CENTRAL COAST FAMILY SCIENCE NIGHTS






Central Coast Science Project

Paso Robles Joint Unified School District

Funded by California Mathematics and Science Partnership Cohort 7

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Part 3 "Expert Advice"

ACKNOWLEDGEMENTS

The Central Coast Science Nights started in 2010 in Paso Robles with the great idea of one teacher (Anne Louise Emrich) and it grew to cover 8 other districts in three years extending from Paso Robles to Guadalupe. It brought together many local enthusiastic teacher leaders, Cal Poly faculty, students and other educational agencies to make this a highlight for all of us involved. We have many happy memories of teachers working to bring this into their schools, and their local communities coming together for this event. We are very grateful for all the teachers, Cal Poly students and District leadership and administrations that contributed and supported the development of the Science Nights. We are especially grateful to all the teacher leaders that organized at their schools and communicated to all to make this happen. This book is a collection of some of their activities and we hope to continue our partnerships many years into the future.

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- Andrea Jacobson from Harloe Elementary
- Eve Drew, Katy Silva, Bill Tindula from Nipomo Elementary

Paso Robles Joint Unified School District

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- Dawn Freunds Steuwer, Karen Grandoli, Virna Ezzell from Georgia Brown Elementary
- Charles Berry, Jillian Jaeger from Kermit King Elementary
- Kathy Dale, Diane Harris, Trina Nicklas, Terri Pearl from Pat Butler Elementary
- Anna Louise Emrich, Kathy Johansing, Breta Yarborough, from Virginia Peterson Elementary
- Deborah Baca, Sandy Clarke, Laura Stark, Lisa Tibbetts, Diana Watt, Brigid Woods, Charla Zukowski from Winifred Pifer Elementary

San Luis Coastal Unified School

- Matt Moore, Erin Wynns from Bishop's Peak Elementary
- Liza Fierro from C. L. Smith Elementary
- Nicole Rege, Lisa Stephens, Marlene Vega from Pacheco Elementary

San Miguel Joint Unified School District

- Laura Learned, Holly Moore from Lillian Larsen Elementary
- Anna Mumford from Cappy Culver Elementary

Templeton Unified School District

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Central Coast Science Project
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www.ccsp.calpoly.edu

SNAP SHOTS

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

San Gabriel Road Elementary

8500 San Gabriel Rd.
Atascadero, CA 93422

Telephone: 805-462-4340
Contact: Dennis Eaton
denniseaton@atasusd.org

Students Enrolled: 553
Students on FRPM*: 25%

WHY a Science Night?
Initially to fulfill the CaMSP grant, but Science Nights have become so much more. Science is not pushed to the back burner in our school anymore.

SPREADING THE NEWS

Number of people in attendance: 250
Who attended? Students, parents, family members, principal, teachers, district superintendent
How did you spread the word? Flyers (save the date and reminder) to PTA, e-mail to students in class, e-mail invitations to superintendent and board members
Did you have student volunteers? Yes; the first science night, 6th graders were recruited to assist with stations. As 7th graders, they were asked to return, and most of them came back to help again.

ACTIVITIES

Owl pellets, entomophagy, fossils, microscopes, chemistry in a baggie, melt-away, solar crickets, centripetal force, nuudles, poly worms, patterns, hoopsters, sinking feeling, magnets, vacuum chambers, plasma globe, slime, submarines.

CROWD PLEASERS

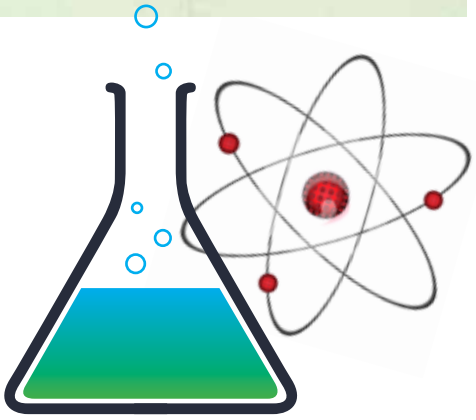
Owl pellets, melt away, fossils, and patterns.

RESOURCES

Cal Poly – the staff and materials they provided.

ADVICE

"Start preparing at the beginning of the school year, with help from fellow staff. The CaMSP website resources were very helpful. If you want Cal Poly at your science night, let them know early on, so they can have you on their radar to help out."



This science night is described as a Science Expo because students display their science projects but are not judged on them.

Date: March 27, 2013
Time: 5:30 - 7 p.m.
Location: Multi-purpose room, classrooms, outdoors

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Creston Elementary

5105 O'Donovon Rd.
Creston, CA 93432

Telephone: 805-238-4771
Contact: Tom Smith
thomassmith@atasusd.org

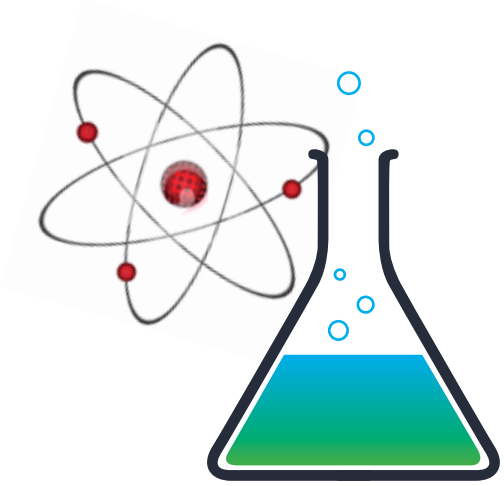
Students Enrolled: 99
Students on FRPM*: 49%

WHY a Science Night?
A lunchtime science club was formed during the year, during which students planned and implemented projects. The Science Night allowed them to share their projects with parents and the school.

SPREADING THE NEWS

Number of people in attendance: 200
Who attended? Parents, students, family, and staff
How did you spread the word?

- School newsletter
- Science club
- Word of mouth
- Flyers



Date: May 25, 2012
Time: 6 - 8:30 p.m.
Location: Multi-purpose room

ACTIVITIES

Air has weight, Bernoulli's principle, Student projects, atomizer with straws, crushing cans, crushing a 30 gal steel drum

CROWD PLEASERS

The hands-on activities were most popular, but especially the crushing of the can.

RESOURCES

Parents donated many things--the can, the pool, and the ice. Parents also set up and cleaned up.

ADVICE

"Set themes for science nights. I can see three different themes: air pressure, astronomy, and one other, that way, every three years you can repeat a theme so that it is all set to go with variety."

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Mary Buren Elementary

1050 Peralta St.
Guadelupe, CA 93434

Telephone: 805-343-2411
Contact: Tino Aleman
taleman@sbceo.org

Students Enrolled: 822
Students on FRPM*: 79%

WHY a Science Night?

- Inspire minority students to get into math, science, and engineering
- See what is available and get motivated

SPREADING THE NEWS

Number of people in attendance: 200
Who attended? Parents, students, administrators and teachers
How did you spread the word?

- Sent home flyer to all MB students
- Mr. Aleman's students created invitations to other classrooms
- School newsletter
- Phone system-automated calls to everyone

ACTIVITIES

Volcanoes, milk food color, paper helicopters, thaumatropes, vibrating robots, vacuum chambers, slime, submarines, solar crickets, skins and animal track-Dunes center, jaws and paws, birds and beaks, Rockets.

CROWD PLEASERS

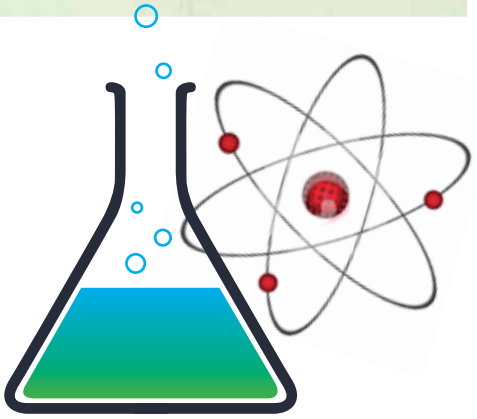
Rockets-outside, slime, submarines, thaumatropes, solar crickets.

RESOURCES

Cal Poly, Dune Center, CaMSP teachers in Mary Buren.

ADVICE

"It is helpful/supportive to host another event related to the topics near your Science Night date. Mary Buren hosted a Robotics competition the next day, and a Science Poster Night the same time as the Science Night. With more people, you may need more time."



This science night included a Science Project Poster Fair. We recommend that you do a science fair/science night combo.

Date: May 29, 2013
Time: 6 - 7:30 p.m.
Location: Cafeteria

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Joe Nightingale Elementary

255 Winter Rd
Orcutt, CA 93455

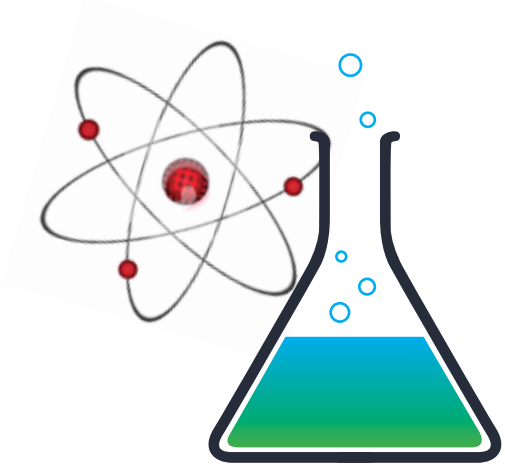
Telephone: 805-938-8650
Contact: Jaime Cuello
cuellojaime@hotmail.com

Students Enrolled: 724
Students on FRPM*: 37%

WHY a Science Night?
Wanted a stronger science presence at the school. Students were asked to help create/facilitate a science day at the school.

SPREADING THE NEWS

Number of people in attendance: 90
Who attended? Students
How did you spread the word? Announced the science day to all third grade teachers at JN, via e-mails
Did you have student volunteers? Yes. Students were picked up in Guadalupe and taken to Orcutt to help the students at JN.



This science day was solely based on fourth grade curriculum. It consisted of student attendees, dispersed in different classrooms.

Date: June 11, 2013
Time: 8:15 - 11:50 a.m.
Location: Different classrooms

ACTIVITIES

Electrical circuits, magnets, food chains.

CROWD PLEASERS

Magnets were most popular. The students enjoyed watching magnets repel against each other on the wood stand.

RESOURCES

Cal Poly student teachers--Ashley Thompson and Ramon Murillo, Mary Buren teachers, Steve Spangler videos on YouTube.

ADVICE

"Keep it small and make sure all the activities are hands-on activities."

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Bauer Speck Elementary

401 17th Street
Paso Robles, CA 93446

Telephone: 805-769-1350
Contact: Nancy Mayer
nemayer@pasoschools.org

Students Enrolled: 505
Students on FRPM*: 62%

WHY a Science Night?
Wanted to incorporate science standards into already established event, combining science with agriculture was an easy transition.

SPREADING THE NEWS

Number of people in attendance: 650
Who attended? Parents, presenters, students
How did you spread the word? Newsletter, websites, marquee
Did you have student volunteers? Had alumni volunteer and many students from other organizations.

ACTIVITIES

Many animals, owl pellets, making butter, painting and chalk drawings, farm equipment, branding, soil and erosion, roping, making tortillas, trail mix, western dancing, milking, tractor races, and making ice cream.

CROWD PLEASERS

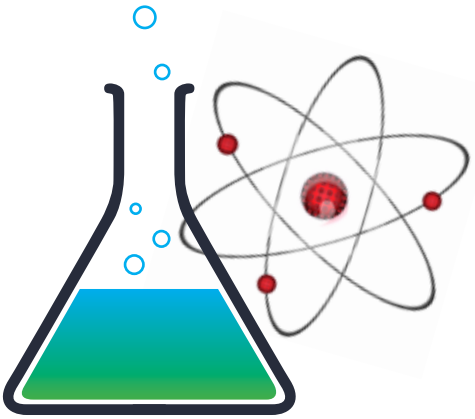
The students loved anything involving food, the owl pellets, all the live animals, the tractor races, and the milking.

RESOURCES

Judy Honercamp

ADVICE

"Start small and incorporate it with an already established event (open house... etc.)."



This science night was held on Bauer Speck's annual "Agriculture Day."

Date: March 22, 2013
Time: 9:15-11:30 a.m.
Location: Multi-purpose room, classrooms, and outdoors

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Kermit King Elementary

700 Schoolhouse Lane
Paso Robles, CA 93446

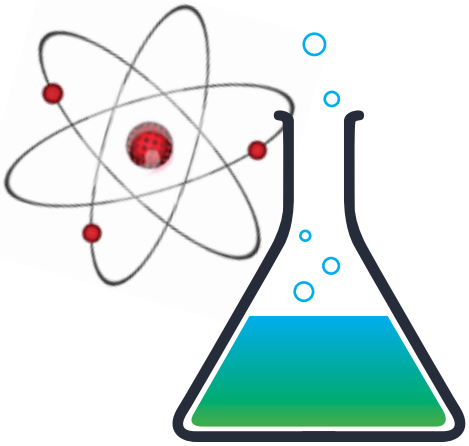
Telephone: 805-237-6170
Contacts:
Charlie Berry
cberry@pasoschools.org
Jillian Jaeger
jbjaeger@pasoschools.org

Students Enrolled: 471
Students on FRPM*: 26%

WHY a Science Night?
To give students and families an environment where they can explore and learn about science and math concepts in a fun, non-assessed way.

SPREADING THE NEWS

Number of people in attendance: 400-500
Who attended? Students, parents, school board members
How did you spread the word? Flyers, school newsletter, school phone autodialer, parent e-mail, school billboard
Did you have student volunteers? 4th and 5th graders who are leaders and self-managers made activity posters, shared announcements on stage, facilitated grading the math competition, assigned half-hour slots to assist in activity stations, set up and cleaned up before/after the event.



We recommend that you select a science night date based upon lunar phases and daylight savings time (for astronomy).

Date: January 26, 2012 and January 17, 2013
Time: 6-8 p.m.
Location: Multi-purpose room, classrooms, outdoors

ACTIVITIES

Magnetraces, polyhedrons, Nastea, Cal Poly slime, Grade level Math competition, pattern quilt, Endeavour Institute, Helium shark, froggie math, astronomy club, High school physics experiments, moon phases, circulatory systems.

CROWD PLEASERS

Math competition, slime, HS physics experiments, astronomy, rockets.

RESOURCES

Student and community clubs, Cal Poly students, PTA-provided pizza and refreshments for attendees and volunteers.

ADVICE

"Start simple and keep what works, eliminate/change what does not. Get PTA and staff support, and keep it interesting and fun for students and families!"

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Pat Butler Elementary

700 Nicklaus St.
Paso Robles, CA 93446

Telephone: 805-237-3407
Contact: Trina Nicklas
tnicklas@pasoschools.org

Students Enrolled: 407
Students on FRPM*: 38%

WHY a Science Night?
After the success of the initial science night for the CaMSP grant, Pat Butler made it an annual event.

SPREADING THE NEWS

Number of people in attendance: 250
Who attended? Parents, students, relatives, former students, presenters, board members, district administration
How did you spread the word?

- 'Shout out' in newsletter
- Flyer sent home with students
- Personal invitations made by students to board members and district administration
- Automated phone calls home as a reminder

ACTIVITIES

A specific set of activities for each grade K-5: K--phase change activity with ice and salt, 1st--teeth exploration and perspective drawings, 2nd--fossil imprints, 3rd--moon phases, 4th--circuits and magnetism, 5th--Harry Potter potions and science fair displays. PRHS physics students provided many activities: bed of nails, broken glass, gravity marble tracks, tablecloth trick, and string and cup telephones. Cal Poly provided density tanks, vacuum chambers, acid tasting, and floating shark.

CROWD PLEASERS

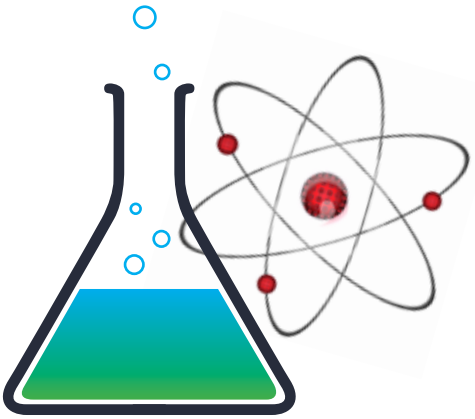
Nail bed, Harry Potter potions, floating shark is a great visual.

RESOURCES

Anna Louise Emrich--matriarch of science night in district as well as human resources. Also, Mark Fairbank and partners at Cal Poly.

ADVICE

"Plan early with a checklist! Work to have other organizations there to excite the kids about science!"



This science night, students did not volunteer. This way they were free to show off their projects and explore.

Date: February 28, 2013
Time: 5:30-7:30 p.m.
Location: Multi-purpose room

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Virginia Peterson Elementary

2501 Beechwood
Paso Robles, CA 93446

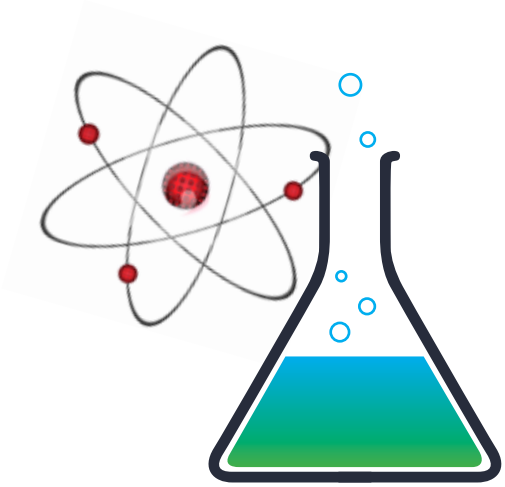
Telephone: 805-466-8113
Contact: Anna-Louise Emrich
aemrich@pasoschools.org

Students Enrolled: 490
Students on FRPM*: 56%

WHY a Science Night?
Wanted the students to teach their parents. There is no language barrier between students and their parents, making it easier for them to explain. Also, to stress the importance of math and science in schools.

SPREADING THE NEWS

Number of people in attendance: 300 – 400
Who attended? Students, parents, board members
How did you spread the word? Sign in front of school, announcement in yearly calendar, flyers, automatic calling system, class announcements
Did you have student volunteers? Yes! 4th and 5th graders became experts at certain stations, and manned them. They were the instructors for the evening, and rose to the occasion!



Date: First moonless night in February
Time: 5-8 p.m.
Location: Multi-purpose room, classrooms, and outdoors

ACTIVITIES

Environments, solar movement, food webs, magnets, gumdrop molecules, guests--food service manager, high school team, landscape architect, Air Quality Board, Cal Poly slime, Topaz Solar Farm presentation, math olympics.

CROWD PLEASERS

Cal Poly slime, astronomy club, walking on glass-physics experiment.

RESOURCES

The internet, and books in library had simple "hands on experiments" that the students could handle with minimal supervision.

ADVICE

"Go for it! Let the students lead, and it will build on itself. Each year will be bigger and better than the last."

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Winifred Pifer Elementary

1350 Creston Road
Paso Robles, CA 93446

Telephone: 805-769-1300
Contacts:
Charla Zukowski
czukowski@pasoschools.org
Lissa Tibbetts
ltibbetts@pasoschools.org

Students Enrolled: 477
Students on FRPM*: 47%

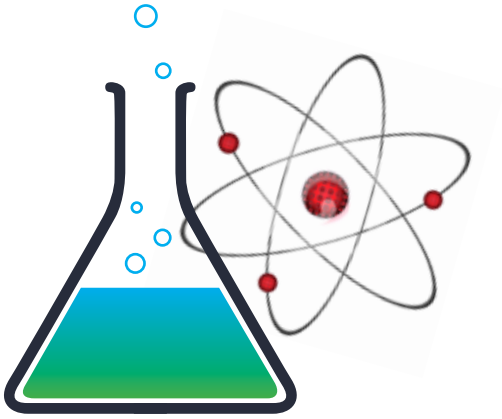
WHY a Science Night?
Wanted to have an event that was fun, academic, and free to students. It is a great way to bring hands-on experiences learned through our science grant, CaMSP, to our school community.

SPREADING THE NEWS

Number of people in attendance: 300
Who attended? Students, parents, teachers, administrators, school board members, parents and students from other schools
How did you spread the word? Save the date flyers, weekly calendar, intercom announcement, e-mail invitations to administrators
Did you have student volunteers? Yes; student council members painted posters and helped with set-up and clean-up.

ACTIVITIES

Rock testing, gumdrop polyhedrons, chemistry in a baggie, moon phases, fossil find, hoop glider, static electricity can race, color changing milk, making music with water glasses, experience gravity, magnet exploration, nastea, sink or float, anatomy of a seed.



CROWD PLEASERS

Gumdrop polyhedrons, chemistry in a baggie, moon phases, poly worms, anatomy of a seed, hoop glider, build a submarine.

RESOURCES

Cal Poly, PR High School, Central Coast Astronomical Society.

ADVICE

"Plan early, collaborate with colleagues, delegate tasks, take advantage of outside resources and community members in your area."

