SANTA FE ALLIANCE FOR SCIENCE

Example Science Fair Projects

Science projects are an excellent way for students to learn about the scientific method and try something new, while having fun at the same time. Many students have trouble coming up with ideas, and the below tables present examples of past science projects to help students find their own creative topic. Two tables are presented – one labeled "Elementary and Middle School Projects" and the other "High School Projects". Students do not have to limit themselves to their own school grade, as the judges have seen many good "High School" projects prepared by middle schoolers and vice versa. Don't forget – these are just examples. We hope these examples will give students ideas for their own projects. A list of websites that provides many science projects and the instructions for carrying them out is shown on the last page.

Elementary and Middle School Projects

Descriptive Title	Summary of Procedure[1]
Measuring plant growth in different soil types	The student collected equal amounts of 3 kinds of soil (potting, garden dirt, and sand) and placed the soils in equal size pots. Then the student planted 5 bean seeds in each pot and gave each pot equal amounts of water every other day for 3 weeks. At the end of 3 weeks the student measured the height of each plant and graphed the averages. NOTE: this project could also be done by varying the amounts of fertilizer given to each group of plants.
Measuring cat behavior with different cat toys	The student made 4 different cat toys: shoe lace on a dowel; small sock filled with catnip dangling from a dowel; cat treat tied to shoe lace on a dowel; and catnip-filled sock with a bell pinned to it dangling from a dowel. The student tested each toy for 5 minutes for 3 days and recorded the cat's behavior. The student recorded how many times the cat exhibited each of 7 behaviors: watching, following, pouncing, kicking, batting, biting, and rolling/tumbling. The student then summarized the results.
Measuring the bounce of a basketball with different air pressures	A regulation basketball has 8 pounds per square inch of air pressure, and the students wanted to see the effect of different air pressures on the bounce of a basketball. They inflated a regulation basketball to 6 PSI of pressure and dropped it from a height of 10 feet. They measured the bounce height and repeated this 10 times at the 6 PSI pressure, recording the results. Then they repeated the experiment at 7, 8, 9, and 10 PSI and graphed the results.
How the angle of the sun affects a solar oven	The student built a solar oven using a tinfoil-lined cardboard box. He placed a thermometer in the middle of the box and recorded the temperature each hour on 4 sunny days. He averaged the hourly temps and graphed the averages by hour showing how the sun's position affected the solar oven temperature.

[1] This is just a summary of the science project. Important elements, like variables, controls, equipment used, complete procedure, and results are not shown.

Elementary and Middle School Projects	
Descriptive Title	Summary of Procedure[1]
Do sports drinks provide more electrolytes than orange juice?	The student made a conductance sensor out of a drinking straw and some copper wire following the instructions on sciencebuddies.com. Then she connected one end of the sensor to a 9 volt battery and the other end to a multimeter. Then she connected the other end of the battery to the multimeter. She placed the conductance sensor in a container filled one-by-one with the same quantity of different liquids: water, Gatorade, Powerade, orange juice, and milk. For each liquid, she recorded the multimeter reading of the electrolyte conductance and graphed the results.
How heat affects light-emitting diodes	Using a digital light meter ($12.00 and up on Amazon), an LED flashlight, and a cardboard box the student measured the light intensity of the LED bulbs as they heated up over time and graphed the results. NOTE: students should be sure they understand what an LED bulb is and how it works.
How to make a homemade barometer	Following the instructions found on www.stormthecastle.com, the student used a glass jar, balloon, rubber band, and drinking straw to make a homemade barometer. He taped a piece of graph paper to the wall next to the barometer and calibrated his homemade device with what he found on www.weather.com. The student then measured the reading from his barometer with the weather site and recorded and graphed the 2 air pressures for 2 weeks. NOTE TO STUDENTS: Be sure you are able to state what the barometer measures and why the barometric reading is important to weather forecasting.
Making potato batteries	Using some potatoes, galvanized nails, copper wire, alligator clips, and a multimeter, the student built 5 potato batteries (using potatoes of different size) and measured the voltage output of each with a multimeter. Then the student graphed the voltage output against the weight of the potatoes to understand how potato size affects electrical output. NOTE TO STUDENTS: Be sure to be able to explain why the potato can create electricity.
Separating water into its basic components	Following the instructions on www.navigatingbyjoy.com (also found on other websites), the student built an electrolysis apparatus to separate water into its oxygen and hydrogen molecules. Then the student tested the hydrogen tube by igniting the hydrogen, and observing the (very small) explosion, and tested the oxygen by flaming a hot wooden match ember. NOTE: This experiment should be made with adult supervision.
Does adding salt to water make it boil faster or slower, and why?	The student recorded the length of time it took to boil 2 cups of distilled water in a pan on the stove. Then the student discarded that hot water, cooled the pan, and poured in another 2 cups of distilled water, but this time added 1 tablespoon of salt, and recorded the time to boil. The student repeated this with 3 and with 4 tablespoons of salt, and then prepared a graph showing the time to boil for each amount of salt. NOTE TO STUDENT: Be sure to be able to explain why you might have observed a difference in time.

