.</p> <p><b>Conclusions/Discussion</b> On average the 13-18 year old girls sang the highest. The second highest was the category women ages 25-35 and 40+ women, next, the 13-18 year old boys then the 25-35 year old men, after, the 7-8 year old boys and girls, who sang the same, and last, the 40+ men, who sang the lowest. In conclusion, the girls ages 13-18 have the highest vocal ranges and the 40+ men have the lowest.</p>	
<b>Summary Statement</b> This project can help determine who has the highest vocal range and who has the lowest, by comparing different ages and genders.	
<b>Help Received</b> Katherine Girvin, my mentor and choir director at Marshall Middle School taught me about music. My Mom and Dad helped by driving me places for testing.	





# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> <b>Shruti Verma</b>	<b>Project Number</b> <b>J1225</b>
<b>Project Title</b> <b>Nature vs. Nurture: Why Do I Have Glasses?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The number of people using visual aids is rapidly increasing. However, it is still not completely clear what is causing this. This epidemiological study uses a sample of the population to find out the probabilities of inheriting need for visual aids based upon family visual history. Environmental factors such as TV viewing time and computer usage time will also be examined.</p> <p><b>Methods/Materials</b> For this project, the main material was 400+ forms asking about visual history, family visual history, and environmental factors. Only 97 pieces of data were collected from optometrists as many optometrists refused to provide any data, or were not able to contribute much data. Optometrists that did help were two different Lens Crafters and the Mira Mesa Optometry. 326 pieces of data were collected from places such as outside of supermarkets, cultural gatherings, swim meets, and school.</p> <p><b>Results</b> The probabilities of inheriting a need for visual aids turned out to be much higher than expected. It was determined that the chance of a child needing glasses when both parents used them was 56.7%. The chance of needing glasses when only one parent wore glasses was 30.2%. When neither parent needed glasses, it was discovered that there was still a 19% chance of developing a need for glasses. These results were also compared to the opinions of three optometrists of San Diego. One optometrist thought that 50% of her patients acquired glasses from genetics. The other two optometrists thought that genetics was a much higher factor of poor eyesight and that 75% of their customers had poor eyesight caused by genetics.</p> <p><b>Conclusions/Discussion</b> For years, children have been urged not to watch too much TV or spend an excessive amount of time on the computer. However, from the data collected, it was found that genetics resulted in a higher amount of children requiring glasses than environmental factors causing this need. Environmental factors merely increase the chances by a little. In fact, TV viewing time was discovered to have little, to no affect. The chances of getting glasses, when both parents had them, were above 50%.</p>	
<b>Summary Statement</b> This epidemiological study concerns the role of genetic and environmental factors in the causation of poor eyesight disorders.	
<b>Help Received</b> Parents helped drive to survey locations; Three optometrists provided data and interviews; Two doctors of optometry provided guidance and suggestions	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Matt J. Wallin</b>	<b>Project Number</b> <b>J1226</b>
<b>Project Title</b> <b>Rascally Rabbits: Social Behavior in Domestic Adult Male Dwarf Rabbits</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Little is known about the social behavior of domesticated male and female rabbits nor the best way to house them. I investigated whether male rabbits change their dominance behaviors based on interactions with the males and females near them. My first hypothesis was that the presence of a female will increase the dominance displays between all male rabbit pairs. My second hypothesis was that rabbits who were friends would show fewer displays of dominance than rabbits who were strangers. <b>Methods/Materials</b> I have hand-raised and trained 12 rabbits over the last 8 months in my home. The male rabbits have been housed together or next to each other as friends or separately with little contact. I put the six pairs of male rabbits who were friends or six pairs of male rabbits who were strangers in a divided pen and recorded how many times each pair showed signs of dominance with and without the presence of a female over two minute trials. I used a Student's t-test to compare the difference in dominance displays between several conditions: 1) all male rabbit pairs with and without a female present; 2) friendly male rabbit pairs with and without a female present; 3) stranger male rabbit pairs with and without a female present; 4) friendly vs. stranger rabbits with a female present; and 5) friendly and stranger rabbits without a female present. <b>Results</b> Contrary to my first hypothesis, the presence of a female rabbit actually significantly decreased the dominance displays between male rabbit pairs in general ( $p < 0.05$ ). This effect was driven by the high level of dominance displays between strange male rabbit pairs compared to that of friendly rabbit pairs. Confirming my second hypothesis, the friendly rabbits did not change their rate of dominance displays when a female was present, but the stranger rabbits reduced their displays of dominance and increased their courtship displays toward the female. <b>Conclusions/Discussion</b> Thus, I conclude that it would be best to house stranger male rabbits with their friends and with females, because this arrangement decreases fighting among stranger rabbits until they become friends with one another. These findings will help domestic rabbit owners and farmers improve their designs for housing their rabbits to reduce stress.	