Date: April 25, 2013
Time: 5:30-7:30 p.m.
Location: Multi-purpose room, and outdoors

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Lillian Larsen Elementary

1601 L Street
San Miguel, CA

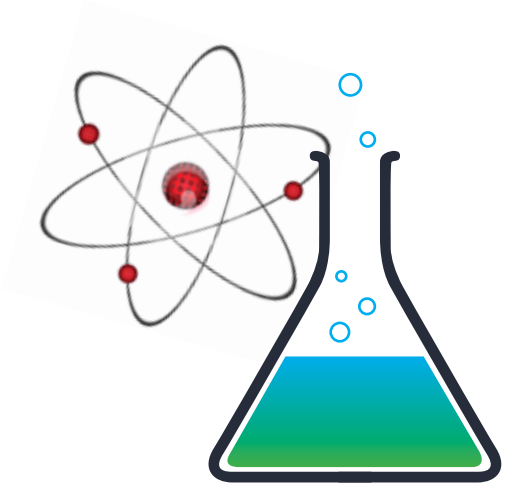
Telephone: 805-467-3216
Contact: Holly Moore
hmoore@smjusd.k12.ca.us

Students Enrolled: 348
Students on FRPM*: 69%

WHY a Science Night?
We wanted to do an all-school science night, but did not get the teacher or parent involvement, therefore a classroom science night was created, in conjunction with open house. It is enjoyable watching students and parents conduct experiments together.

SPREADING THE NEWS

Number of people in attendance: 65
Who attended? Students, parents, future students
How did you spread the word? Incorporated science night with open house.
Did you have student volunteers? Students were the instructors. They helped their parents conduct the experiments. Students also provided explanations about each of the labs.



Date: May 22, 2013
Time: 6-7 p.m.
Location: Classrooms

ACTIVITIES

Identifying rocks and minerals, what owls eat, static electricity, electromagnets, make blood, diagram the water cycle, animal and plant cells, human body quiz.

CROWD PLEASERS

Electromagnets and making blood. Students and parents loved the blood mixture most.

RESOURCES

Science kit from the textbook, and resources received during the grant.

ADVICE

"If you don't have parent involvement, do not let that discourage you. Start small and have it in a classroom if need be. Each year it will get bigger!"

*FRPM: Free and Reduced Price Meals

SNAP SHOTS ON FAMILY SCIENCE NIGHTS FROM

Vineyard Elementary

2121 Vineyard Drive
Templeton, CA 93465

Telephone: 805-434-5840
Contact: Susan Sonne
ssonne@templetonusd.org

Students Enrolled: 448
Students on FRPM*: 20%

WHY a Science Night?

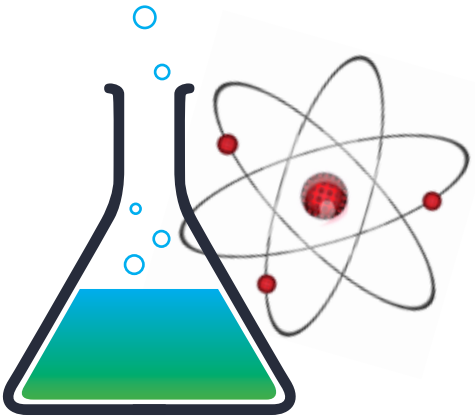
Originally to get credit for the CaMSP project, but as Vineyard got more into planning, it became something much more important, stressing the importance of science in schools.

SPREADING THE NEWS

Number of people in attendance: 250
Who attended? Students, parents, staff from other sites
How did you spread the word? Flyers, classroom newsletters, school website
Did you have student volunteers? Yes. Students handed out evaluation forms, fortune fish, at-home activity sheets.

ACTIVITIES

Melt-away, food for thought, exploring our universe, solar critters, chemistry in a baggy, slime, building biodegradable packing peanuts, patterns, popping bubbles, invincible balloon, mystery minerals, airplanes, magnets, vacuum pumps, circuitry, acids.



CROWD PLEASERS

Acid station, popping bubbles, slime, patterns, invincible balloon, magnets, melt-away.

RESOURCES

Cal Poly, science supply magazines/catalogues, the internet.

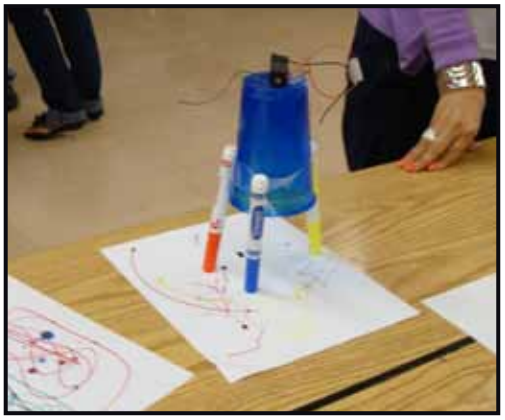
ADVICE

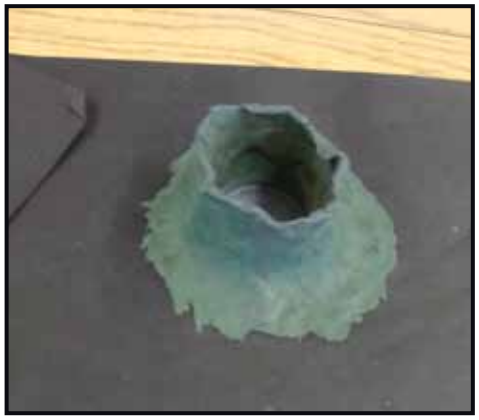
"Look at as many samples of science nights as you can. Select a variety of activities that work for the age group you are targeting, but also include some for younger children and older students. Consider the weather if you plan to do outdoor activities. Start planning early so you are not rushed the day of the event. Get help from local schools/universities to man/provide stations."

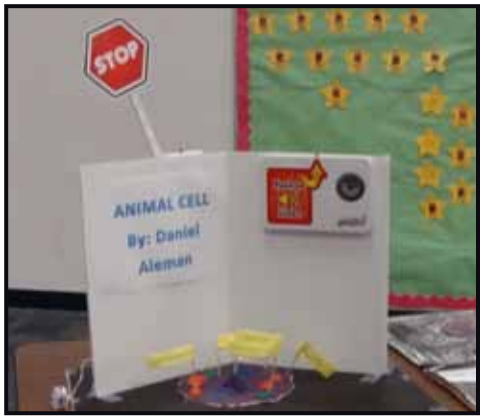
Date: March 29, 2011
Time: 6-7:30 p.m.
Location: Multi-purpose room, classrooms, outdoors

*FRPM: Free and Reduced Price Meals

ACTIVITIES







ACIDITY OF JUICES*

Students will test and compare the acidity of fruit juices using baking soda.

Reference:

- Chemistry Magic Show: COSAM Cal Poly, San Luis Obispo. Profs. Phil and Tina Bailey. The Cotchett Foundation, 2004. DVD.
- Bush, Seth D. Learn By Doing Lab Activity Book: Atoms and Molecule Exploration. San Luis Obispo: LBDL, 2009.

Materials:

- Apple juice
- Orange juice
- 3 500 mL graduated plastic cylinders
- 2 Trays
- 1 Measuring spoon (Tbsp)
- Taster cups for student tasting of juices (optional)
- White grapefruit juice
- Baking soda

Procedures:

1. Place juices in the front of the table and ask students to arrange in order of acidity: Which one do you think will be the most acidic?
2. If having students taste juices, each student should receive a taster cup, and have them taste the juices one at the time. How can you tell which one is more acidic? Did that match your predictions?
3. Fill a graduated cylinder with 100 mL of apple juice. Repeat with the white grapefruit juice and orange juice. Arrange in the same order as most of the students has predicted.
4. Add a tablespoon of baking soda to each graduated cylinder. Now we'll test acidity by reacting the juices with this base, baking soda.
5. Observe which juice produces the most bubbles when baking soda is added. Decide which is the most acidic and which juice is the lease acidic. Does this match your predictions? Can you think of more acidic juices? Where would pineapple juice or lemon juice be in relation to these three juices?

Questions:

1. Based on your taste observations, which juice is the most acidic? Which is the least?
2. Based on your observation of bubbles, which juice is the most acidic? Which is the least?
3. How does the least acidic juice compare to the most acidic juice in the reaction with baking soda?
4. Citrus fruits contain citric acid. Based on your observations, which juices are made from citrus fruits? Which are not?

Explanation:

Juices have naturally occurring acids. Acids have a tart or sour taste. Predictions of which juice is the most acidic and which is the least acidic are based on content of acid. Citric acid (C6H8O7) is a naturally occurring acid, named after citrus fruits like lemons, oranges, and grapefruit, and is one of the molecules that give some juices their tart taste. Other common natural acids include: malic acid (apple), acetic acid (vinegar) and formic acid (ants).

The amount of citric acid present determines the juice's acidity. The following table shows pH data. pH is a measure of acidity, the lower the value, the more acidic.

Juice	Approximate pH
Apple	4.0
Orange	3.3
Grapefruit	2.9
Lemon or Lime	2.0

Baking soda is a base and it is chemically known as sodium bicarbonate. A base reacts with acids to form carbon dioxide gas. We know this reaction is occurring when we observe bubbles–the carbon dioxide gas. The more acid present in the juice, the more bubbles we expect to see when we add baking soda. Here is the reaction:

$C_6H_8O_7$ (aq) + $NaHCO_3$ (aq)→$NaC_6H_7O_7$ (aq) + H_2O (l) + CO_2 (g)

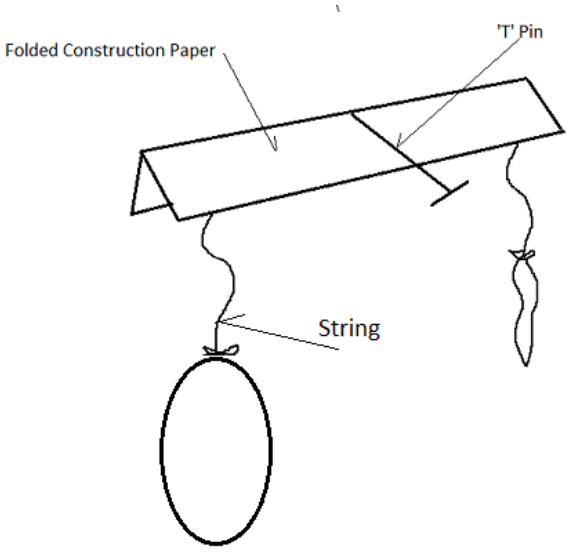
This is an example of a neutralization reaction.

What other ingredients are in juices? Water, sugar (fructose), fiber, and sodium. The stability of the foam in each of the juices indicates another ingredient in juices: protein. While juices have a very small amount of protein (<1%), this demo shows their presence in some juices.

*Central Coast Science Project can provide materials for this activity.

AIR HAS MASS

Students see that air has mass by balancing two balloons and then popping one.



Reference:

- Hone, Joseph, Victor, and Brandwein. *Teaching Elementary Science: a Sourcebook For Elementary Science*. California Department of Education, 1967. Print.

Materials:

- Balloons of equal size and weight
- Tape
- 2-inch by 18-inch construction paper strips
- Strings
- Straight pins

Procedures:

1. Fold paper strips lengthwise.
2. Blow up two balloons to equal sizes.
3. Tie 6 inches of string to the balloons.
4. Tape the balloons onto the ends of the paper strips.
5. Find the balance point by poking the pin into the center of the paper strip.
6. When they are balanced, pop one of the balloons and the other should drop.

Questions:

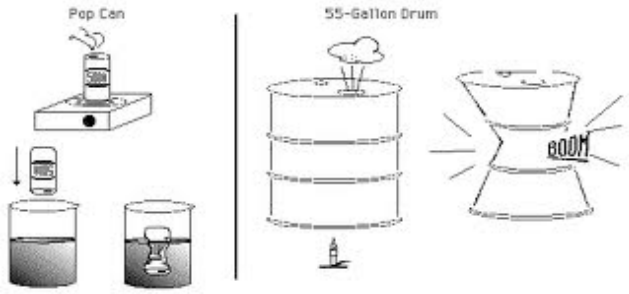
Why is the air in the balloon heavier than the surrounding air?

Explanation:

Air is composed of molecules of gases and thus has mass. When a balloon is blown up, you must force air into it so that it will expand. The air in the balloon is under pressure (because it is confined to the volume of the balloon) and there are more molecules of air per square inch than in the outside surrounding air (which is "free" to expand to the entire available volume). After one balloon pops, the air in the full balloon is heavier than the surrounding air, and will thus sink.

ALUMINUM CAN CRUSH!

Demonstrate the power of atmospheric pressure by crushing an aluminum can.
This can be performed as a demonstration or small group activity.



Reference:

- Hone, Joseph, Victor, and Brandwein. *Teaching Elementary Science: a Sourcebook For Elementary Science*. California Department of Education, 1967. Print.
- "Steve Spangler Science." Air Pressure Can Crusher. N.p., n.d. Web. 11 Sept. 2013. <http://www.stevespanglerscience.com/lab/experiments/incredible-can-crusher>.
- http://youtu.be/fPamKIGz_Ag
- http://youtu.be/Zz95_VvTxZM

Materials:

- Hot plates
- Tongs
- Tubs with ice water
- Various aluminum cans

Procedures:

1. Put enough water in an aluminum can to just cover the bottom.
2. Place the can on a hot plate and turn on the hot plate.
3. When the water is boiling, as evidenced by steam escaping from the top, grab it with tongs and quickly put it in the ice water with the open side down.

Questions:

1. Why does the can collapse?
2. How strong is air pressure?
3. How much air pressure is around us right now?
4. Can I crush bigger things using atmospheric pressure?

Explanation:

At the beginning of this activity, the can is filled with mostly air; the small amount of liquid water inside doesn't account for much of the volume inside. Air is composed of molecules of gas and thus exerts pressure when it moves around and collides with the surrroundings, whether they are other gas molecules or the walls of a can. At this point, there is little or no difference between the air pressure inside and outside the can. When the water boils the liquid water undergoes a phase change to water vapor (vaporization). Gases always try to occupy the entire volume available to them, whereas liquids are more compressed. So now the water vapor occupies more space inside the can than the original liquid did. This water vapor replaces some of the air inside the can; i.e., it forces the air out of the can. When you submerge the hot can in the ice water, the temperature drops quickly, and the water vapor inside the can undergoes a phase change back to the liquid (condensation). This liquid water occupies much less volume inside the can than the gas did, and water can't rush into the can from the outside quickly enough to fill that extra volume. With so little air inside the can, the air pressure outside the can is much greater than inside the can, so the can is crushed by a net inward force exerted by the pressure difference, surrounding air, and will thus sink.

ATTRACTIVE

Determine which objects are attracted to a magnet.

Reference:

- "Teacher Activities." N.p., n.d. Web. 13 Sept. 2013. <http://Galileo.phys.Virginia.EDU/classes/620/Magnetism_Activities.html>.

Materials:

- Ferro fluid tubes
- Sealed iron filings
- Various magnets
- Various metallic and non-metallic items
  (All available from Educational Innovations, Inc.®)
- Floating ring magnets
- Paperclips
- Mazes

Procedures:

1. Touch the magnet to each object. Which objects or portions of objects are attracted to the magnet?
2. See if you can attract a paper clip to one end of the magnet and then pick up another paper clip.
3. Rub a paper clip slowly over the magnet in its long direction about 50 times. Now try to pick up a second paper clip with the first paper clip, but without the magnet. What happens?
4. Try a maze. Place a paper clip on top of the paper. Place a magnet on the underside of the paper. Can you guide the paper clip through the maze?
5. Experiment with the Ferro fluid tubes. What happens as you bring a magnet close by?
6. Try the iron fillings. Can you see the effects of the magnetic field around your magnet? Try a different magnet. Does the magnetic field change?

Questions:

1. Are all metals attracted to magnets?
2. Are other materials beside metals attracted to magnets?
3. Can some objects become magnetic after long contact with a magnet?

Explanation:
Permanent magnets have an invisible force field around them that can affect other magnets and some other objects. This force field has a north end and a south end. What we can see when we bring two permanent magnets together is that two like poles (north and north, or south and south) repel each other, while two opposite poles (north and south) attract each other. Here, repel means to push away from each other and attract means to pull toward each other. This push and pull comes about as we try to overlap the invisible force fields around the magnets.

Some objects, like a paper clip, are not magnets all by themselves; however, they can become temporary magnets when they feel the invisible force field of a permanent magnet. If you remove the permanent magnet, these objects often go back to not being a magnet. We call this induced magnetism or ferromagnetism. Most ferromagnetic objects contain iron. In fact, the Latin prefix ferro- means iron-containing. The north end of these temporary magnets is attracted or pulled towards the south ends of the permanent magnets. Thus, when an object like a paper clip is exposed to the invisible force field of a permanent magnet, it will be pulled toward the permanent magnet. This is how a refrigerator magnet works.

Many metals, like aluminum (cans) and copper (pennies), are not ferromagnetic. They do not become temporary magnets in the presence of a permanent magnet. As a result, they are not attracted to permanent magnets.

BALANCING BUTTERFLIES

Make a balancing butterfly toy and explore the variables.

Reference:

- "Balancing Butterflies." *Balancing Butterflies*. N.p., n.d. Web. 15 Sept. 2013. <http://ideas4kids.org/activity/balancingbutterflies>.

Materials:

- Printed butterfly on white card stock paper
- Paper clips
- Scissors
- Toothpick
- Colored pencils
- New pencils
- Tape

Procedures:

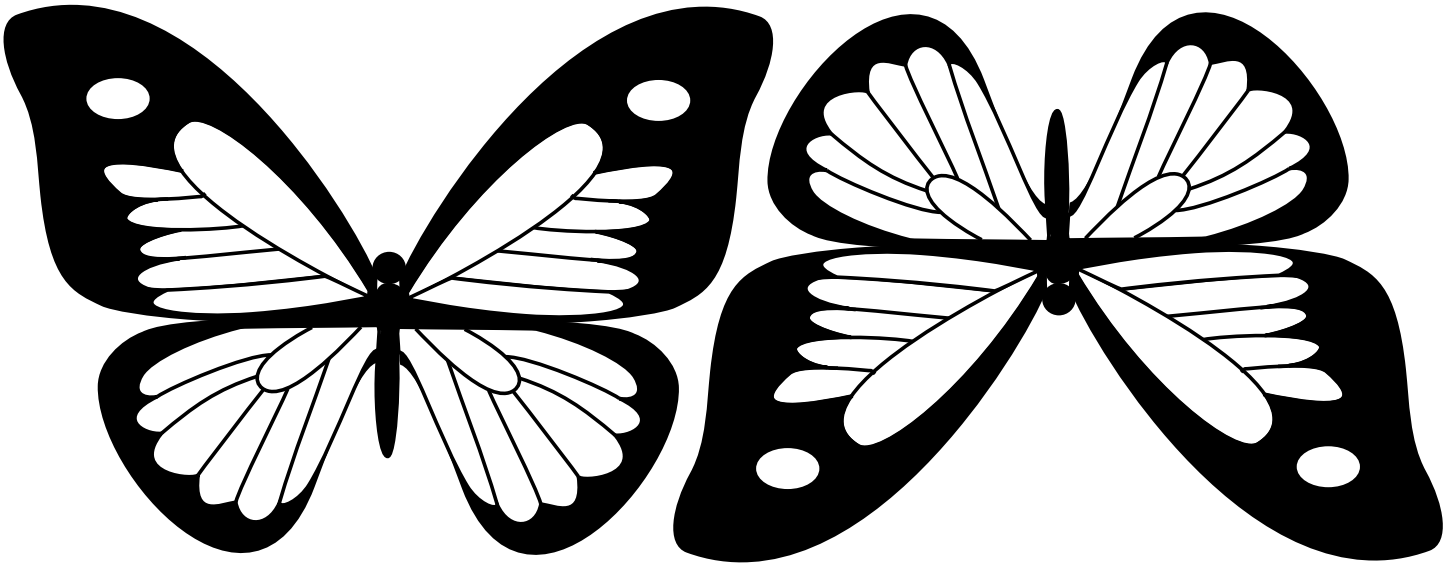
1. Color and cut out a butterfly.
2. Tape the toothpick on the backside of the butterfly.
3. Place two paper clips at the front end of the butterfly on each wing.
4. Take your new pencil with a flat eraser and hold it vertically in one hand (eraser end up). Hold the butterfly horizontally in the other hand.
5. Place the tip of the butterfly's nose in the center of the eraser and release the butterfly. The butterfly should stand on its nose. If it leans to one side, adjust the position of the paper clips to change the center of gravity.