Elementary and Middle School Projects	
Descriptive Title	Summary of Procedure[1]
How does temperature affect yeast's ability to produce carbon dioxide?	The student heated a water bottle filled with 1 cup of water in a large pot of water on the stove. Using a candy thermometer, the student waited until the water in the bottle was 80˚F, and then added 2 Tbsp of sugar and 1 packet of yeast and quickly attached a balloon to the top of the water bottle. The student measured and recorded the circumference of the balloon every 30 minutes for 2 hours. The student repeated this at 90˚F, 100˚F, 110˚, 120˚F, and again at room temperature (70˚F), i.e., without putting the water bottle in the hot water pan. The student then graphed the results.

High School Projects	
Descriptive Title	Summary of Procedure[2]
Can emotional intimacy be accelerated between strangers?	Students hypothesized that by providing complimentary information to two strangers about the other that the two would become more intimate (or at least friendly) upon meeting each other. The students pick 12 pairs of strangers and in 6 of the pairs provided complimentary information to the pairs. After each pair met for 30 minutes, they were asked to complete a standardized form that assessed their impression of their partner. The results showed whether giving information about a stranger before a meeting would lead to a more successful meeting.
The effect of light pollution on stargazing	Three students counted stars at three different locations on the same night looking at the same place in the sky. The locations were: downtown Plaza, the Santa Fe Municipal Recreation Sports Complex on Caja del Rio Road (outside of city lights, but at city elevation), and at the Ski Santa Fe parking lot (10,350 ft. elevation). They each used a toilet paper tube, placed the North Star in the upper left portion of their view (to assure they were all looking at the same area), and counted the stars inside the TP ring (they counted twice). Then they each put the constellation Gemini in the upper left corner of their TP ring and again counted stars. Their results showed how light pollution from Santa Fe city lights affected their ability to see stars.
Which bridge construction design is strongest	The student used popsicle sticks to build 4 bridges of the same length, each using a different design: suspension, arch, truss, and beam. One by one he then placed increasingly heavier weights in the middle of each bridge and recorded when the bridge broke.
Measuring the speed of light using a microwave, egg white, and a ruler.	The student measured the speed of electromagnetic waves in the microwave portion of the spectrum by measuring the spacing between hot spots in a microwave oven. First the student poured several egg whites onto a microwave-safe plate. After cooking the egg whites for 30 seconds, the student measures the distance between "hot spots". This distance is one-half of the microwave's wavelength. Now the student calculated the speed of the microwaves by using the wave length and the unit's frequency (taken from the oven's label).
A robotic car that can traverse a windy road and obey traffic signals	With a purchased kit, students built a robotic car, which with its camera, could recognize and traverse a winding road, could recognize the color of a stop light and proceed through a green light, but stop at a red light.

[2] This is just a summary of the student's project. Important elements, like variables, controls, equipment used, complete procedure, and results are not shown.

High School Projects	
Descriptive Title	Summary of Procedure[2]
Using a laser to measure the speed of light in gelatin	Following the instructions on www.sciencebuddies.org, the student used an inexpensive laser pointer to measure the speed of light by applying Snell's Law of Refraction and a little high school math. Then the student varied the amount of sugar in the gelatin to see if the index of refraction (and therefore the speed of light) changed. NOTE: Lasers should never be pointed at a person's (or animal's) eyes.
Does singing along with music affect reaction time?	The student acquired 12 subjects and explained that their reaction time was going to be measured by dropping a ruler between their thumb and forefinger and recording the centimeter number on the ruler, which corresponds to the length of their reaction time. The subjects were broken into 4 groups of 3 and each subject practiced performing in each of the 3 roles of dropper, grabber, and recorder. After practicing for 15 minutes, each subject took turns grabbing the ruler ten times as it was dropped, and their results were recorded. Then the experiment was repeated, but droppers had to listen to and sing along with (out loud) their favorite music played at a rather loud, but not excessively loud, level. The volume level was consistent for each dropper. Their results were again recorded, averaged, and compared to their results without music.
How will changing my style of clothes and appearance affect the way people react to me when asked a question?	This student dressed in a "fancy/good" outfit, then went downtown to the Santa Fe Plaza and asked 10 people at random for the time. She recorded their responses on a scale of 1 to 5 (where 1 was they ignored her and 5 was they politely told her the time). Then she changed into a "dirty/bad" outfit and again asked 10 people at random for the time and recorded the results. Her results showed a highly significant difference in people's response strictly based on her appearance.

Good websites to search for ideas:

www.sciencebuddies.org

www.sciencemadesimple.com

www.education.com/science-fair/middle-school/

www.hometrainingtools.com/a/high-school-science-projects/

www.cool-science-projects.com/Middle-School-Science-Projects.html

www.navigatingbyjoy.com/science/