<b>Summary Statement</b> Social behavior in domestic adult male dwarf rabbits is affected by male familiarity and female proximity.	
<b>Help Received</b> My mom (Dr. Brewer) and friend (Dr. Barton) helped with experimental design and statistical training. My sister was a backup data collector, and my mom videotaped data collection.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Trinity O. Walter</b>	<b>Project Number</b> <b>J1227</b>
<b>Project Title</b> <b>Screen Size and Eyes</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this project was to determine whether playing video games on a small screen, as opposed to a larger screen, will cause a greater amount of eye strain that will result in blurrier vision.</p> <p><b>Methods/Materials</b> Test subjects played the same video game on 3 different sized screens: Desktop computer (19.5 inches), Kindle Fire (8.5 inches), and a Nintendo DS (3.5 inches). The Test Subjects played the same game on each device for 1 hour, taking a break every 15 minutes to test eyes on Snellen eye charts. Two tests were conducted for each test subject, taken at two time intervals. The eye charts were alternated to control for memorization variables. Test subjects were exposed to consistent lighting and other environmental conditions, including the distance from face and eye chart. All chart readings took place in same area.</p> <p><b>Results</b> The results for my experiment determined that signs of increased eyestrain were significantly greater on the Nintendo DS, the smaller screen, than the Desktop or the Kindle Fire, the larger screens.</p> <p><b>Conclusions/Discussion</b> Game play on a smaller screen exhibits a bigger decrease in visual acuity than game play on a larger screen, proving that gaming on smaller screens cause more eyestrain quicker.</p>	
<b>Summary Statement</b> My project is about the way different sized screens effect your eyes and how smaller screens are worse for your eyes than larger screen.	
<b>Help Received</b> Mother helped cut paper for display and assisted in conducting eye tests. Teacher advised me in proper scientific method as information.	



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> Madelyn S. Wolfe	<b>Project Number</b> <b>J1228</b>
<b>Project Title</b> <b>Cat Scat! What Does Your Cat's Scat Tell You?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This project tests four cat foods to see which is best for your cat: Meow Mix, Friskies, Iams, and Natural Balance. My hypothesis was that Natural Balance would be the best out of the four because it had better quality ingredients.</p> <p><b>Methods/Materials</b> I tested six trials of each type of cat food. Each trial started with 150 grams of cat food. I added 300 mL of hydrochloric acid and let it soak for 12 hours. The hydrochloric acid was pH level 2 and breaks down the food like the acid in a cat's stomach. I drained the hydrochloric acid and added 300 mL of meat tenderizer (pH level 5) to the cat food. The meat tenderizer breaks down the proteins in the cat food into amino acids. It is like the process in the cat's intestines. The meat tenderizer soaked for 12 hours and then I had to let the cat food drain. After 24 hours of draining, the remaining cat food is like the cat feces # it is what was not digested. The cat food with the smallest feces is the best because it can be digested best.</p> <p><b>Results</b> My hypothesis was proven right. Natural Balance is the best cat food out of the four I tested because it had the smallest percent increase. The average percent digested for each cat food were Natural Balance at 151.7%, Iams at 179.9%, Friskies at 197.5%, and Meow Mix at 199.2%.</p> <p><b>Conclusions/Discussion</b> Better quality ingredients will improve digestibility and make a healthier cat food. It also matters how the ingredients are listed and what quality and quantity of lesser valuable ingredients are included.</p>	
<b>Summary Statement</b> This project tests which cat food provides the best digestibility for your cat.	
<b>Help Received</b> My mom, dad, sister, and brother helped me in different ways to complete this project.	