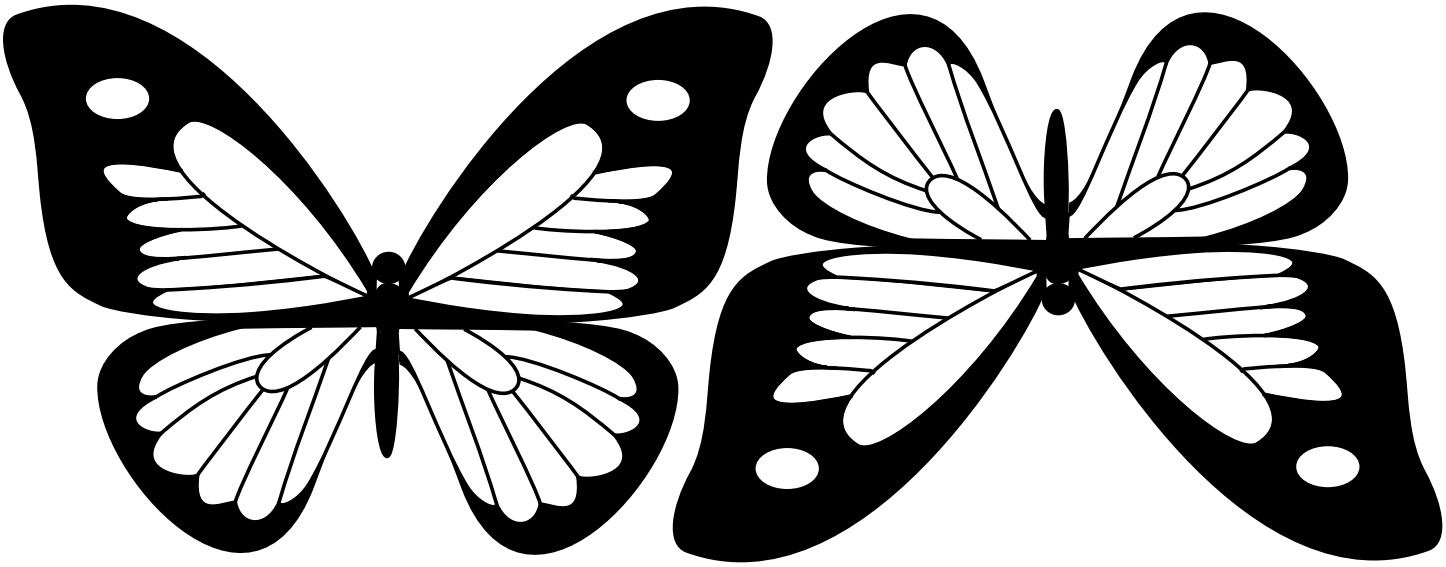
Questions:

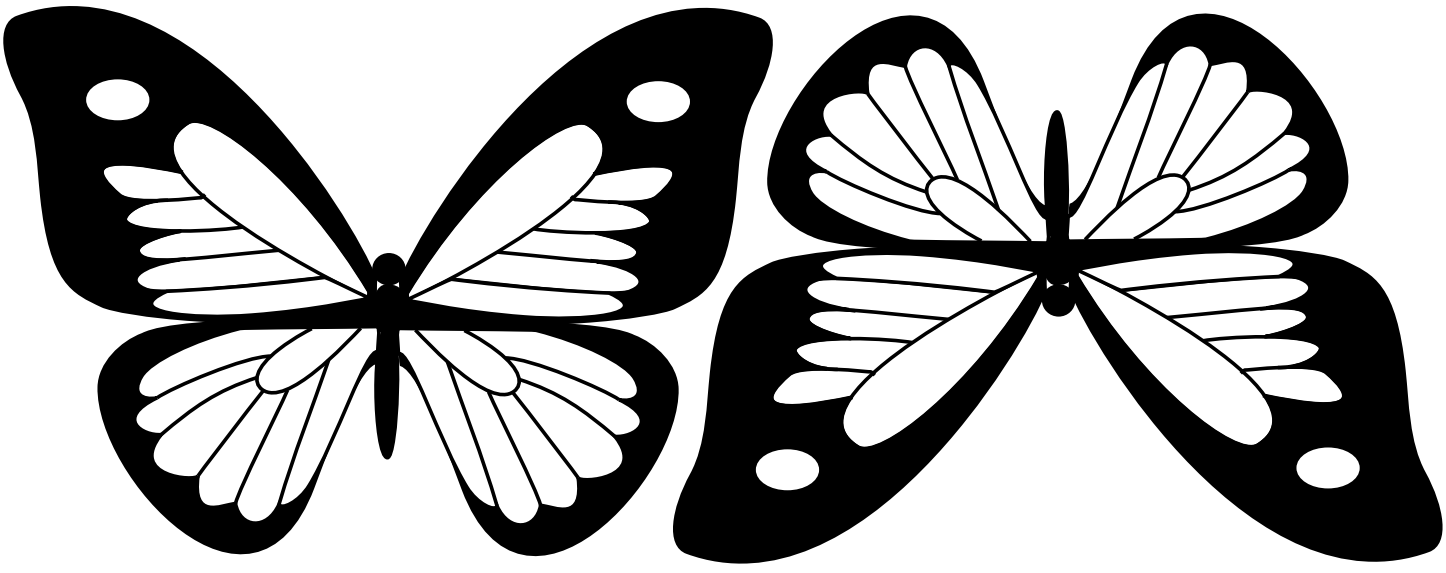
1. What makes the butterfly balance?
2. What happens if you change the length of the toothpick?
3. Can you find other ways to balance your butterfly?
4. Where do your counterweights (the paper clips) work best - higher or lower?

Explanation:

Objects can be balanced in many ways. Counterweights can help balance an object. A stable position is one that is steady; the object is not falling over. The place on which an object balances is called the balance point. Counterweights work best when placed low on an object in relation to the balance point.







EXPLORING BERNOULLI'S PRINCIPLE #1

Students illustrate Bernoulli's Principle, which states that faster-moving liquids or gases possess lower pressure. This is a group activity in which everyone participates.

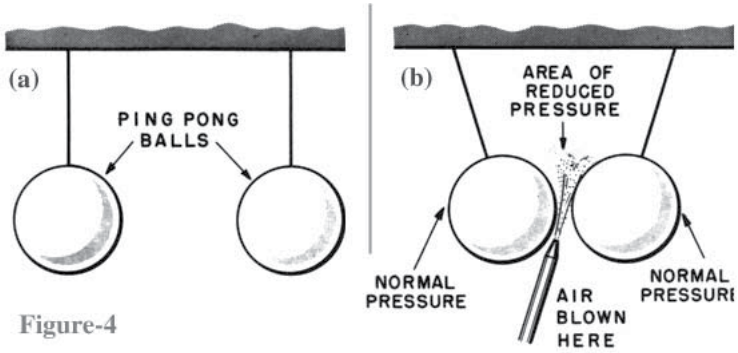


Figure-4

Reference:

- Hone, Joseph, Victor, and Brandwein. *Teaching Elementary Science: a Sourcebook For Elementary Science*. California Department of Education, 1967. Print.

Materials:

- Ping-pong balls
- String
- Tape
- Rulers and straws (enough for everyone or groups of two or three)

Procedures:

1. Tape strings to two ping-pong balls.
2. Tape strings to a ruler about two inches apart.
3. Blow as hard as you can between the balls with the straw.

Questions:

1. What causes the balls to move together?

Explanation:

Bernoulli's Principle states that an increase in the speed of a fluid (i.e. a liquid or gas) occurs concurrently with a decrease in pressure of that fluid. In this activity we illustrate that principle by showing that a moving gas – the air you blow between the ping pong balls - creates an area of lower pressure. The greater air pressure on the outside faces of the ping pong balls causes them to come together.

EXPLORING BERNOULLI'S PRINCIPLE #2

Students illustrate Bernoulli's Principle, which states that faster-moving liquids or gases possess lower pressure. The challenge is to blow a paper bridge off of a table.

Reference:

- Hone, Joseph, Victor, and Brandwein. *Teaching Elementary Science: a Sourcebook For Elementary Science*. California Department of Education, 1967. Print.

Materials:

- 8 x 11.5 or so paper
- A table or desk top

Procedures:

1. As shown in the picture above, make approximately 1-inch "Z" folds on opposite edges of a piece of paper to form the feet for the bridge.
2. Place the bridge on a hard surface like a tabletop.
3. Challenge participants to push the paper off of the table by blowing under the bridge. Ask for predictions.

Questions:

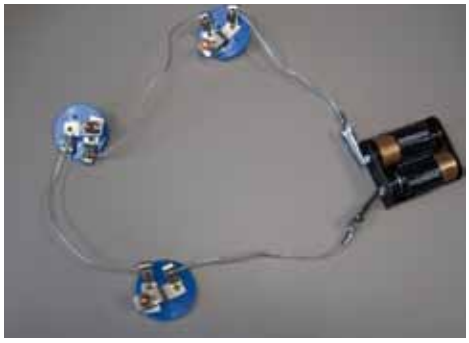
1. Why does the paper get sucked down to the table?

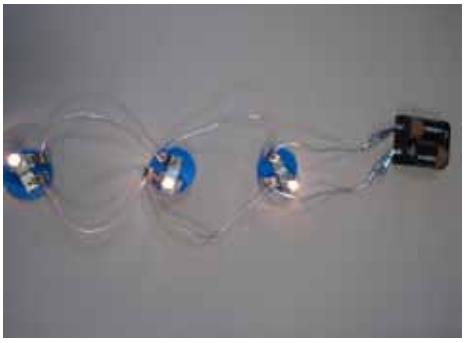
Explanation:

Bernoulli's Principle states that an increase in the speed of a fluid (i.e. a liquid or a gas) occurs concurrently with a decrease in pressure of that fluid. This activity illustrates that principle in that when air is blown under the paper, it speeds up (relative to the surrounding air) and creates an area of low pressure on the bottom side of the paper. The greater air pressure on the top face causes the paper to be pushed down toward the tabletop.

BUILD A CIRCUIT

Students use a light bulb, wires, and a battery to make a light bulb turn on.





Reference:

- "Lesson Plans for Electric Circuits." *Electric Circuits*. N.p., n.d. Web. 13 Sept. 2013. <http://www.srpnet.com/education/pdfx/electriccircuits.pdf>.

Materials:

- A few small light bulbs
- Battery
- Wires
- A few small light bulb holders
- Battery holder

Procedures:

1. Place the battery in the battery holder.
2. Connect wires to the battery holder's ends.
3. Connect the other ends of the wires to the light bulb holder. Does the bulb light up?
4. Continue to connect wires in different arrangements to make different circuits, as shown in the figure above.
5. Try the same procedure but add one or more extra light bulbs.

Questions:

1. If you take out one light bulb in a series circuit, what will happen to the other light bulb?
2. If you take out one light bulb in a parallel circuit, what will happen to the other light bulb?
3. Why do you think this happens?

Explanation:

Components of an electronic circuit can be set up either in **series** or **parallel**. In a **series circuit**, the components are connected along a single path. A simple series circuit can be built from a battery joined to one bulb, which is then joined to the next bulb, and so on, and then back to the battery. In a series circuit the same current (electrical charge) will flow through all the connected components, because the charge is traveling through each component consecutively. Thus, if one component, such as one light bulb, in a series circuit is removed, this interrupts the flow of current to the other components and the remaining light bulbs will go out.

In a **parallel circuit** each component is placed in its own separate branch or path of the circuit. This differs from a series circuit in that there are as many paths for the charge to travel as there are branches in the circuit. Thus the charge travels through only one light bulb at a time along that individual path. In this case, if one light bulb is removed from the circuit, the other light bulbs will stay on because the flow of charge to the remaining components remains uninterrupted.

BUILD YOUR OWN SUBMARINE*

Students explore building film canister submarines.

Reference:

- Rohrig, B. "Making a Mini-submarine: An Open-ended Investigation with Positively Buoyant Results" *The Science Teacher* (Feb 2001).

Materials:

- Fish Tank with Water (half to three quarters full)
- Film canisters with small holes poked in the lids (submarines)
- Pennies (sailors)
- Alka-Seltzer tablets (quartered)
- Trays for pennies, film canisters
- Towels
- Optional: Bruce the Shark

Procedures:

1. Start by asking the students: How do fish float? Have you seen them go down and up? How do they do that?
2. Give the students an empty canister with a top and ask them to predict: Will this sink or float?
   - Have student place the empty submarine in water
   - Does it sink or float?
3. Give students 5 coins (sailors) and have them test the submarine with the "sailors" inside to see if it will sink or float
   - Add sailors to submarine and place submarine in water
   - Does it sink or float?
4. Have them fill the canister with water and predict: Will it sink or float?
5. Show them a small piece of Alka-Seltzer and have them observe as it is dropped in the water: What do you see? Could you use an Alka-Seltzer to help you float your submarine?
6. Give each student a quarter of an Alka-Seltzer tablet to add to the submarine and have them place it in the water. What do you see? Let them explore and see if they can figure out how to use the Alka-Seltzer properly to get the canister to float.
   - Hint to the students that placing the submarine upside-down will help the submarine float
7. Discuss why the submarine either floated or sank.

Questions:

1. Why did your submarine work? Why did some of your attempts not work?
2. What made it possible for your submarine to float when it had sailors?
3. What made it possible for your submarine to float when it had sailors and an Alka-Seltzer tablet?
4. What were the key features that lead to your successful design?

Explanation:

The ability for objects to stay afloat in water is called buoyancy. Buoyancy is tied very closely to density. Things that are less dense than water (less than 1.00 g/mL) will float in water, while things that are more dense than water (more than 1.00 g/mL) will sink. The submarine without water and sailors is less dense than water so it floats at the surface of the water.

When you add sailors to the submarine you are increasing the mass of the submarine therefore increasing its density, but the submarine is still less dense than water so it floats. When you add water to the submarine with sailors you increase its mass yet again, this time making the density of the submarine even higher than water and causing the submarine to sink.

Alka-Seltzer is made of sodium bicarbonate, aspirin, and anhydrous citric acid. When Alka-Seltzer is placed in water it will dissolve and fizz as it produces carbon dioxide bubbles. When you add a fourth of an Alka-Seltzer tablet to the submarine with sailors and water it releases carbon dioxide out of the submarine into the tank through the hole in the lid of the submarine. Because the lid is facing up, the bubbles escape out of the submarine and the submarine sinks. When you place the submarine with sailors, water, and an Alka-Seltzer tablet upside-down in the tank, the carbon dioxide bubbles that are produced escape out the bottom of the submarine, pushing the submarine up and making it float despite the fact that the submarine is denser than water.

Fish have swim bladders, which is an internal organ that contributes to the ability of a fish to control its buoyancy.

*Central Coast Science Project can provide materials for this activity.

CABBAGE JUICE INDICATOR

Cabbage juice indicates the presence of acids or bases in a variety of substances.

Reference:

- "Red Cabbage pH Indicator." *About.com Chemistry*. N.p., n.d. Web. 13 Sept. 2013. <http://chemistry.about.com/od/acidsbase1/a/red-cabbage-ph-indicator.htm>.

Materials:

- Red cabbage
- Knife
- Distilled water
- Plastic cups
- A variety of household testing substances, such as lemon juice, vinegar, liquid soap, etc.
- Chopping board
- Sieve or strainer
- Saucepan
- Large jar or bottle

Procedures:

1. Chop about half of the red cabbage head into small pieces.
2. Cover the chopped cabbage with distilled water and gently heat it on a stove for about 10 minutes, or until the water turns a deep purple. Turn the heat off and let it cool.
3. Strain the cabbage water into a large jar or bottle. Divide the water evenly into four or more plastic cups, depending on how many substances you have to test.
4. Add one testing substance to each cup. Those that turn the cabbage water red - - such as lemon juice and vinegar - - are weak acids. Substances such as baking soda and soap turn the water blue or green because they are weak bases.

Questions:

1. Did the substance change color? Why?
2. Compare it to the color scale for acids and bases. Where does it align – more towards the acidic end? Or the basic end?

Explanation:

Red cabbage juice contains an anthocyanin, which is a water-soluble pigment that changes color depending on the pH of the solution. pH is a measure of the acidity or basicity of a solution. This anthocyanin acts as an acid-base indicator. An acid-base indicator is a chemical substance that will change color in the presence of acids or bases. The anthocyanin in red cabbage juice is a purple color in neutral solutions, which are neither acidic nor basic. It turns pink or red in the presence of acid, and green in the presence of base. The anthocyanin in cabbage juice is found in many things, including blueberries, cranberries, red grapes and even violet petals.

CENTRIPETAL FORCE

The purpose of this experiment is to investigate centripetal force.

Reference:

- "The Spinning Penny." *Steve Spangler Science*. N.p., n.d. Web. 13 Sept. 2013. <http://www.stevespanglerscience.com/lab/experiments/spinning-penny>.
- "The Centripetal Force Requirement." *Physics Classroom*. N.p., n.d. Web. 13 Sept. 2013. <http://www.physicsclassroom.com/mmedia/circmot/cf.cfm>.
- "Centripetal Force." *Hyper Physics*. N.p., n.d. Web. 13 Sept. 2013. <http://hyperphysics.phy-astr.gsu.edu/hbase/cf.html>.

Materials:

- Pennies or other small coins
- Clear balloons

Procedures:

1. Squeeze a penny or other coin into a balloon; make sure you push the coin all the way into the balloon so that it cannot be sucked out when blowing up the balloon.
2. Blow up the balloon about 1/2 way and tie the end.
3. Hold the balloon in one hand at the stem end, like you would hold a bowling ball.
4. Holding your hand palm down, spin the balloon in a circular motion. The penny should start to spin around the inside of the balloon.
5. Stop spinning the balloon and note how long the coin continues to spin.
6. Try different coins to test whether the coin size has an effect on how long the coin spins on its own.

Questions:

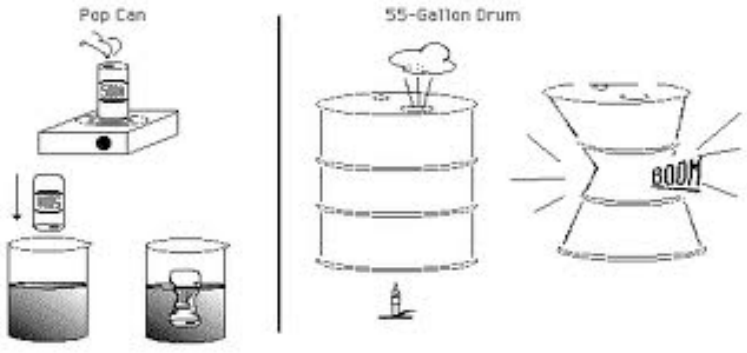
1. What causes the coin to spin even when the balloon is still?
2. Do different coins spin for different amounts of time? Why or why not?

Explanation:

Any object moving along a circular path must be accelerating in order to account for the required direction changes. According to Newton's Laws, accelerated motion requires an unbalanced force in the same direction as the direction of acceleration. In the case of an object following a circular path, without such a force, the object would continue along a straight line rather than a curved path. The unbalanced force responsible for circular motion is known as the centripetal force, and was mathematically described by Dutch physicist Christian Huygens in 1659. The word "centripetal" comes from the Latin centrum meaning "center" and petere meaning "to seek," and this is exactly what centripetal force is – a center-seeking force. Such a force, as in the case of the penny spinning inside the balloon here, is a force directed inwards towards the center of the circular path and is the force that causes the penny to move along a curved path. Centripetal is the same force that the track of a roller coaster applies to the cars to allow them to move through a loop without falling off.

CRUSH THAT DRUM!

This activity is a great grand finale to your Science Night. It is a demonstration of the power of air pressure. The audience will be amazed as a drum is crushed before their eyes.



Reference:

- Hone, Joseph, Victor, and Brandwein. *Teaching Elementary Science: a Sourcebook For Elementary Science*. California Department of Education, 1967. Print.
- "Air Pressure Can Crusher." *Steve Spangler Science*. N.p., n.d. Web. 13 Sept. 2013. <http://www.stevespanglerscience.com/lab/experiments/incredible-can-crusher>.
- http://youtu.be/Bi6sDTXE9TE

Materials:

- 55-gallon drum with a tight lid and a screw-on bung
- Ice
- A garden hose
- Propane turkey burner
- Plastic "kiddie" pool

Procedures:

1. Fill the drum with 4 inches or so of water and place it on the turkey burner. MAKE SURE THE BUNG CAP IS OFF AND THE DRUM IS OPEN.
2. Turn the flame up to high.
3. When the water is at a strong boil and steam is shooting out of the bung, quickly screw the cap on the drum.
4. Push the drum into a plastic "kiddie" pool that is filled with ice water.
5. Stand back and watch the fun.

Questions:

1. Why does the can collapse?
2. How strong is air pressure?
3. How much air pressure is around us right now?

Explanation:

This is essentially the same activity as "Aluminum Can Crush," just on a MUCH larger scale. At the beginning of this activity, the drum is filled with mostly air; the small amount of liquid water inside doesn't account for much of the volume inside. Air is composed of molecules of gas and thus exerts pressure when it moves around and collides with the surrroundings, whether they are other gas molecules or the walls of a can. At this point, there is little or no difference between the air pressure inside and outside the drum. When the water boils, the liquid water undergoes a phase change to water vapor (vaporization). Gases always try to occupy the entire volume available to them, whereas liquids are more compressed. Now, the water vapor occupies more space inside the can than the original liquid did. This water vapor replaces some of the air inside the drum; i.e., it forces the air out of the can. When you submerge the hot drum in the ice water, the temperature drops quickly, and the water vapor inside the drum undergoes a phase change back to the liquid (condensation). This liquid water occupies much less volume inside the drum than the gas did, and water can't rush into the drum from the outside quickly enough to fill that extra volume. With so little air inside the drum, the air pressure outside the drum is much greater than inside the drum, and thus the drum is crushed by a net inward force exerted by the pressure difference.

THE CRUSHER*

Students determine how much weight their paper column can take.

http://tiny.cc/gxtbpx

Materials:

- 2 Crusher bases with sliding platform
- 2 Liter bottles with funnel
- 2 PVC pipes
- Rice and containers to store rice (note: the amounts marked in the bottles are calibrated for sand not rice. Rice weighs less and simplifies manipulation and clean-up.)
- 2 Cups (8 oz. each)
- 2 Trays
- 8.5" x 5.5" paper (variety of colors and types)
- Tape

Procedures:

1. Ask the students to build a column by wrapping a piece of paper around the pipe. Use tape to secure the paper column and then remove the pipe.
2. Place the column under the crusher and predict how much weight it can take.
3. Ask the students to pour rice into the liter bottle and observe. Repeat until the paper column crushes.
4. Pour the rice back into the container and repeat.

Questions:

1. How much weight did The Crusher need to crush the paper column?
2. Can you redesign the paper column so that the The Crusher can hold more weight? What variables would you change?
3. Do you think columns in buildings work the same way? What materials do they use? What is the tallest or widest column that you have seen?

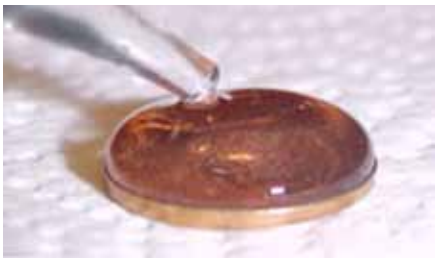
Explanation:
Columns made of different papers with the same diameter should be able to take more weight than the lighter version. Students could work in pairs and try this using two different papers at the same time: regular vs. recycled, 20 lb. vs. 24 lb., newsprint vs. craft paper. Same quality (weight) paper but different colors should have no effect on the column. Paper defects or imperfections (bends, folds, holes, etc.) may also affect the load that the column can take. Students can use the same paper and different amounts or placement of the tape to see the effects.

In general, shorter columns of the same diameter can take more load than longer ones. In this activity, it is hard to work with this parameter in a science night but this could be a question to ask the students. Also, wider columns can take more load. In this activity, we restrict the amount of paper that the students take and the choices tend to be two: 1) column of PVC diameter, and 2) column with a tighter diameter. Students discover that the smaller diameter column can take more load but make sure to ask: Is it because the column is smaller in diameter? or, is it because the paper was wrapped around itself more times? How do you know? What do you need to do to prove your answer?

*Central Coast Science Project can provide materials for this activity.

DROPS ON A PENNY

Using an eyedropper, students will try to get as many water drops on the surface of a penny before the surface tension breaks.



Reference:

- "Drops on a Penny." *Science Spot*. N.p., n.d. Web. 13 Sept. 2013. <http://sciencespot.net/Media/pennylab.pdf>.

Materials:

- Paper plate
- Eyedropper
- Paper prize ribbon per student
- Dry penny
- Small bottle filled with water

Procedures:

1. Set up 14 stations with the above materials.
2. Ask students to predict how many drops of water they will be able to put on the surface of a penny. Have them record their predictions on their "prize ribbon."
3. Have students use an eyedropper to carefully place droplets of water on the surface of a penny, counting them as they add them.
4. When water spills over the side of the penny, students record their results on their "ribbon".
5. "Top Droppers" – those that made the best predictions – get to hang their ribbons on the wall.
6. Other students get to take their ribbons home with them.

Questions:

1. How many drops of water can fit on a penny?
2. What is surface tension?
3. What breaks the surface tension?

Explanation:

Water molecules, H_2O, are composed of one oxygen and two hydrogen atoms. These atoms are "held" together by sharing electrons in a covalent bond. In any one water molecule, the oxygen atom "pulls" on the shared electrons in the bond more strongly than do the hydrogen atoms, resulting in the oxygen "side" of the water molecule having a partial negative charge, and the hydrogen "ends" having a partial positive charge. The result is known as a "polar" covalent bond, or we say that the water molecule is polar. The polar nature of individual water molecules results in strong electrostatic attractions between neighboring water molecules in a collection. At the surface of water, for example in a body of water or along the surface of a water droplet, the surface water molecules only have neighbors next to them and below them, but not above them. Thus these surface molecules experience an unbalanced cohesive force or a net downward attraction, resulting in the phenomena we know as **surface tension**. Surface tension is measured as the energy needed to increase the surface area of the water by one unit. Surface tension is responsible for the shape of water droplets and can be observed when objects are seen to float on the surface of water even if they are more dense than water, or when you see water bugs "walk" across water.

EGGS-PERIENCING AIR PRESSURE

Use air pressure to get a hard-boiled egg into a bottle.

Reference:

- "How To Suck An Egg Into A Bottle." *Videojug*. N.p., n.d. Web. 13 Sept. 2013. <http://www.videojug.com/film/how-to-suck-an-egg-into-a-bottle>.

Materials:

- Saucepan
- One egg
- Glass bottle with a neck slightly smaller than the egg
- Water
- Matches

Procedures:

1. Ask an adult to boil an egg in water for at about 5 - 7 minutes. Cool the egg by putting it in a bowl of cold water for a minute. When it is cold enough to handle, peel off the shell.
2. Place the egg on top of the bottle. No matter how long you leave it there, it won't slide into the bottle.
3. Now ask an adult to strike two matches. Lift the egg off the bottle, drop the matches inside the bottle, and quickly place the egg back on top.
4. After a few seconds, the egg will squeeze down inside the bottle.

Questions:

1. Why did the egg squeeze down into the bottle?
2. How might you be able to get the egg back out of the bottle?

Explanation:

Variations in air pressure are responsible for changes in weather, as well as many other phenomena. In this activity, a difference in air pressure between inside and outside the bottle pushes a hard boiled egg into the bottle. There is air in the bottle and outside it; air is composed of a mixture of oxygen and other types of gases. Gas molecules exert pressure by colliding with each other and their surroundings. Before you put the matches inside the bottle, the pressure exerted by the air inside is roughly the same as that exerted outside the bottle. However, when you drop the lit matches into the bottle, the flame burns up all the oxygen in the bottle, which is sealed from the outside air by the egg. The sudden absence of air in the bottle results in a huge decrease in pressure relative to outside the bottle. Thus the pressure outside pushes the egg into the bottle. You can also describe this in terms of a vacuum that is created by the sudden absence of air in the bottle pulling the egg into the bottle.

Another way to explain what happens describes the phenomena in terms of heating the air molecules in the bottle. The matches heat up the air in the bottle. The warm air expands and some leaves the bottle. When the matches are extinguished, the air inside the bottle cools and the pressure decreases. The air outside the bottle now has a higher pressure than the air inside the bottle, so it pushes its way in, forcing the egg inside at the same time.

ENERGY TOYS*

Explore how energy can be transformed form one form to another.

Materials:

- Radiometer and flashlight
- Woodpecker
- Newton's Cradle
- Plinko with 4 marbles and tray
- Marble Twister
- Lumindisk (requires an electrical outlet)
- Sound Tubes

Procedures:

This is an open exploration table where students explore different energy toys. Facilitator can help asking questions and could oversee the Plinko station.

Questions:

1. What do you see?
2. What type of energy is on display?
3. Can you tell us how each of the toys transforms one form of energy to another?

Explanation:

The toys show the change of one form of energy to another:

- Radiometer: Change of light energy into kinetic energy (energy of motion).
- Woodpecker: Change of potential energy into kinetic energy (motion) and sound.
- Newton's Cradle: Change of potential energy into kinetic energy. When the first ball is dropped its kinetic energy increases and when it hits the second ball it transfers that energy into potential energy. The second ball then transfers that energy to the third and fourth ball. The fourth ball transfers the potential energy into the last ball, which has room to swing out, and the energy is then transferred into kinetic energy. When the last ball swings back down it transfers potential energy into the fourth ball and the cycle repeats itself until it reaches the first ball. This is a never-ending cycle of transfers of energy. What will make it stop?

- Plinko: The marble has potential energy and when dropped this is released as kinetic energy. Students like to take turns with their 4 marbles and add up their numbers. Facilitator should keep track of the addition and note the highest number.
- Marble Twister: Demonstrates gravity, acceleration, and centripetal force as the marble is dropped and twists to the bottom.
- Lumindisk: Change of electric energy into kinetic energy.
- Sound Tubes: Change of kinetic energy into sound energy. When the sound tube is spun around the kinetic energy transforms into sound energy creating the sound that you hear.

*Central Coast Science Project can provide materials for this activity.

ENTOMOPHAGY (Eating Bugs!)

Students examine a bug, eat it (optional), and discuss the eating of bugs by humans.

Reference:

- http://www.teachersource.com/product/crick-ettes/biology-life-science
- http://www.teachersource.com/product/larvets-worm-snax/biology-life-science
- http://www.teachersource.com/category/s?keyword=bug-110

Materials:

- 10 Crick-ettes Singles from Educational Resources, Inc. (first website address in "Reference" above)
- 10 Larvets Worm Snax Singles from Educational Resources, Inc. (second website address in "Reference" above)
- 5 "I Ate a Bug Today" Sticker Sets from Educational Resources, Inc. (third website address in "Reference" above)

Procedures:

1. Select a cricket and/or larvae and examine it.
2. If you are willing to try it, go ahead and eat it!
3. If you did go through with it, don't forget to get your "I Ate a Bug Today!" sticker and wear it proudly.

Questions:

1. Why would people eat bugs?
2. How might eating bugs be helpful to our health and our planet?
3. Does it taste like anything you've ever eaten before?
4. Was it crunchy? Soft? Somewhere in the middle?
5. Do you think you would eat a different type of insect?
6. What about a spider, tarantula or scorpion? These animals are eaten by people in other parts of the world.

Explanation:

Entomophagy is, simply put, the eating of insects, and the term is often used to broadly include arachnids and myriapods even though they are technically not insects. Many scientists believe that entomophagy will not only benefit our health, but also the planet. Belgian entomologist Arnold van Huis says that farming insects emits 10 times less greenhouse gas than farming livestock. Insects are actually far more nutritious than other common forms of protein, even fish. Some insects are eaten as larvae or pupae, others as adults. Insect consumption as food is common in many parts of the world such as Africa, Asia, Australia, New Zealand, and North, Central and South America. Some of the more popular insects and arachnids eaten around the world include crickets, cicadas, grasshoppers, ants, various beetle grubs (such as mealworms), the larvae of the darkling beetle or rhinoceros beetle, various species of caterpillar (such as bamboo worms, mopani worms, silkworms and waxworms), scorpions, and tarantulas.

ERUPTING VOLCANO

Use baking soda, vinegar, and soap to create a chemical volcano!

Reference:

- "Baking Soda and Vinegar Volcano." *Science Kids*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sciencekids.co.nz/experiments/vinegarvolcano.html>.

Materials:

- Clay or plastiline
- Vinegar
- Red food coloring
- Small container
- Baking soda
- Red food coloring

Procedures:

1. Using clay or plastiline, make a volcano around the small container such that the base of the volcano is flush with the base of the container. Place your volcano on a flat surface. Note that the reaction will make a bit of a mess, but everything is safe and non-toxic.
2. Pour baking soda into the container.
3. Add dishwashing liquid and red food coloring.
4. Add vinegar.

Questions:

1. What is a chemical reaction?
2. Why use soap?
3. What makes the volcano erupt?

Explanation:

A chemical reaction is a process by which one or more substances are chemically changed into new substances with new and sometimes different physical properties. The baking soda (sodium bicarbonate) is a base and the vinegar (acetic acid) is an acid. When these two chemicals react, one of the products is carbon dioxide gas, which forms bubbles in the soap. This is an example of an acid-base neutralization reaction, which in this case also forms water and sodium acetate.

EXPLORING OUR UNIVERSE

The purpose is to view the night sky in a new and exciting way.

Reference:

- centralcoastastronomy.org

Materials:

- This activity is done in collaboration with the Central Coast Astronomical Society, which will bring everything they need for the event.
- We had additional binoculars available.

Procedures:

1. Pick a telescope and wait patiently in line for your turn.
2. Look up at the night sky; what do you see?
3. Now use some binoculars to look at the sky.
4. Look through the telescope, now what do you see?

Questions:

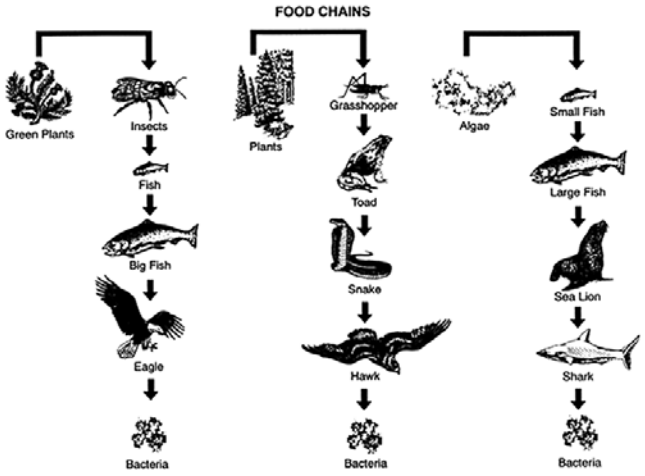
1. Which way could you see the most things in the sky?
2. Which way did you see the most detail?
3. Which way made object appear the closest?

Explanation:

When an object is viewed from a telescope, it appears to be much larger. You see a much smaller amount of the sky, but what you see seems to be closer to you, and you can see much more detail. Stargazers view the cosmos through telescopes and binoculars "oooing" and "aahhing" at each of their deep space discoveries. The word galaxy comes from the Greek word meaning 'milky circle' or 'milky way'. The white band of light across the night sky that we call the Milky Way was poetically described long before Galileo. But with his small telescope, what he discovered was a multitude of individual stars, "so numerous as almost to surpass belief." Today we know that the Milky Way is our home galaxy - a vast rotating spiral of gas, dust, and hundreds of billions of stars. The Sun and its planetary system formed in the outer reaches of the Milky Way about 4.5 billion years ago.

FOOD CHAINS

Students create a food chain.



Reference:

- "Food Chains - Science Games & Activities for Kids." *Food Chains - Science Games & Activities for Kids*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sciencekids.co.nz/gamesactivities/foodchains.html>.

Materials:

- Teacher-created model of oceanic and land food chains with red string demonstrating the flow of energy
- 3x5 cards with pictures of producers and consumers
  (Pictures can be from the Internet, magazines, old books, or student art.)

Procedures:

1. Demonstrate teacher-created food chain charts to group.
2. Pass out 3x5 cards with pictures to groups of 4-5 children per table/group.
3. Ask them to create a food chain. I discovered that 3rd graders need to think of it as "Who eats who?" for them to gain a better understanding.

Questions:

1. Who eats who?
2. Who/what is a producer and why?
3. Who/what is a consumer?
4. Who/what is the top predator?

Explanation:

Students create a simple food chain with a producer at one end and a top consumer at the other end. In ordering this food chain I found it better for younger children to have them think of this as "Who eats who?" Producers use the sun to make their own food and are the primary source of energy for all consumers. Primary consumers eat producers as their source of energy. Secondary and tertiary consumers eat producers and/or other consumers as a sources of energy. The top of a food chain is a consumer (often a predator) that is not food for other consumers.

FOOD FOR THOUGHT

The purpose is to investigate and compare some of the foods we eat.

Reference:

- "5.5 Portion Sizes." *Portion Sizes*. N.p., n.d. Web. 16 Sept. 2013. <http://www.learnnc.org/lp/editions/nutrition/6481>.

Materials:

- Mystery foods
- Food scale
- A variety of healthy and unhealthy food snacks
- Bowls
- Towels

Procedures:

1. Pick a snack and check the list for the weight of 1 serving. How many calories do you think are in your choice?
2. Weigh out 1 serving. Is it less or more than you usually eat?
3. Try it again with several different food items.
4. Try your hand at guessing all the items under the food tent. Remember you can only use your hands. Write down all your guesses. Remember to put your name on the paper and put it in the bowl. The winner will get 2 free lunches.

Questions:

1. Which snack's single serving is the biggest?
2. Which serving would probably fill you up the most?
3. Do you think the healthier choices would be more filling than the non-healthy choices if you just ate 1 serving?
4. What observations helped you make your guesses under the food tent?

Explanation:

We all like a snack now and then, but which foods are better for you? Looking at just the amount of food you get in a serving will often help you pick the more healthy choice. Foods high in fat and sugar allow only a small amount for 1 serving. You can see that a serving of fruit or vegetables will give you a much bigger snack and will probably fill you up. Remember to always check the serving size on the foods you choose to eat and stick with that size.

FOSSILS

Students dig for real fossils and then classify them.

Reference:

- "Fossil Sorting Kit." *Educational Innovations*. N.p., n.d. Web. 13 Sept. 2013. <http://www.teachersource.com/product/fossil-sorting-kit/biology-life-science>.

Materials:

- Large clear plastic bin
- Play sand
- Several trowels
- Fossil Sorting Kit from Educational Innovations, Inc. (see "Reference" above)

Procedures:

1. Pick up a fossil and observe it closely. See if you can identify it using the Fossil Sorting Guide. Some may be difficult to identify.
2. Organize the fossils by type, setting them in groups next to the Fossil Sorting Guide.
3. If you can't identify the piece, choose another one.

Questions:

1. What made your fossils easy or difficult to identify?
2. Are there pieces missing from your fossil, or hidden in the rock that it is stuck in?
3. What pieces are most represented (which ones are there most of) in your sample?

Explanation:

Fossils are preserved animals, plants, or bacteria. A fossil is generally more than 10,000 years old. The fossilization process takes a long time. The oldest fossils date to the Achaean Era, 3.4 billion years ago.

Fossils form when body parts are buried in sand, mud or soil, or embedded in resins (which eventually turn into amber). Fossils form when minerals replace or fill in the spaces of an organism. Fossils can be molds (the shape of an object "printed" into mud or other substances), casts (the shape inside a mold filled in with minerals), permineralized parts (minerals replace the open spaces in something like bone). Fossils also can preserve footprints, worm tracks, or even feces! Fossilized poop is called a coprolite. Sometimes fossils are carbon shadows of the organism between layers of slate-like shale.

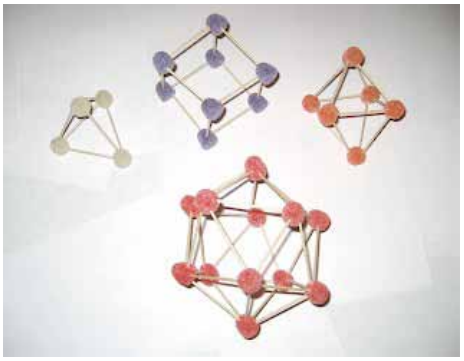
Not all things that die can form a fossil. Most often, the fossils we find are from the "hard parts" of an organism—its teeth, bones, shells, or other parts that already have mineral content, like your bones, which are made of calcium. An organism needs to die and end up in an environment with little oxygen

to have the best chance of becoming a fossil. Lack of oxygen slows down the decomposition process and keeps organisms intact. Rarely we find fossils of soft parts of organisms—their skin prints, feathers, or body organs.

Fossils are found in sedimentary rock—rock that hardens out of mineral deposits (like limestone), sand, or mud. Metamorphic rocks have been heated to high temperatures and sometimes pulled, bent or twisted. Metamorphic rocks might have started as a sedimentary rock that had fossils in it, but after the metamorphic process, you can't find the fossils anymore. Igneous rocks were melted (like lava from a volcano, or deep underground). Igneous also rocks don't have fossils.

GUMDROP POLYHEDRONS

Students create polyhedrons to observe the similarities between geometric figures and the well-ordered arrays of atoms and molecules.



Reference:

- "Gumdrop Polyhedra Pdf Free Ebook Download from www.scholastic.com." *EbookBrowsee.net*. N.p., n.d. Web. 13 Sept. 2013. <http://ebookbrowsee.net/gumdrop-polyhedra-pdf-d416956279

Materials:

- Coffee stirrers or toothpicks and gumdrops (unlimited)
- Containers (small bowls)

Procedures:

1. Place bowls with materials in center of the table.
2. Provide examples of polyhedrons for reference.
3. Give each student an unlimited supply of materials (coffee stirrers or toothpicks and gumdrops).
4. Students use materials to create their own shape or polyhedron, or they can copy the examples given.
5. Students may take their creation with them, or take it apart for the use of the next student.

Questions:

1. What is the definition of a polyhedron?
2. Are there examples in nature?

Explanation:

Sometimes in mathematics we study ideas that are abstract and difficult to see, but polyhedra can be seen! Crystals are real world examples of polyhedra. The salt sprinkled on our food is a crystal in the shape of a cube. A polyhedron is a three-dimensional solid whose faces are polygons joined at their edges. A polyhedron is said to be regular if its faces are made up of regular polygons. A regular polygon is a polygon with sides of equal length placed symmetrically around a common center.

THE INCREDIBLE HOOP GLIDER

Students will discover that hoops and a straw can fly!

Reference:

- "Make a Straw Hoop Plane." *Make a Straw Hoop Plane - Sciencebob.com*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sciencebob.com/experiments/straw_hoop_plane.php>.

Materials:

- A regular plastic drinking straw
- 3 X 5 inch index card or stiff paper

Procedures:

1. Cut the index card or stiff paper into 3 separate pieces that measure 1 inch by 5 inches.
2. Tape two of the pieces of paper together into a hoop as shown. Be sure to overlap the pieces about half an inch so that they keep a nice round shape once taped.
3. Use the last strip of paper to make a smaller hoop, overlapping the edges a bit like before.
4. Tape the paper loops to the ends of the straw as shown above. The straw should be lined up on the inside of the loops.
5. That's it! Now hold the straw in the middle with the hoops on top and throw it in the air.

Questions:

1. Can you really call this an airplane?
2. How far can it fly?
3. Will placing the hoops in different places on the straw help it fly further or higher?

Explanation:

The two sizes of hoops help to keep the straw balanced as it flies. The big hoop creates "drag" (or air resistance) which helps keep the straw level while the smaller hoop in at the front keeps your super hooper from turning off course.

INVINCIBLE BALLOON

Study a property of elastic polymers by passing a thumbtack through an inflated balloon.

Reference:

- "Sandia National Laboratories." : *About Sandia: Community Involvement: Education Programs: Family Science Night*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sandia.gov/about/community/education_programs/family_science_night.html>.

Materials:

- Helium quality balloons
- Thumbtacks
- Tape

Procedures:

1. Inflate a balloon to about 3/4 of its full size.
2. Tie off the end of the balloon.
3. Stick about one inch piece of Scotch tape somewhere on the balloon.
4. Using a gentle, twisting motion, stick the thumbtack into the tape. Try it again. Put another piece of tape on the balloon and put another tack in it. Make sure the tape is secure on the balloon. You don't want any leaks.
5. Take one tack out at a time. What do you notice? Did your balloon pop? It's INVINCIBLE!

Questions:

1. Can you ride for miles with a thumbtack through your bicycle tire and tube?
2. Why does air leak out of the tire and tube when we remove the thumbtack?

Explanation:

Balloons are made of a thin sheet of rubber containing many long intertwined or cross-linked strands of polymer chains. When a balloon is stretched, the polymer network will attempt to regain its original shape, giving an elastic quality to the polymer. Blowing up the balloon stretches these strands of polymer chains. The cross-linked chains of elastic polymers in the balloon are pushed apart or separated when the tack is inserted. The tape holds these polymers together where the tack is pushed through. When you remove the tack, you feel air leaking out through the holes where the strands were pushed apart. Eventually the balloon deflates.

MAGNET EXPLORATION

Students will discover what items attract to a magnet and test the magnet's strength.

goo.gl/ndZSva

Reference:

- "Explore..." *National Science Digital Library*. N.p., n.d. Web. 15 Sept. 2013. <http://nsdl.org/>.

Materials:

- Bowl of paperclips
- Bowl of small/large washers
- Bowl of aluminum foil
- Bar magnets
- Other shape/size magnets with different strengths
- Bowl of nails
- Bowl of pennies
- Bowl of popsicle sticks
- Horseshoe magnets

Procedures:

1. Predict what items will be attracted to the magnets.
2. Test if the magnets will stick to the items by dipping the magnets in each bowl.
3. Predict how many small or large washers the different magnets can pick up at once.
4. Test how many small washers/large washers you can pick up at once.

Questions:

1. Will a magnet be attracted to: foil, paperclips, popsicle sticks, a washer, nails, or a penny?
2. How many small/large washers can you pick up with different magnets?

Explanation:

Students should discover that magnets are attracted to some, but not all metal. Most (but not all) metals that are attracted to magnets contain the element iron. When a metal is attracted to a magnet, the metal becomes a temporary magnet. They will also discover that some magnets have different strengths.

MAGNETS

Students learn about repel and attraction.

goo.gl/8IaoVH

Reference:

- "Floating Rings, Simple Magnet Levitation Experiment." *Floating Rings, Simple Magnet Levitation Experiment*. N.p., n.d. Web. 13 Sept. 2013. <http://www.miniscience.com/projects/FloatingRings/>.

Materials:

- 4 floating magnets
- 8 bar magnets

Procedures:

1. Introduce the group to magnets and explain how to handle them with care, so as not to pinch your skin between the magnets.
2. Demonstrate the "floating magnets."
3. Introduce the bar magnets.

Questions:

1. Do all magnets have a north and south pole?
2. What is it called when they push each other away?
3. What is it called when they stick together?
4. Why do they stick together?
5. Why do they push each other away?

Explanation:

All magnets have a north and south pole. When you cut a bar magnet on the north side, that piece will still have a north and south pole.

Magnets will repel each other (as modeled by floating magnets) when a north pole meets another north pole or south to south pole.

Magnets will attract each other when they are opposites (north and south or south and north pole.)

MAKING MUSIC

Students will turn glasses of water into instruments.

goo.gl/jeRMyb

Reference:

- "Making Music with Cups of Water." *Fun Science Experiments for Kids*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sciencekids.co.nz/experiments/makemusic.html>.

Materials:

- 5 or more drinking glasses or glass bottles
- Water
- Wooden stick such as a pencil
- Simple song sheet: Twinkle, Twinkle Little Star

Procedures:

1. Line the glasses up next to each other and fill them with different amounts of water. The first should have just a little water while the last should be almost full; the ones in between should each have slightly more than the last.
2. Hit the glass with the least amount of water and observe the sound, then hit the glass with the most water. Which makes the higher sound?
3. Hit the other glasses and see what noise they make. See if you can get a tune going by hitting the glasses in a certain order.

Questions:

1. Can you play a song with glasses of water?
2. How does the amount of water relate to the pitch of the sound?

Explanation:

Each of the glasses will have a different tone when hit with a pencil. When you hit the glass you create vibrations, which create sound waves that travel through the water. A low tone is a sound wave with low frequency caused by slow vibrations. In contrast, a high tone has a high frequency, caused by fast vibrations. As you increase the amount of water in the cup, you increase the mass of water. This leads to slower vibrations, and, in turn, lower tones. The glass with the most water will have the lowest tone, while the glass with the least water will have the highest tone.

MELT AWAY*

The purpose of this experiment is to investigate the conduction of heat.

goo.gl/Cpfubc

Reference:

- "Ice Melting Blocks." *Arbor Scientific*. N.p., n.d. Web. 13 Sept. 2013. <http://www.arborsci.com/ArborLabs/PDF_Files/ASLab_58.pdf>.

Materials:

- Several sets of Ice Melting Blocks
- Ice cubes

Procedures:

1. Feel both black tiles closely - which one is cooler?
2. Predict which tile will cause the ice cube to melt at a faster rate.
3. Put one ice cube on each black tile inside the rubber ring.
4. Observe which ice cube melts at a faster rate.

Questions:

1. Which tile caused the ice cube to melt at a faster rate?
2. Which tile felt cooler before/after the ice cube melted?
3. Why didn't the ice cubes melt at the same rate?
4. Why didn't the ice cube melt faster on the 'warmer' tile?

Explanation:

One of the tiles is made of metal, and it feels cool to the touch. The other tile is made of plastic and it feels warm to the touch. The metal tile is a conductor. Conductors allow heat energy to flow quickly. The plastic tile is an insulator. Insulators slow the flow of heat energy. To melt the ice, heat energy must flow from the "hot" tile to the "cold" ice cube. The ice cube melts at a faster rate on the metal tile because the heat energy in the metal tile flows more quickly than the heat energy in the plastic tile.

So, why does the metal tile feel cool to the touch? The metal tile is at or near room temperature. You are at or near 98.6°F, much warmer than the tile. When you touch the tile, heat energy flows from your fingers to the tile. Your senses detect this as a "cool" feeling.

* Central Coast Science Project can provide materials for this activity.

MICROSCOPES AND HUMAN CELLS

Students view a variety of human cells, including their own, under a microscope.

Reference:

- "Staining Cells." *Staining Cells*. N.p., n.d. Web. 13 Sept. 2013. <http://legacy.mos.org/sln/sem/staining.html>.
- http://www.environmentalgraffiti.com/featured/images-inside-human-body-images/8292

Materials:

- Microscopes
- Commercial slides of human cells
- Small box of blank microscope slides and coverslips
- Cell diagram to display
- Box of flat toothpicks
- Eyedroppers
- Water
- Paper towels

Procedures:

1. Prepare four commercial slides already mounted for viewing. The fifth microscope is for students to view their own cells.
2. Students use the microscopes to view the commercial slides of human cells. (We had cells from intestines, the esophagus, lungs, and blood.)
3. With help from the adult-in-charge, students use the flat end of a toothpick to gently take a sample of their own cells from the inside of their cheek.
4. The adult assists in placing the cells on a blank slide for viewing.

Questions:

1. How are the cells different from one another? How are they similar?
2. Look at the diagram of a human cell. What do you think the black dot is inside the cells from your cheek?

Explanation:

Scientists believe that the human body is made up of 75 to 100 trillion cells. Cells do everything from providing structure and stability to providing energy and a means of reproduction for an organism.

Tissues, like the inside of your cheek, your lungs, your esophagus, and intestines, are groups of cells with a shared structure and function. Different types of tissues are arranged together to form organs, like your heart, stomach, lungs, kidneys, etc.

MILK AND CHANGING COLORS

Students will study properties and changes of matter.

Reference:

- "Color Changing Milk." *Steve Spangler Science*. N.p., n.d. Web. 13 Sept. 2013. <http://www.stevespanglerscience.com/lab/experiments/milk-color-explosion>.

Materials:

- Plates
- Food coloring
- Dish washing soap
- Milk: whole or 2%
- Cotton swabs (Q-tips)
- Small container

Procedures:

1. Pour milk on plate.
2. Add four different color dots of food coloring.
3. Add liquid dish washing soap to small container.
4. Dip cotton swab in liquid dish washing soap.
5. Dip cotton swab into the plate.

Questions:

1. Why do the colors move away from the cotton swab?
2. What causes the food coloring to move and mix colors?
3. Is the milk moving?
4. Do you think milk in your cereal moves?

Explanation:

There are many theoretical explanations as to why the colors move in this activity. One theory relies on the age-old idea of "Like dissolves Like". Fats will mix with other fats ("non-polar" things), but they won't mix with "polar" things like water. This is why oil and vinegar don't mix (vinegar is polar) while vinegar and water mix. Milk is a mixture with microscopically dispersed droplets of fat and protein suspended in water. Unlike oil and vinegar milk does not separate with time. Soap is a looong molecule with a non-polar end and a polar end. When soap is added it disrupts the milk. The fat molecules in milk move towards the non-polar end of the soap molecules (away from the polar ends). The water molecules in milk move towards the polar end of the soap molecules. The molecules of food dye get caught up in this motion so the colors swirl.

NUUDLES

Build with a non-styrofoam packing peanut: biodegradable and a lot of fun to play with!

Reference:

- "Sandia National Laboratories." *: About Sandia: Community Involvement: Education Programs: Family Science Night*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sandia.gov/about/community/education_programs/family_science_night.html>.

Materials:

- Biodegradable packing peanuts
- Water
- Cups
- Sponges
- Trays
- Weights

Procedures:

1. Wet the sponge with water and squeeze it out.
2. Count out 20 Nuudles.
3. Lightly moisten a Nuudle on the sponge to activate the glue.
4. Build a structure that will support a cup (the cup must not touch the table).
5. Add weight to the structure by placing the weights into a cup. How much weight can your structure hold?

Questions:

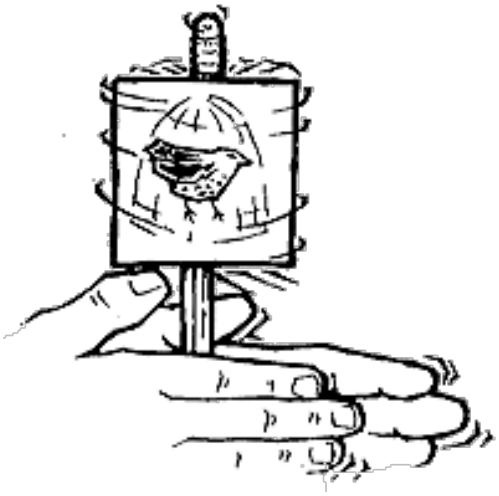
1. Which structures were sturdiest?
2. Were the tallest structures very stable?
3. What happens when the Nuudle is submerged in water?
4. What advantages does the Nuudle offer as a packing material, instead of styrofoam?

Explanation:

Nuudles are a starch-based product that is biodegradable. They are made from cornstarch (most of the mass) and trapped air (most of the volume). That means Nuudles pretty much "disappear" when they are put in water (or thrown away). The solid parts of Nuudles dissolve in water, which releases the trapped air. Wet starch acts like glue when it comes in contact with another solid object.

OPTICAL ILLUSION

The purpose is to explore optical illusions and explain why we see them.



Reference:

- "The Most Amazing Optical Illusions (and How They Work)." *LiveScience.com*. N.p., n.d. Web. 13 Sept. 2013. <http://www.lifeslittlemysteries.com/2070-amazing-optical-illusions-work.html>.
- "Optical Illusions." *Science Experiments at Home*. N.p., n.d. Web. 13 Sept. 2013. <http://members.ozemail.com.au/~macinnis/scifun/miniexp.htm>.

Materials:

- Color Pencils
- Plain index cards
- Optional: Optical Illusion Cards (available from Education Innovations®)
- Straws
- Tape

Procedures:

1. Draw a picture on one side of an index card.
2. Then draw an other part of the picture on the other side. The pictures should be related; like a spider and a web or a bird and a cage.
3. Tape the straw to the middle of the card.
4. Rotate the straw between your hands. Try drawing different pictures.
5. Check out the other optical illusion cards.

Questions:

1. What did you see?
2. What can be seen when you rotate the toy faster?
3. What can be seen when you rotate the toy slower?
4. What kinds of pictures work best?
5. Do you know the name of the toy that you created?

Explanation:

The toy that you created goes back to the Victorian times (1800's) and it is called a "thaumatrope." It appears that the pictures are of the same side because of how your eyes and brain work. When you see the image of one side, say the bird, your brain holds onto the image for a short time--even though the image appears and disappears quickly. The same thing happens with the image of the cage. The two images actually overlap in your brain so the bird appears to be in the cage. The technical name for this effect is persistence. It is what lies behind every movie and every TV program that you see.

DISSECTING OWL PELLETS

Students investigate owl pellets and what is inside them.

Reference:

- Hildreth, Jody. "KidWings Virtual Owl Pellet Dissection." *KidWings Virtual Owl Pellet Dissection*. N.p., n.d. Web. 16 Sept. 2013. <http://www.kidwings.com/owlpellets/flash/v4/index.htm>.
- http://www.teachersource.com/product/owl-pellets/biology-life-science
- http://www.teachersource.com/product/bone-sorting--id-guides/biology-life-science

Notes: This activity works better as a demo: you could use your local Biology/Science Middle School or High School teacher and their students to help.

Materials:

- 15 sterilized owl pellets from a commercial source like Educational Innovations® (second website in Reference)
- Bone sorting guides (from third website in Reference)
- Disposable gloves
- Dissecting probes like wooden sticks
- Plastic trays
- Paper towels
- Spray bottle with water
- Stereoscope (optional)

Procedures:

1. Put on a pair of disposable gloves.
2. Open foil and spray the owl pellet to make it moist.
3. Using a couple of wooden dissecting probes, carefully take apart the owl pellet, pulling out bones as you encounter them.
4. Sort the bones using the Bone Sorting Chart.

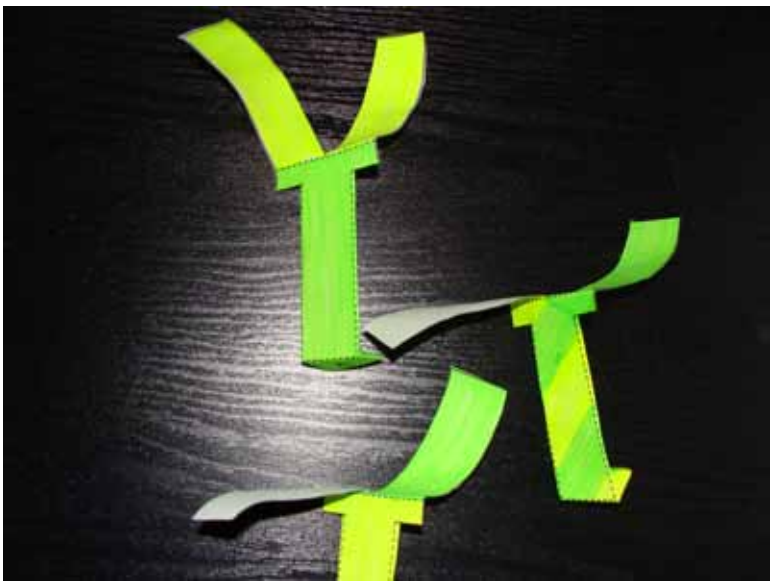
Questions:

1. What different types of bones did you find (legs, vertebrae)?
2. What types of bones did you find the most?
3. Were you able to tell what kind of animals the owl ate? If so, what animals did you identify?
4. Did you find any skulls?

Explanation:
Most birds, owls included, cannot chew their food. Owls usually swallow their prey whole. They can digest muscle, fat, skin, and internal organs. However, this leaves indigestible material such as bones, teeth, claws and feathers intact. In order to safely excrete this material, an owl's gizzard compacts it into a tight pellet that the owl regurgitates. The regurgitated pellets are known as owl pellets.
Much can be learned about an owl's diet and the food chain by dissecting these pellets. By comparing the bones found inside the pellets to a bone sorting guide, one can determine what an owl has been eating.

PAPER HELICOPTERS

Create a paper helicopter and investigate what makes it work.



Reference:

- "Rotor Motor (pdf)." *Nasa.gov*. N.p., n.d. Web. 13 Sept. 2013. <http://www.nasa.gov/pdf/205711main_Rotor_Motor.pdf>.

Materials:

- Paper helicopter template at http://quest.arc.nasa.gov/space/teachers/rockets/act11ws2.html
- Crayons
- Scissors
- Paper clips

Procedures:

1. Color paper helicopter.
2. Cut paper helicopter solid lines only.
3. Fold paper helicopter in a, b, c order.
4. Create an obtuse angle with wings and add paper clip.
5. Throw helicopter up or drop down.

Questions:

1. Why does it spin?
2. What happens if you add more or less mass (paper clips)?
3. Can you count the number of spins before it hits the ground?
4. What are the forces that are acting on the helicopter?

Explanation:

Air must move across the surface of a wing to produce lift. Placing the wings in an obtuse angle decreases air resistance, so the air under and above the wing push in opposite ways. This makes the helicopter spin. Adding the paper clip(s) increases its mass, making it spin and fall faster.

PEPPER PICKER UPPERS

Explore how static electricity can help you separate salt and pepper.

goo.gl/OX30RU

Reference:

- "Separate Salt And Pepper." *Science Fair Project*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sciencefairadventure.com/ProjectDetail.aspx?ProjectID=161>.

Materials:

- Comb
- Pepper
- Inflated balloon (optional)
- Salt
- Cloth/wool
- Paper plate (optional)

Procedures:

1. Shake salt onto a flat surface.
2. Shake pepper over the salt.
3. Mix the salt and the pepper together until the mixture is even.
4. Charge your comb, by rubbing it against the wool cloth or inflated balloon.
5. Slowly lower the charged comb (teeth side down) above the salt and pepper mixture.
6. Move the comb closer and closer to the mixture and observe what happens!

Questions:

1. What happened to the pepper and salt particles? Why did this happen?
2. What did we do to the comb to make the particles act in this way?

Explanation:

When you rub a comb with a wool cloth, electrons (invisible particles with negative charges) build up on the surface of the comb. This is called static electricity, which means "non-moving electrical charge." The electrons attract (or pull) objects with positive charges and repel (or push) objects with negative changes (like other electrons). Both salt and pepper are neutral; that is, they do not have a positive or negative charge. However, when you bring a negatively charged object (like the comb) near a small object (like a pepper flake) you induce a diple. That is, you cause one part of the pepper flake to have a positive charge and another part to have a negative charge. This happens because the electrons in the pepper flake move relativiely freely while protons (positively charged particles) in the pepper flake are stuck in place. Thus, when a negatively charged comb is brought near pepper, the electrons in the pepper are pushed away (sort of hiding on the opposite side of the pepper flake), while the protons, stuck in place, are attracted towards the negative comb. This causes the pepper to jump towards the comb. The pepper is lighter than the salt, so it is easily attracted to the comb. As you move the comb closer and closer to the mixture, the lighter salt particles will attract.

POLY WORMS*

Investigate how a solution solidifies as you pour it into another solution.

Reference:

- "Gel Beads and Worms." *Gelfand - Carnegie Mellon University*. N.p., n.d. Web. 16 Sept. 2013. <http://www.cmu.edu/gelfand/k12-teachers/polymers/polymer-architecture/gel-beads-and-worms.html>.
- http://www.teachersource.com/product/alginate-worm-kit/chemistry

Materials:

- 1.5 % sodium alginate solution in a squeeze bottle (Available commercially from Education Innovations©)
- Cabbage juice indicator solution
- 1 % calcium chloride solution
- Small cups
- Tablespoons
- Forks or toothpicks

Procedures:

1. Pour 1 tablespoon of calcium chloride ($CaCl_2$) solution into the cup.
2. Squeeze the sodium alginate solution in a thin stream into your cup while you count to 3. (The solution is purple because of the red cabbage juice indicator mixed in)
3. Wait about 10 seconds. What do you observe?
4. Pick up the alginate 'worm' with a fork or toothpick. See how far up you can lift the worm out of the cup.
5. Next, pick up the worm with your fingers. How does it feel? Try to stretch it.

Questions:

1. Did you observe physical or chemical changes? Why do you think you saw physical change? Or chemical change?
2. Do you think that the calcium chloride solution helped change the product? What do you think would happen if we pour the alginate into a sodium chloride (salt) solution?
3. Do you have evidence of the formation of a new and different product? What is the evidence?

Explanation:

We can see the physical properties and color of sodium alginate change when it mixes with the calcium in the calcium chloride solution. These changes are the result of a chemical reaction. A chemical reaction is a process that changes one set of substances into a new substance (or product) with different properties. The alginate reaction in this activity does just that. It is a type of crosslinking reaction. The sodium alginate starts as a single polymer strand. When it is combined with the calcium ions the single strand joins with several neighboring strands. As the crosslinking happens, we see a new substance (or product) that looks like worms.

* Central Coast Science Project can provide materials for this activity.

POPPING BUBBLES

Observe the color of a bubble to predict when it is ready to pop.

Reference:

- "Family Science Night." *: About Sandia: Community Involvement: Education Programs: Family Science Night*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sandia.gov/about/community/education_programs/family_science_night.html>.

Materials:

- Clean wrapped straws
- Bubble solution in small styrofoam trays

Procedures:

1. Select a clean straw and remove the wrapper.
2. Lower the straw into one of the puddles of soap solution in the Styrofoam tray. Blow GENTLY through the straw to form a large bubble dome.
3. Observe the swirling of the soap film and the changing colors in the bubble until the bubble pops.
4. Repeat steps 2 & 3 several more times. Observe what happens.

Questions:

1. What colors do you see?
2. What color do you think indicates that the bubble is ready to pop?

Explanation:

Bubbles are formed when air is trapped inside a thin soap-film-walled enclosure. Bubbles remain intact as long as the walls of the enclosure are strong enough to hold the air in. Over time the soap-film wall becomes thinner and thinner. This is because the soap film gradually flows away from the top of the bubble due to gravity. Eventually, the wall becomes so thin at the top that air pushes out and the bubble pops.

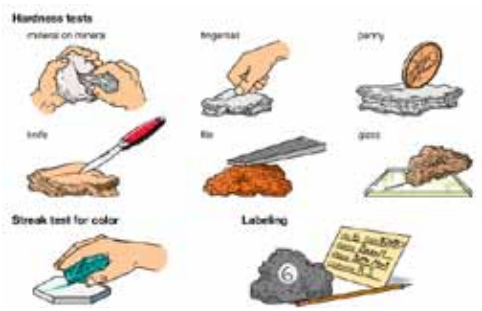
Here are the colors that you can see if you observe a bubble as it pops:

Green → Blue → Magenta → Yellow → Green…White → White with Black Spots → Black POP!

The pattern may be slightly different, because air currents may cause the bubble to grow thin too quickly or pop early, disrupting the pattern.

ROCK TESTING LAB

Determine the type of rock (igneous, sedimentary, metamorphic) by using a variety of diagnostic tests.



goo.gl/to9YpS

Reference:

- "The Physical Properties of Minerals." *Kids Love Rocks*. N.p., n.d. Web. 13 Sept. 2013. <http://www.kidsloverocks.com/html/physical_properties_of_mineral.html>.

Materials:

- Variety of rocks (on trays in center of table)
- Hand lens and rulers (to measure length)
- Penny, nail, small piece of glass, white tile (for scratch test)
- Vinegar, cup, eye dropper (alkalinity/acidity test)
- Scale (with weights)
- Bucket of water (does it float?)
- Placemat at each station (Moh's scale of hardness, discovery organizer)
- Dry erase pens to record answers

Procedures:

1. Set up each station with a kit containing the items listed above.
2. Have students choose a rock.
3. Looking at the chart, determine which test to perform first.
4. Continue working and complete all tests: scratch test for hardness, float/not float, alkalinity, weight.
5. Depending on discoveries, determine which type of rock they have.
6. Students record their findings on the placemat provided.
7. Students may repeat the activity as many times as they choose with different rocks.
8. Erase the placemat and set up for the next student.

Questions:

1. How was this rock formed?
2. What kind of rock is this? How do I know?

Explanation:

It is not always easy to tell the difference between different rocks & minerals. However, rocks and minerals often have different physical and chemical properties (like hardness or alkalinity) that, with practice, can be used to help distinguish them. It takes years of study to be able to accurately identify a mystery rock and even then seasoned rock-hounds need to know where the specimen came from. This is an activity to promote scientific thinking and further investigation.

Rock Testing Discovery Organizer

Mohs' Hardness Scale

1 TALC

2 GYPSUM

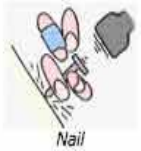
Finger nail 2.5

Desert Rose

3 CALCITE

Aragonite

4 FLUORITE



Nail

5 APATITE

6 FELDSPAR

Steel Knife 6.5

Iron Pyrite

7 QUARTZ

Amethyst

Quartz

Drill bit 7.5

Agate Geode

8 TOPAZ

9 CORUNDUM

10 DIAMOND

Diamond

Did you know?
Diamond is actually 4 times harder than Corundum.

* Hardness scale:		Hardness Number	
	Fingernail can scratch rock. . . .	2	A soft rock
	Penny can scratch rock.	3	↕
	Nail can scratch rock	4	A hard rock

** If there are bubbles appearing on your rock, it has lime (or calcium carbonate) in it. This mineral is found in limestone and marble.

*** Rocks that float usually have come out of a volcano. Was the area where you live ever a volcano?

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** If there are bubbles appearing on your rock, it has lime (or calcium carbonate) in it. This mineral is found in limestone and marble.

*** Rocks that float usually have come out of a volcano. Was the area where you live ever a volcano?

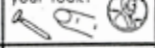
Check the correct boxes.

My rock is:

☐ SHINY ☐ DULL ☐ HARD ☐ SOFT ☐ ROUGH

☐ SPARKLY ☐ NOT SPARKLY ☐ BIG ☐ LITTLE ☐ SMOOTH

Now conduct your experiment. Predict what you think the answers will be and write them down in the first row. After the experiment, write down the results. Compare.

	LENGTH Measure with a ruler.	WEIGHT Measure with a scale.	HARDNESS Which will scratch your rock?* 	ACID Does your rock bubble when vinegar is dropped on it?**	FLOATS Does your rock float or sink?***
PREDICTION					
RESULTS					

SILLY SLIME (aka GlueP or Sillly Putty)*

Make a plastic material toy by mixing together two solutions.

Reference:

- "Make Your Own Slime" *Science Bob*. N.p., n.d. Web. 13 Sept. 2013. <http://www.sciencebob.com/experiments/polymer.php>.

Materials:

- Elmer's glue
- Food coloring
- Borax powder or 4% borax solution
- Tablespoon
- 2 disposable cups
- Water
- Plastic spoon
- Plastic bags

Procedures:

1. Fill one small cup with water and add a spoonful of the Borax powder and stir it up. Then set it aside.
2. Fill the other small cup with about 1 inch (~20 ml) of the glue.
3. Add three tablespoons (20 ml) of water to the glue and stir.
4. Add a few drops of the food coloring and stir it up until mixed.
5. Add one tablespoon of the Borax solution you made earlier to water and glue solution and stir well. Watch the slime form!
6. After the slime forms, let it sit for about 30 seconds and then pull it off the spoon and play with it!

Questions:

1. Was this a physical or chemical change? What evidence do you have to support your claim?
2. Did you produce a liquid or a solid?
3. What properties does the product have that are different from the starting materials?

Explanation:

The polymer used in this activity has qualities of both a solid and a liquid! It can take the shape of its containers like a liquid, yet you can hold it in your hand like a solid. Molecules in solids are held together very tightly such that if one molecule moves, all of the molecules (and indeed the whole solid) moves. Thus a solid holds it shape. Molecules in liquids are held together more loosely and are able to move independently. As a result a liquid will not hold its shape. Polymer molecules actually arrange themselves together, stretching and bending as much as they want. Thus they have properties of solids and liquids.

Elmer's glue is an emulsion of polyvinyl acetate (PVA) which is a synthetic polymer mainly found in long single chains. When you pour it into a borax solution, the borax solution brings neighboring polymer chains together giving the crossed linked polymer the properties that you observe in GlueP.

* Central Coast Science Project of Cal Poly can provide materials for this activity.

SINKING FEELING

Predict which object will float in a mixture of three liquids.

Reference:

- "Sinking Feeling." *Kids Science Challenge*. N.p., n.d. Web. 13 Sept. 2013. <http://www.kidsciencechallenge.com/pdfs/2009activities/Sinking_Feeling-Det_Sci_2009.pdf>.

Materials:

- Honey
- Cooking oil
- Waste bottle
- At least three different kinds of objects to test for their density (a dime, bead, bean, popcorn, piece of crayon, plastic toy, etc.)
- Water
- Test tube or graduated cylinder

Procedures:

1. Pour water into your test tube or graduated cylinder until you have at least one inch of water. The glass should not be more than 1/3 full.
2. Tilt the glass and gently pour a little oil down the side. Straighten the glass when you have at least an inch of oil.
3. Tilt the glass again and pour honey down the side, until you have about one inch of honey.
4. Collect three or more samples to test from the materials suggested. Try to find things that are all roughly the same size.

Questions:

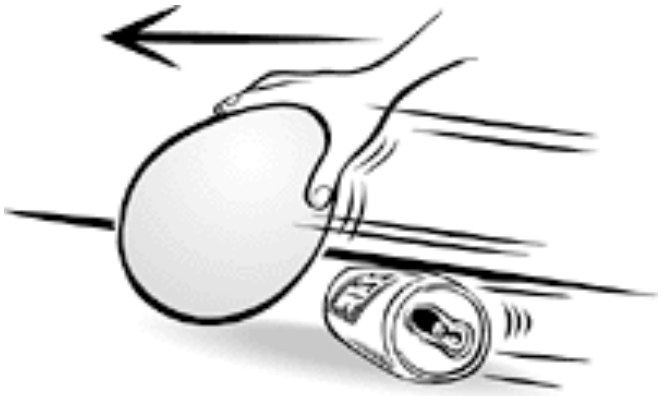
1. Make a prediction: Which sample has the highest density? Which has the lowest?
2. Gently drop your samples, one by one, into your glass and observe where each object comes to rest.

Explanation:

Density describes how much mass an object packs into a given volume. Density determines the object's ability to float or sink. If an object has a greater density than the liquid it is in, it will sink. If its density is lower than the liquid, then it will float.

SODA CAN RACER

Use static electricity to race a soda can across a table.



Reference:

- "Roll a Can with Static Electricity." *Roll a Can with Static Electricity - Science Bob*. N.p., n.d. Web. 05 Sept. 2013. <http://www.sciencebob.com/experiments/staticroll.php>.

Materials:

- An empty soda can
- Blown-up balloon
- A head with hair (or a sweater)

Procedures:

1. Place the can on its side on a flat smooth surface like a table or a smooth floor.
2. Rub the blown-up balloon back and forth through your hair (or on a sweater) really fast.
3. Now the fun part: hold the balloon close to the can without actually touching the can. The can will start to roll towards the balloon without you even touching it!

Questions:

1. Does the size of the balloon change the power of the pull?
2. Does the length of the person's hair affect the power of the static electricity?
3. How much water can you put in the can until the balloon can't pull it anymore?

Explanation:

When you rub a balloon with your hair, electrons (invisible particles with negative charges) build up on the surface of the balloon. This is called static electricity, which means "non-moving electrical charge". The electrons attract (or pull) objects with positive charges and repel (or push) objects with negative changes (like other electrons). In a metal (like the aluminum soda can) electrons move relativiely freely but protons (positively charged particles) are stuck in place. Thus, when a negatively charged balloon is brought near an aluminum can, the electrons in the can are pushed away (sort of hiding on the opposite side of the can), while the protons, stuck in place, are attracted towards the balloon. This causes the can to roll towards the balloon.

SOLAR CRICKETS*

Explore what makes solar crickets jump.

goo.gl/7n6iMJ

Reference:

- http://en.wikipedia.org/wiki/Solar_cell

Materials:

- 6 solar crickets
- 3 light sources: regular incandescent light bulb, UV light or black light, and heating lamp (careful: it gets hot!)
- 3 plates with UV beads under each light

Procedures:

1. Give a solar cricket to each person and ask him/her to place it under each source of light.
2. Observe and explain.

Questions:

1. What makes the cricket vibrate? Can you make it work faster? Slower?
2. What kind of light does each lamp generate? Did you notice any difference between the lights?

Explanation:

The sun produces light that covers a wide spectrum: visible, infrared, and ultraviolet. The light sources that you have in front of you have different wavelengths and intensity that mimic the sun, but they are not exactly the same (Could you detect a difference?). Light from a source hits the solar panel and is absorbed. In the solar cell, electrons (negatively charged particles) are knocked loose from their atoms, causing an electric potential difference. A current starts flowing through the material to cancel the potential, and this electricity is captured. Due to the special composition of solar cells, the electrons are only allowed to move in a single direction. An array of solar cells converts solar energy into a usable electricity that, in turn, can be used to make the cricket move. Solar cells can use radiation from many different light sources; however, some light sources work better than others. Did you discover which ones worked best? Does the color or the intensity matter more?

* Central Coast Science Project can provide materials for this activity.

UNDER PRESSURE

Observe that when the air pressure in the glass falls, the water level rises.

Reference:

- "Steve Spangler Science." *Why Does the Water Rise?* N.p., n.d. Web. 03 Sept. 2013. http://www.stevespanglerscience.com/lab/experiments/why-does-the-water-rise.

Materials:

- Candle
- Food coloring
- Shallow dish
- Tall glass or jar
- Modeling clay
- Matches
- Water

Procedures:

1. Put the candle in the dish and secure it in place by pressing modeling clay around its base. Then pour water into the dish around the candle.
2. Add a few drops of food coloring to the water. This will help you to see the results more clearly.
3. Ask an adult to light the candle. Then place a tall glass or jar over the candle and watch what happens.
4. To begin with, the water level is the same inside and outside the glass. But when the candle burns out, the air cools and contracts, taking up less space, and the water level in the glass rises to fill the gap.

Questions:

1. What did you observe when the candle extinguished? And why?
2. At the end how is the pressure inside the glass and outside the glass related or different?

Explanation:

The candle heats up the air in the bottle. The warm air expands and some leaves the bottle. When the candle is extinguished, the air inside the bottle cools and the pressure (or push) inside the bottle decreases. The air outside the bottle now has a higher pressure (or push) than the air inside the bottle. The forces are not balanced. As a result, the air outside pushes water up inside the bottle until the pressure inside the bottle (the push of the remaining air and the water) is the same as the pressure on the outside of the bottle (the push of the air in Earth's atmosphere).

VACUUM CHAMBERS*

Explore pressure with marshmallows and shaving cream in small vacuums.

goo.gl/COvVfB

Reference:

- "Pressure Demonstration Using a Vacuum Chamber." *Space Science Demonstrations Hawaiian Style*. N.p., n.d. Web. 16 Sept. 2013. http://www.spacegrant.hawaii.edu/ScienceDemos/vacuumDemos.html.

Materials:

- Vacuum chambers
- Marshmallows or balloons
- Shaving cream (optional)

Procedures:

1. Put marshmallows, balloons or globs of shaving cream in the vacuum chamber.
2. Have an adult hold down the lid as the student removes all of the air from the container. Students may need assistance when doing this! Pumping the cylinder requires some strength.
3. Observe what happens to the object inside the vacuum chamber.
4. Let air out of the container by releasing the valve on the pump.

Questions:

1. What makes the object grow? Would any object do the same?
2. What did you observe when you released the vacuum? Did the object go back to its original size?
3. What other objects could you observe in the chamber?

Explanation:

This demonstration shows the relationship between pressure and volume. As the air is taken out of the chamber, the pressure decreases. As the pressure decreases, the size of the marshmallow (or volume) increases. As the air is put back into the chamber, the air pressure returns. As a result, the marshmallow returns back to normal size. Only objects with gas "trapped" inside like marshmallows, sealed balloons or shaving cream will grow in the chamber as you decrease the pressure. An open balloon will not change.

* Central Coast Science Project can provide materials for this activity.

VIBRATING ROBOT

Make a simple drawing robot using circuits.

Reference:

- "How to Build an Art Bot." *Wired.com*. Conde Nast Digital, 14 May 0012. Web. 03 Sept. 2013. http://www.wired.com/geekdad/2012/05/ff_artbot/

Materials:

- Vibrating motor
- Three markers
- Paper or plastic cup
- Tape
- AA or AAA battery
- Battery holder
- Paper

Procedures:

1. Tape three markers to cup.
2. Insert battery into battery holder.
3. Tape battery holder to cup.
4. Remove marker caps.
5. Place on paper.
6. Turn motor on.

Questions:

1. Is this a robot? What makes it draw?
2. How can you modify the robot? Can you add a light?
3. What type of energy is used? Produced?
4. Could you describe the electric circuit pathway?

Explanation:

Robots can carry out actions automatically. The robot in this activity is powered by a battery in an electrical circuit. A battery converts stored chemical energy into electrical energy or electricity. It is a power source. An electric circuit is a closed loop that allows electricity at high potential energy to flow from a power source through devices like lights or motors, only to return to the power source at lower potential energy. In this robot the potential energy stored in the battery is converted to kinetic energy using a motor. This kinetic energy causes the robot to move and draw with the markers.

EXPERT ADVICE

San Gabriel Road Elementary School

8500 San Gabriel Road
Atascadero, CA 93422
805-462-4340
Contact: Dennis Eaton, denniseaton@atasusd.org

Approximately how many people attended?

250

Who attended? (Parents, students...)

- Parents
- Students
- Other family members and their guests
- Principal
- Teachers
- The district superintendent

How did you spread the word about your Science Night? (Flyers, newsletters...)

I spread the word by sending out physical flyers (one was a "save the date" flyer several months before the event, another was sent out a couple of weeks before the event). I also sent out .pdf versions of the flyers through our PTA email. I sent several reminders to the parents of students in my own class via email as well. I also emailed invitations to the district superintendent and school board members.

Where did you host your Science Night?

- Multi-purpose room
- Classrooms
- Outside

What was the start and end time?

5:30-7:00 p.m.
5:30-6:00 p.m. was designated as Science Expo time. Students stood with and shared their own science projects.
6:00-7:00 p.m. was the Hands-On Science time. The Expo was closed and students and their families were encouraged to remove the projects at this time, or before they left for the evening.

Was your event a Math and Science Night or specifically a Science Night?

Our event was called "Family Science Night," and it specifically was dedicated to science. As mentioned above, it consisted of two parts, the Science Expo and the Hands-On Science activities.

Please list any other planned activities. (Dinner, bake sale, math contest...)

The PTA has planned for an outside vendor to sell food at both of our Science Nights at San Gabriel, with the school getting a cut of the income both times. Vineyard did the same for its first Science Night, but dropped the food option in its second year. It's really a matter of preference. The leader of the Science Night can completely delegate this responsibility. Because we have our event in the spring, many families are working around baseball or softball games, and they seem to appreciate this "dinner on the run" option.

If you had Science Fair on the same night, would you recommend having a Science Fair/ Science Night?

Yes, I recommend combining these two events. As mentioned previously, we opted for a "Science Expo," which I define as a Science Fair without the judging. It's an opportunity for students to share their work without the added pressure of a competition (for both the students and the judges). I think it's great to do both on the same night. Our Family Science Night has become so popular that it provides a much larger audience for the student projects than any other setting, even Open House.

Which activities were most successful? Teacher and/or student favorites?

We have had the opportunity to hone our activities because we've had three Science Nights (counting the one I participated in at Vineyard Elementary). We have eliminated some of the less successful centers and replaced them; however, it is an ever-changing landscape. Some of the activities don't seem to get old even with repeated use, and others need to be replaced because they fail to keep interest high year after year. A few that just didn't create enough interest from the get-go were eliminated after the first year.

The activities that we did at this year's Science Night were for the most part "keepers." The teachers enjoyed running them and the students enjoyed the activities. I would recommend all of them, with the following considerations/exceptions:

- **Owl Pellets:** It takes quite a while to dissect one of these, and at Science Nights, people want to move on to other activities. Partially dissecting at least some of the pellets ahead of time would help speed the process.
- **Melt Away:** This activity is great for one or two years, but then should be retired for awhile. We intend to bring it back after a couple of years off.
- **Fossils:** This activity appealed to the younger set more than upper elementary, but it's good to have a few activities that specifically interest this age group.
- **Patterns:** This was designed for the younger kids, but it just didn't have much appeal in this second year of its use. It will be retired, probably for good, from our rotation.

Did you have students from your school volunteer? If so, in what capacity?

Our first year, I recruited some of our sixth graders to assist teachers at the various centers and also offered them to our Cal Poly crew for the same purpose. It was great having the extra help at our centers, as they were able to assist when the crowds at a certain center became larger, or when supplies needed to be replenished (water, ice, etc.), not to mention when it came time for clean-up. This year I reached out to this same group of students, now seventh graders, to come back to help at their alma mater, which just about all of them were excited about and happy to do. Some reprised their roles at the same centers where they had worked the previous year, which cut down on the learning curve for most of them.

What resources did you find most helpful?

Without a doubt, the most valuable resource we have for this event is the group from Cal Poly. The staff, students, and materials they provide made our Family Science Night possible. I wouldn't even want to attempt it without them.

How long did it take to set up?

Approximately two hours

How long did it take to clean up?

About an hour

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

As the only CaMSP participant at my school, I was primarily the planner for our Science Night, but it never would have worked without a large group of teachers (ten counting myself) who volunteered to run the centers. This is in addition to the Paso Robles High School class and their teacher, the many volunteers from among Cal Poly students and faculty, and parents and students from San Gabriel and Atascadero Junior High. It truly was a collaborative effort!

How much time was needed to plan the Science Night and what was the timeline in planning the event?

The first time you do the Science Night, obviously, it takes longer. If you can make it through that first effort and have a second year, it's much easier. I'll give the time line for the second year, if only because once you get there, everything seems easier, and it feels a lot less like you're "winging it."

- **First Couple of Weeks of School**
  - Set up date of Family Science Night. Let Cal Poly staff know.
  - At an early staff meeting, explain your plans so that everyone has the date of the event, and then ask for teacher volunteers to run centers. Note: Some centers almost run themselves, while others take a high level of participation on the part of the teacher in charge. It is possible to give out two centers to one person, but you have to be careful about the centers with which you do this. I highly recommend keeping yourself free to roam and trouble-shoot, so try not to take a center yourself. Reliable, trained parents and/or high school students can also run centers.

Note: If this is your first Science Night, the following timeline events will need to be moved up. You will need to establish the activities and confirm outside organizations/schools that you want to include in the evening earlier in the school year. Initially, putting together the bins containing the centers and assembling instructions is time consuming.

- **Before the holiday break**
  - Contact/confirm any outside organizations/schools that will be presenting at Family Science Night.
  - Reserve your venue. Fill out any paperwork that your school requires (Use of Facilities form).
  - At a staff meeting, explain your plans so that everyone has the date of the event, and then ask for teacher volunteers to run centers. Note: Some centers almost run themselves, while others take a high level of participation on the part of the teacher in charge.
- **Early January**
  - Now that everyone has their new calendars, send out "Save the Date" emails using whatever system your school/PTA has in place to contact parents. Also send home hard copies of the notice. For simplicity's sake, I recommend using the same document for the email and the hard copy.

- **3 Months before Event**
  - Go through bins to make sure you have all of the materials needed. Doing it this early gives you plenty of time to order anything you need.
  - Order supplies that need to be replenished.
  - Order supplies needed for any new centers you intend to implement this year.
  - Touch bases with your PTA contact to keep an open line of communication. If your parent group decides to provide food for the event, this gives them plenty of time to get things on the schedule.
- **2 Months before Event**
  - If your school has a monthly newsletter, include information about the date and time of your Science Night.
  - Map out the locations of each center at your venue, including the locations of each grade level's student projects (we arranged them by grade level).
- **1 Month before Event**
  - Meet with the teacher volunteers to hand out the center(s) (bins) for which they will be responsible. Have them try out the activities before the big night. Have them let you know right away if they notice anything critical missing from their center(s). You might even want to do this before they leave the meeting.
  - Remind teachers that any students who plan to participate in the Science Expo will have to complete their projects and bring them to school on or before the day of the event.
  - Ask teachers to plan to help or recruit parents to help move student projects to their assigned areas after school on the day of the event.
  - Contact any outside presenters to confirm the date and their participation.
  - Send email invitations to the event to the superintendent and board members.
- **2 Weeks before Event**
  - Send out a reminder via email and hard copy to parents, teachers, and administrators.
  - Contact teacher volunteers to make sure they have all supplies and have tried their activities (they're busy people, some will not have done it yet!).
  - Ask teachers to give you a good estimate of how many student projects their class will be turning in. This will make a difference in how much space you'll need. We opened up some nearby classrooms and our library to meet the demand for space.
  - Keep talking it up at lunch and elsewhere to keep the buzz and awareness going.
- **1 Week before Event**
  - Go through the items on this timeline to make sure all of your ducks are in a row.
  - Give your teacher volunteers a copy of the event map, so they'll know where they should set up their centers.
  - Check with your custodian to make sure he/she understands your needs table-wise on the big night. Just a sidebar, but if you use the cafeteria, we do not use the benches, only the tables.
- **The Day of the Event**
  - It may seem overwhelming in theory, having to get everything ready by 5:30 once your school day has ended. Like most things, though, if you have plenty of help, it goes quickly. The centers are easy … the teacher volunteers bring their one or two centers over in the bins and set them up. The student projects are a little trickier. It takes time to get all of the displays set up, but hopefully you'll have lots of help. We've been done at least an hour or more before the event starts.

- Enjoy the evening! Much like a wedding that you're in or have planned, you'll know about all of the little things that don't go perfectly, but no one else will even notice!

Would you make the Science Night longer or shorter next time? Why?

The timing of our Science Night at San Gabriel worked out just about perfectly, but I only knew this because I worked with the teachers at Vineyard Elementary on their first Family Science Night in 2011. That first one was scheduled for two hours, which seemed a bit too long. Vineyard decided to pare theirs down to an hour and a half, and I followed their lead. Both years—2012 and 2013—we have had the event at San Gabriel, this timing seemed right. It is a whirlwind of activity during this time frame, and it seemed to start winding down just about when our scheduled times had been met.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

- Cal Poly faculty and students ran and brought several of our centers.
  Lola Berber-Jimenez, Cal Poly contact, lberberj@calpoly.edu
- Paso Robles High School Science Department also presented.
  Mark Fairbank, Paso Robles High School, mfairbank@pasoschools.org

When did you host the Science Night and what factors were considered when choosing the dates?

In my mind, the most important considerations were:

- Avoiding conflict with other major school events. In the springtime the biggest "other" event is Open House. I wanted to make sure there was at least a 6-8 week buffer zone between these two events. I also wanted to stay away from STAR testing time.
- Scheduling a teacher-friendly time. To me, this meant the night before the last day of the week. That would typically mean a Thursday night, but both years I scheduled the event during weeks when there was no school on Friday, so we had Science Night on a Wednesday evening.
- Scheduling a night when the Cal Poly contingent didn't already have a commitment (you'll see I kind of blew it this year).

The first of our Science Nights was Wednesday, May 23, 2012.
Our second Science Night was Wednesday, March 27, 2013.
That first year we had an early Open House, so Science Night was held late in the spring. This year, that schedule was reversed. I thought I had everything perfectly synchronized, and everything was in place for the big night. Then, about a month before the event, I came to learn that I had scheduled our event during Cal Poly's Spring Break. Miraculously we had a large contingent of Cal Poly faculty and students show up anyway! Now that is dedication.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

The feedback we have received on our Science Night has generally been of the informal variety. It has been, to my knowledge, unanimously positive. The first year, the principal's wife, whose children attend the school, told me, "This is the best thing our school has ever done!" That meant a lot to me, especially when I had almost the exact same words spoken to me by 3-4 other long-time San Gabriel families. In another example of positive feedback our superintendent has graciously attended both of our Science Nights, and this year asked me to do a presentation for our school board describing the event. I believe the purpose for this was for more than just the information. I believe she wanted to encourage participation at other schools in the district, and questions that were asked by board members after the presentation made it sound like that is what they would like to see. Finally, in a more formal form of feedback, I did my first-ever Survey Monkey poll, asking for feedback from the teachers who worked at our centers. Everyone responded, and what really told the tale for me is that every one of them (nine) said they would help again next year.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

1. **Owl Pellets:** Students examine and classify the contents of owl pellets.
2. **Entomophagy:** Students learn that many different types of bugs are eaten by humans throughout the world, and they can be a very nutritious food. They can then eat a bug if they so desire.
3. **Fossils:** Fossils, all of which are at least 65 million years old, are buried in bins of sand. Students dig them out and sort them according to a sorting guide.
4. **Microscopes:** Students view commercial slides of human cells (esophagus, intestines, lungs, blood), then get a sample of their own tissue from the inside of their cheek and view it under the microscope.
5. **Chemistry in a Baggie:** Students mix chemicals in a baggie to observe the reactions and resulting physical and chemical changes.
6. **Melt Away:** Students observe the conduction of heat as ice cubes melt on two different types of identical-looking tiles, one made of metal and one of plastic (the insulator).
7. **Solar Critters:** A variety of solar-powered toys are activated by lamps at this center. Students may also create bracelets of solar beads that change colors in light.
8. **Centripetal Force:** Students explore this force by spinning objects such as coins and metal nuts inside a balloon.
9. **Nuudles:** These "packing peanuts" are biodegradable (carbon dioxide is released when water is added), and when water is applied to them with a sponge, they become sticky and can be used to build small structures.
10. **Poly Worms:** This is a demonstration in which students create a chemical reaction that leads to the making of a polymer—in this case rubbery worms that stretch.
11. **Patterns:** Classification (so essential in science) is demonstrated in this center, which is geared toward younger students. The plastic pattern blocks may also be used to form designs out of the triangles, rhombuses, squares, etc.
12. **Hoopsters:** Aerodynamics are demonstrated at this center, where students create unusual flying objects from index cards, straws, and tape, then test them out.
13. **That Sinking Feeling:** Students explore density of an object by predicting which objects will float and which will sink.
14. **Attractive:** This is a magnet center where students explore the magnetic characteristics of various objects and learn about attracting and repelling of magnetic fields.

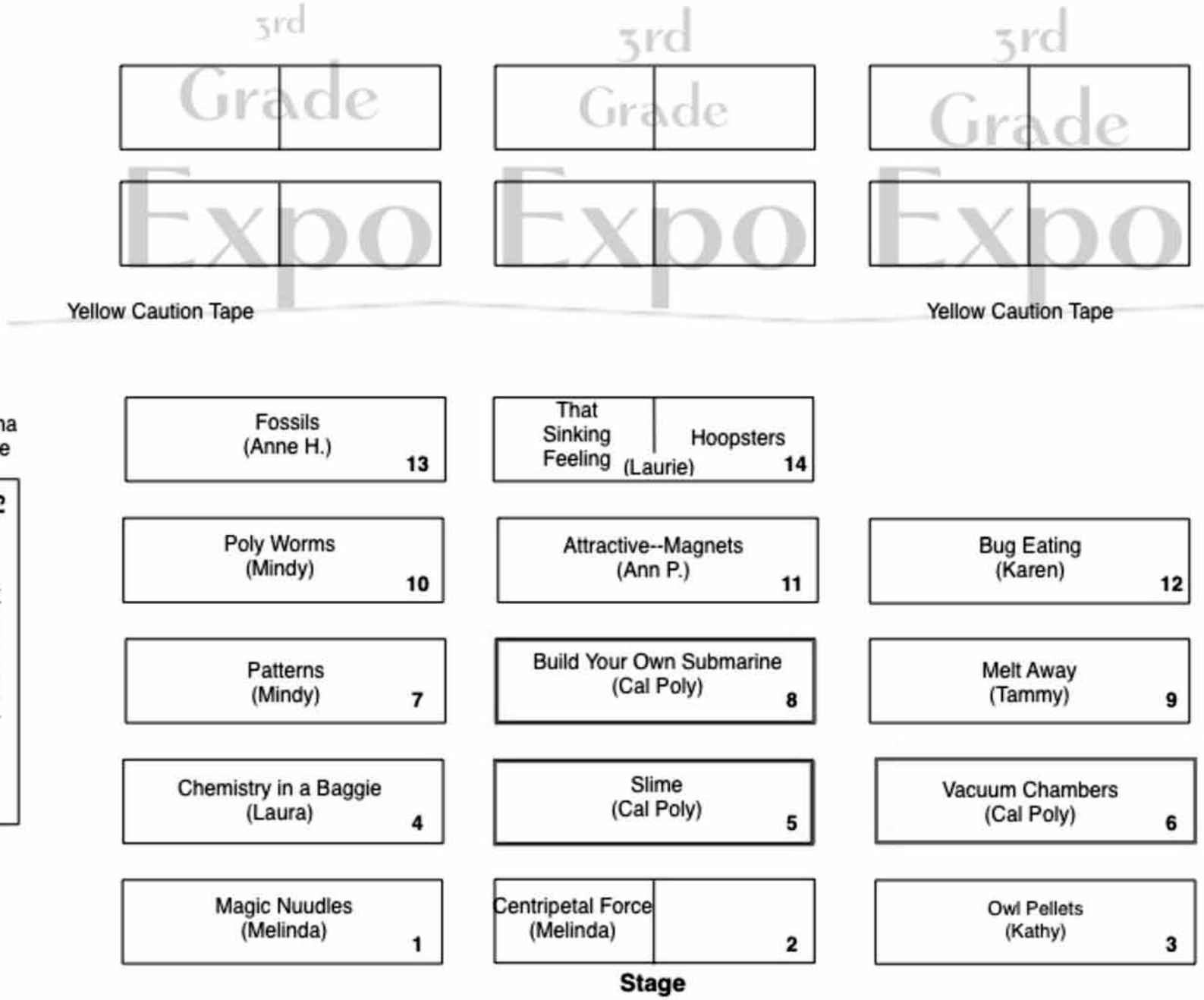
15. **Vacuum Packed Fun:** Students predict and explore the effects of air pressure on marshmallows.
16. **Plasma Globe:** We left this center unattended by a leader and used it more for its "cool factor," although it does demonstrate a number of scientific principles.
17. **Making Slime:** Students used the supplied materials to "make slime," an example of a polymer that has the characteristics of both a solid and a liquid. They got to take it home with them.
18. **Make Your Own Submarine:** Students make a "submarine" out of a plastic film canister and pennies. It sinks and rises in a container of water with the help of baking powder (not baking soda, which reacts with vinegar but not water).

What were your motivations for having Family Science Night?

Initially, my motivation for doing Science Night was to complete my obligation for CaMSP for a continued application assignment. However, it has become much more than that. Now that I've seen the impact on science at our school that these evenings have had, I can't imagine not having one each year. It's hard to imagine the highly involved San Gabriel community allowing it to go away. If it's possible after only two years, it has already become a tradition at our school. There is a new feeling about science school-wide. Not just that it's cool and fun, but that it needs to be addressed and not pushed to the back burner during this era of high-stakes testing. All of these things are elements of my motivation for having Family Science Night.

What advice would you give a school trying to start a Family Science/Math night?

- You can't start too early. If you're going to do it, you need to start preparing at the beginning of the school year for a spring Science Night.
- Enlist help from your fellow staff at the beginning. Use the helpful resources on the CaMSP website… you don't have to reinvent the wheel.
- Contact the Cal Poly folks early, and give them the date of your Science Night. They're willing to help, but there are a lot of Science Nights these days, so they need to get yours on their schedule.
- Talk to your PTA and any other source at your disposal to get funding for the materials. The first year I applied for and received a $500 grant through CAPS (Committee for Atascadero Public Schools), and our PTA provided an additional $300. This $800 funded all of our needs for the first year. For our second year, PTA budgeted $300 for Family Science Night, which covered everything we needed for year two. PTA contacted an outside vendor for food during the event that helped pay for about half of the supplies this year (they shared the proceeds). They made about $150. There are probably ways to make it happen for less. Be creative!
- Remember two things… it gets easier, and it's definitely worth it!


3rd Grade Expo
3rd Grade Expo
3rd Grade Expo
Yellow Caution Tape
Yellow Caution Tape
Plasma Globe
Microscopes (Peter and Sonja) 15
Fossils (Anne H.) 13
That Sinking Feeling (Laurie) Hoopsters 14
Poly Worms (Mindy) 10
Attractive--Magnets (Ann P.) 11
Bug Eating (Karen) 12
Patterns (Mindy) 7
Build Your Own Submarine (Cal Poly) 8
Melt Away (Tammy) 9
Chemistry in a Baggie (Laura) 4
Slime (Cal Poly) 5
Vacuum Chambers (Cal Poly) 6
Magic Nuudles (Melinda) 1
Centripetal Force (Melinda) 2
Owl Pellets (Kathy) 3
Stage
Solar Creatures (Near Outlet on Folding Table)
Solar Beads

SAN GABRIEL ELEMENTARY SCHOOL'S 2ND ANNUAL

Family Science Night and Expo

RealScience 4 Kids

Wednesday, March 27th

***Expo*: Starts 5:30 p.m., Ends 6:00 p.m.**

***Family Science*: Starts 6:00 p.m., Ends 7:00 p.m.**

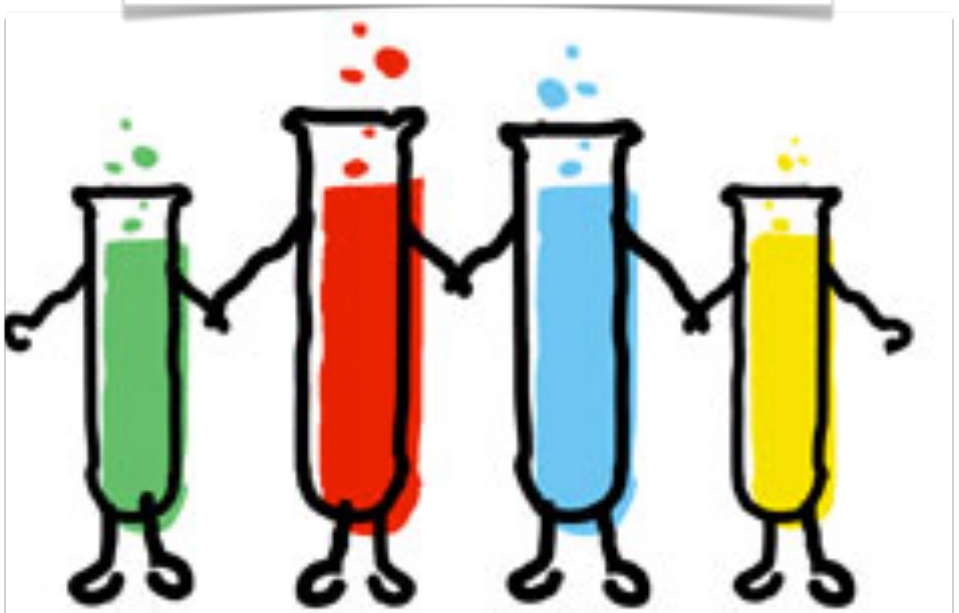
No need to cook!

Food and drinks will be available. There will be cheese and pepperoni pizza, and bottled water. Thank you to our friends at Pizza Express. Over 40% of the sales go straight to PTA to benefit our students!

COME SEE THE FABULOUS EXHIBITS PRESENTED BY THE YOUNG SCIENTISTS OF SAN GABRIEL ELEMENTARY SCHOOL DURING THE SCIENCE EXPO. THE STUDENTS HAVE BEEN WORKING HARD TO CREATE AMAZING DISPLAYS AND WILL BE ON HAND TO EXPLAIN THEIR WORK TO YOU.

STAY FOR AN EXCITING NIGHT OF HANDS-ON SCIENCE EXPLORATION. YOU WILL HAVE A CHANCE TO BUILD A STRUCTURE, DIG FOR FOSSILS, VIEW YOUR OWN CELLS UNDER A MICROSCOPE, BE ATTRACTED BY MAGNETS, EAT BUGS, AND EXAMINE OWL PELLETS, JUST TO MENTION A FEW.

FAMILY SCIENCE NIGHT



MARK YOUR CALENDAR

Come join us for a fun-filled evening of Science adventure!

DATE: Wednesday, March 27, 2013

WHERE: San Gabriel Elementary School Cafeteria

TIME: 5:30–7:00 p.m.
Expo 5:30–6:00 (Student projects on display)

6:00–7:00 p.m.
Hands-on Science Activities

Creston Elementary

O'Donovon Rd.
Creston, CA
805-238-4771
Contact: Tom Smith, thomassmith@atasusd.org

Approximately how many people attended?

200 (there are only 93 total students at our school)

Who attended? (Parents, students...)

- Students
- Parents
- Family
- Staff

How did you spread the word about your Science Night? (Flyers, newsletters...)

- School newsletter
- Science Club
- Word of mouth
- Flyers

Where did you host your Science Night?

Multi-purpose room

What was the start and end time?

6-8:30 p.m.

Was your event a Math and Science Night or specifically a Science Night?

It was a strictly a Science Night. We had demonstrations, hands-on activities, and student science projects.

Please list any other planned activities. (Dinner, bake sale, math contest...)

Student Science Fair projects

If you had Science Fair on the same night, would you recommend having a Science Fair/Science Night?

Yes. At a small school like ours, it was great to break up activities with students sharing their work.

Which activities were most successful? Teacher and/or student favorites?

Everyone loved the hands-on activities. The crushing of the drum was a huge hit.

Did you have students from your school volunteer? If so, in what capacity?

They all helped clean up. Parents helped with the set-up and the crushing of the can.

What resources did you find most helpful?

Parents. They donated the can, the pool, and the ice. Parents helped with activities as well as set-up and clean-up.

How long did it take to set up?

Two hours

How long did it take to clean up?

About an hour

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

I did all the planning and was the Master of Ceremonies for the event. There are only four teachers at our school, and three of the four were there. The others helped with passing out supplies and clean-up.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

I started working on Science Night about two months before the event by starting a lunchtime science club. The club met two days a week, and I helped students plan and implement science projects. During this time, I outlined and planned the Science Night activities.

Would you make the Science Night longer or shorter next time? Why?

I would make it longer so we could have more time for the students to share their projects.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

This year we did not have any organizations that presented. I did the demonstrations, and everyone participated in the hands-on activities. In between the hands-on activities, the students shared their individual projects.

When did you host the Science Night and what factors were considered when choosing the dates?

Our Science Night was the Friday before Memorial Day, 2012. I chose this date because the cafeteria was open that night. I also felt that we would have a good turn out on a Friday because the PTA holds Family Fun Friday nights throughout the year.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

Yes. The principal was there, and she was very pleased with the whole event. Parent and student feedback was upbeat and positive.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

1. **Introductory Air has Weight (demonstration then hands-on):** Two balloons of equal weight and size are balanced on a stick. When you pop one the one with air in it, it goes down.
2. **Bernoulli's Principle:** Discussion, diagram on board, lift paper by blowing above it, try to blow a paper bridge off the table.
3. **Student projects:** Potato gun, volcanoes, and science projects.
4. **Atomizer with straws:** Spray water at each other, giant one with electric blower and ping pong balls, lift ping pong balls with straw, lift beach ball with electric blower.
5. **Crushing cans:** Hot pad and bucket of cold water. Heat can with a tad of water. Invert into cold water when it steams.
6. **Clean-up:** Point out the 50 gallon drum that is steaming away outside and promise, "We will crush that as soon as the multi-purpose room is clean."
7. **Grand Finale:** Crushing a 50-gallon steel drum. Heat drum on turkey burner with 4 inches of water in it. When it boils hard, put the bung on it and push it into a kiddie pool of ice water. Stand back and watch the action.

What were your motivations for having Family Science Night?

I wanted to create an outlet for students to share Science Fair projects that also involved families and hands-on activities.

What advice would you give a school trying to start a Family Science/Math night?

My next step is the set themes for Science Nights. I can see three different themes: air pressure, astronomy, and one other. That way, every three years we can repeat a theme so that it is all set to go, at the same time creating variety. Next year, I plan on bringing in experts from the field to do the various activities.

Creston Elementary Multipurpose room
Student Science Fair Projects
Student Science Fair Projects
Participants
Participants
Student Science Fair Projects
Demonstration Table
With doc-cam
Supply table
Screen

Mary Buren Elementary

1050 Peralta St.
Guadalupe, CA 93434
805-343-2411
Contact: Tino Aleman, taleman@sbceo.org

Approximately how many people attended?

200

Who attended? (Parents, students...)

- Parents
- Students
- Administrators
- Teachers

How did you spread the word about your Science Night? (Flyers, newsletters...)

- Flyer: sent home to all Mary Buren students a month before the event
- Invitation card: made by Tino's 4th-grade students
- Classroom visit: also by Tino's 4th-grade students, who went to each room the day before the event and invited other students to come
- Newsletter: distributed at school the week of the event
- Phone call: from an auto-dialer system

Where did you host your Science Night?

Cafeteria

What was the start and end time?

6-7:30 p.m.

Was your event a Math and Science Night or specifically a Science Night?

Science Night

Please list any other planned activities. (Dinner, bake sale, math contest...)

Science Project Poster Fair in the multi-purpose room

If you had Science Fair on the same night, would you recommend having a Science Fair/Science Night?

I recommend a combo because they support each other. I would give them extra time to visit the projects in the cafeteria, where some interactive stuff took place.

Which activities were most successful? Teacher and/or student favorites?

- Rockets—outside
- Slime
- Submarines
- Thaumatropes
- Crickets

Did you have students from your school volunteer? If so, in what capacity?

Yes! 20 kids total

- 15 set-up
- 1 photographer
- 6 lead students
- Clean-up helpers

What resources did you find most helpful?

- Cal Poly resources
- Dunes Center
- CaMSP teachers in Mary Buren

How long did it take to set up?

Three hours (2:30-5:30 p.m.)

How long did it take to clean up?

One hour

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

- Tino Aleman—lead
- Jaime Cuello—co-lead
- Azucena Guzman
- Martha Morales
- Maria Gonzalez
- Principal—Dr. Sandra Bravo; allowed the hands-on work in addition to student projects (done by 5th graders)
- PTO—gave students trifold for the poster boards
- Janitor—set up tables

How much time was needed to plan the Science Night and what was the timeline in planning the event?

The planning stage started in December with a Super Science Saturday workshop. Everything was ready by May 4th; we recruited people to come.

Would you make the Science Night longer or shorter next time? Why?

Same—perfect amount of time. If we get more people, it may work better to increase the time to 2 hours.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

- Dunes Center
- Cal Poly
- Mary Buren students- lead

When did you host the Science Night and what factors were considered when choosing the dates?

Wednesday May 29th, 2013 (6–7:30 p.m.)
We considered the poster night—the events worked together. A robotics competition was the next day (Tino is lead on that project). There was an article on rockets.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

Parents of Tino's students said it was good to be in charge. They enjoyed it and learned a lot. Other students loved the activity. They look forward to next year.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

1. **Volcanos**
2. **Milk food color**
3. **Paper helicopters**
4. **Thaumatropes**
5. **Vibrating robots**
6. **Vacuum chamber**
7. **Gluep**
8. **Submarines**
9. **Solar crickets**
10. **Skins and animal track/Dunes Center**
11. **Jaws and paws**
12. **Birds and beaks**
13. **Rocket (pump bottle)**

What were your motivations for having Family Science Night?

We wanted to inspire minority students to get into math, science, and engineering, to see what is available and get motivated. Also, many local parents could not make the Hancock Science Night.

What advice would you give a school trying to start a Family Science/Math night?

Talk to us! Talk to people that do the nights, and just do it!


AXΣ
SPECTRUM


STOP

Mary Buren
Science Night 5/29/2013
Table set-up

Outside: Rockets
Jesse S.

Solar Crickets Cal Poly	Submarines Cal Poly
Dunes Center	
Bird Beaks Cal Poly-AMB	Jaws & Paws Cal Poly- AMB

Gluep Cal Poly	Vacuum Chambers Cal Poly	
(Pizza/drinks for helpers)		
Vibrating Robot 5th grader	Thaumatropes 4th grader	Paper Helicopters 4th grade
Milk/Food color 4th grader	Volcanoes 4th graders	Volcanoes 4th graders

Joe Nightingale Elementary

255 Winter Rd.
Orcutt, CA 93455
(805) 938-8650
Contact: Jaime Cuello, cuellojaime@hotmail.com
Ann Kardel, akardel@orcutt-schools.net

Approximately how many people attended?

90

Who attended? (Parents, students...)

Students

How did you spread the word about your Science Night? (Flyers, newsletters...)

We announced the Science Night/Fair to all third grade teachers via emails.

Where did you host your Science Night?

Classrooms

What was the start and end time?

8:15-11:50 a.m.

Was your event a Math and Science Night or specifically a Science Night?

It was solely based on fourth grade science curriculum, because I am a fourth grade elementary school teacher.

Please list any other planned activities. (Dinner, bake sale, math contest...)

I created a Science Fair at my school (Mary Buren Elementary) for 60 students, then this one on June 11, 2013 at Joe Nightingale, another school in a neighboring school district. The goal for next time is to create three: one at Mary Buren in GUSD, a second at Joe Nightingale in Orcutt Union School District, and a third in Santa Maria Union School District (school undecided).

If you had Science Fair on the same night, would you recommend having a Science Fair/ Science Night?

I would do them in combination, in order to ensure the greatest number of students could experience the greatest variety of science. The exposure would ensure that more families attend the Science Night after the Science Fair.

Which activities were most successful? Teacher and/or student favorites?

The 90 students were distributed well as far as what they liked, but the most popular activity was the magnets. The floating magnets were a big hit with the majority of the children. They liked the concepts of repulsion and attraction. They liked watching magnets repel against each other on the wood stand.

Did you have students from your school volunteer? If so, in what capacity?

Yes, I did. In fact, the students were picked up in Guadalupe and then taken to Orcutt, where they helped the students during the Science Night/Fair at Joe Nightingale School. Omar, Jazmin, Alex, George, Kennedy, and Agustin helped out tremendously.

What resources did you find most helpful?

Watching the Steve Spangler videos on YouTube.

How long did it take to set up?

It took about 10 minutes to set up each working station/exhibit.

How long did it take to clean up?

It took about 10 minutes to clean up.

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

Jaime Cuello was the lead person. Student teacher Ramon Murillo and teacher Ann Kardel assisted.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

This Science Night/Fair took approximately a month to set up. The student teacher, the third grade teachers, and I had to coordinate among ourselves. We had to create/construct the electrical circuits, food chain boards, and magnet stations well in advance in order to have them work properly. Students had to be trained on how to effectively communicate information to adults and students as well as how to maintain the integrity of the stations on exhibit.

Would you make the Science Night longer or shorter next time? Why?

I would make it shorter. Many of the students grew bored quickly at the stations.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

Student teacher Ramon Rueillo: ramoncris7450@yahoo.com

Jaime Cuello: cuellojaime@hotmail.com
Mary Buren Elementary School teacher
PO Box 788 Gudalupe, CA 93434

Joe Nightingale Teacher Ann Kardel: akardel@orcutt-schools.net

When did you host the Science Night and what factors were considered when choosing the dates?

The Science Night/Fair was held on June 11, 2013. It was held during this time because it was the last week of school, when teachers typically are teaching science that could not be taught during the regular school year.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

I received feedback from Mrs. Ann Kardel and her 30 students. They wrote notes to my student helpers and me expressing their likes and dislikes.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

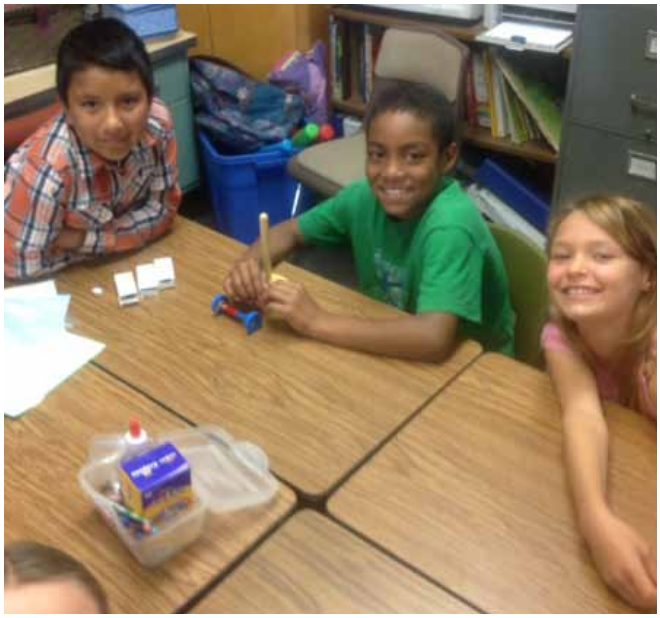
1. **Electrical Circuits:** Students learned that a circuit is a loop, and that electrons flow through the wires producing electricity.
2. **Magnets:** Students learned that all magnets have north and south poles. They also learned that opposites attract (concept of attraction) and that like poles repel (concept of pushing away when similar poles meet).
3. **Food Chains:** Students learned "who eats who." Producers make their own food, and consumers eat or consume.

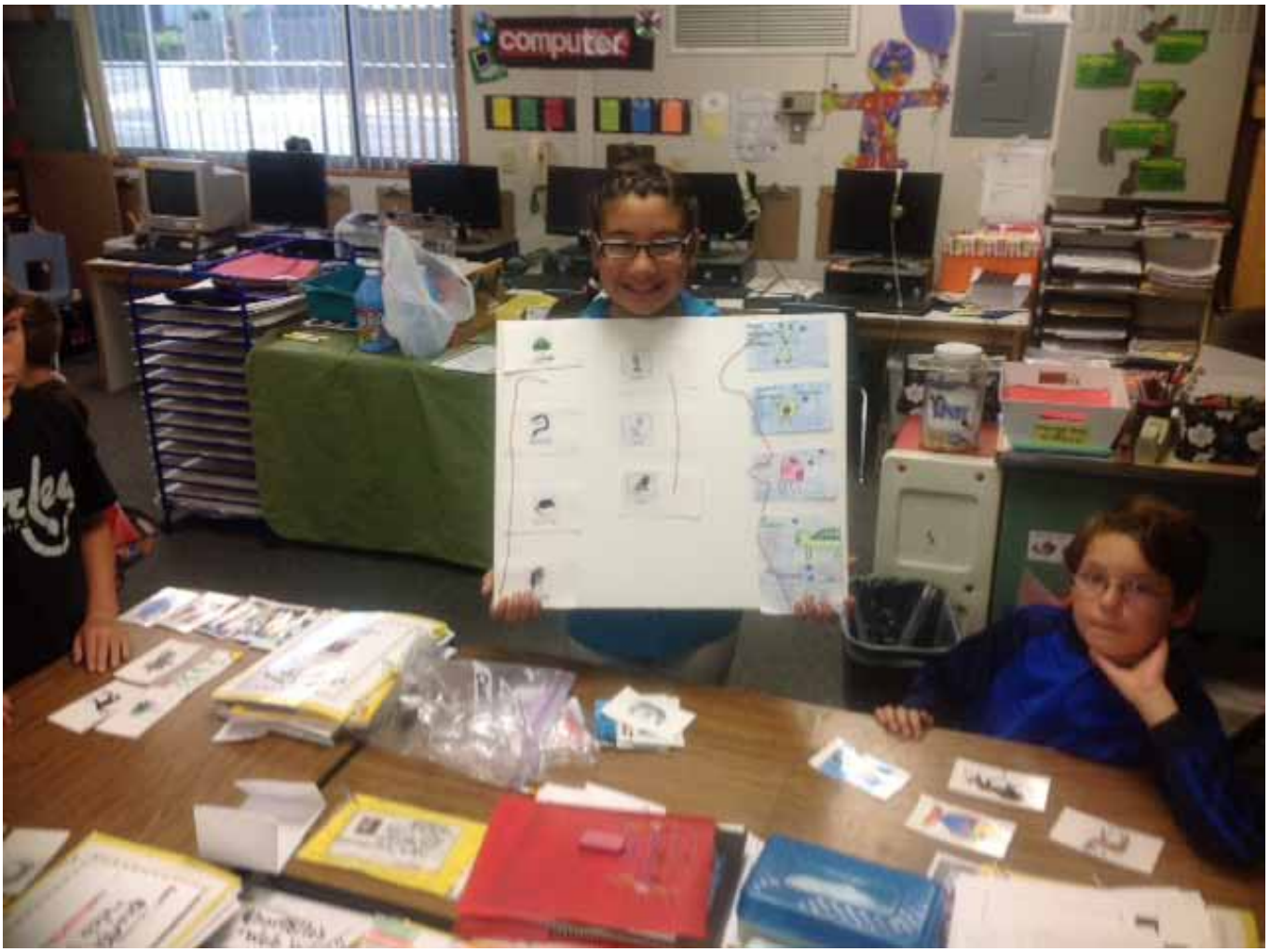
What were your motivations for having Family Science Night?

My children attend Joe Nightingale Elementary, and when I discovered how little science was being taught there, I offered my services to teacher Mrs. Ann Kardel. She invited my students and me to create, facilitate, and coordinate the Joe Nightingale Science Day/Night/Fair. I agreed and looked to Cal Poly and student teachers for assistance.

What advice would you give a school trying to start a Family Science/Math night?

Keep it small, with 3-5 hands on activities. Make sure they are all hands-on activities.




computer

Joe Nightingale Elementary Classrooms

Electricity Omar 4th grade student & Mr. Cuello	Electricity Alexander 4th grade student and Mr. Cuello
Food Chains Kennedy 5th grade student and Mr. Cuello	Food Chain Jazmin 4th grade student and Mr. Cuello
Magnets George 4th grade student and Mr. Ramon Murillo Cal Poly student	Magnets Mr. Murillo Cal Poly student

Bauer Speck Elementary

401 17th Street
Paso Robles, CA 93446
805-769-1350
Contact: Nancy Mayer, nemayer@pasoschools.org

Approximately how many people attended?

650

Who attended? (Parents, students...)

- Parents
- Presenters
- Students

How did you spread the word about your Science Night? (Flyers, newsletters...)

- Newsletter
- Websites
- Marquee

Where did you host your Science Night?

- Multi-purpose room
- Classrooms
- Outside

What was the start and end time?

9:15-11:30 a.m.

Was your event a Math and Science Night or specifically a Science Night?

It was an Agriculture/Science Day.

Please list any other planned activities. (Dinner, bake sale, math contest...)

- Dancing presentation at break
- Breakfast buffet at snack/break
- Flip books for review
- Writing thank you notes

If you had Science Fair on the same night, would you recommend having a Science Fair/Science Night?

It worked well to combine it with an established event.

Which activities were most successful? Teacher and/or student favorites?

- The students love anything involving food
- Owl pellets
- All live animals
- Tractor races
- Milking

Did you have students from your school volunteer? If so, in what capacity?

We had alumni volunteers and many students from other organizations participate.

What resources did you find most helpful?

Judy Honercamp :)

How long did it take to set up?

Two hours

How long did it take to clean up?

Two hours

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

We incorporated our science "night" into our annual Agriculture Day. Judy Honercamp was the lead staff member as she has been the organizer of Ag Day. Each grade level has one teacher in charge of arranging the four stations and contacting the presenters. Another teacher was in charge of organizing the buffet that we provide at snack and each grade level is responsible for contributing food, drinks, or paper goods.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

We begin planning for our science day after winter break. We begin contacting presenters between January and March. Beginning about six weeks before the event, the teachers in charge of presenters meet to discuss who we have lined up. We meet to ensure that a science standard is being met at each station. Because it is a day focused on agriculture, it is very easy to incorporate life science standards into the stations. A lot of discussion is involved in incorporating physical science and earth science.

Would you make the Science Night longer or shorter next time? Why?

Our stations are 30 minutes each. We are planning on making the break 30 minutes instead of the 20 minutes for the regular recess time. The presenters enjoy chatting and networking, and we felt the additional 10 minutes would make that time more effective.

Which organizations or schools presented in your Science Night? Please include contact

information, if possible.

We had many families who have been presenting at Ag Day for years. There are many students who receive 4H credit for presenting, children of teachers, friends of teachers, Farm supply, Art Docents, local farmers.

When did you host the Science Night and what factors were considered when choosing the dates?

Our Science Night was incorporated into our Ag Day and held during regular school hours, so it was not necessary to consider sunset, sports activities, or night sky activities.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

We always receive very positive feedback from the community and the many volunteers who have returned to participate year after year.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

1. **Many animals (sheep, horses, cattle, dogs, pigs, rabbits, chickens)**
2. **Owl pellets**
3. **Making butter**
4. **Painting and chalk drawings**
5. **Farm equipment**
6. **Branding**
7. **Soil and erosion**
8. **Roping**
9. **Making tortillas**
10. **Trail mix**
11. **Western dancing**
12. **Milking**
13. **Tractor races**
14. **Making ice-cream**

What were your motivations for having Family Science Night?

Incorporating science standards into our already established event ... combining science with agriculture was an easy transition.

What advice would you give a school trying to start a Family Science/Math night?

Start small or incorporate it with an already established event, such as Open House.

Kermit King Elementary School

700 Schoolhouse Lane
Paso Robles, CA 93446
805-237-6170
Contacts: Charlie Berry: cberry@pasoschools.org
Jillian Jaeger: jbjaeger@pasoschools.org

Approximately how many people attended?

400-500

Who attended? (Parents, students...)

- Parents
- Students
- Siblings
- Faculty
- District administrators
- District board members
- Press

How did you spread the word about your Science Night? (Flyers, newsletters...)

- Flyers
- School newsletters
- School phone autodialer
- Parent email
- School website
- RSVP to families' homes
- School marquee
- Various posters at school
- Daily student council announcements
- Facebook

Where did you host your Science Night?

- Multi-purpose room
- Classrooms
- Outside

What was the start and end time?

6-8 p.m.

Was your event a Math and Science Night or specifically a Science Night?

Math and Science Night. We have found that most of our faculty participants preferred to design and supervise math events. All of the science activities have been developed by the two teachers involved in the CaMSP project; and those activity tables have been manned by the Cal Poly students or our school site student volunteers.

In both cases math activities have been along one side of the MPR, while all science activities have been conducted along the other side of the MPR. In the future we plan to stagger the activities so that math and science activities are fully integrated. Our goal is to disperse the number of people so that students really interested in science will also be exposed to mathematics and vice versa.

Please list any other planned activities. (Dinner, bake sale, math contest...)

- Pizza and refreshments
- Math Competition

If you had Science Fair on the same night, would you recommend having a Science Fair/ Science Night?

Year 1: I am torn regarding having our Math/Science Night at the same time as a Science Fair. Student Science Fair projects would have to be located in classrooms and the activities in the MPR may keep students from touring all of the other student fair projects. I would prefer to use our math/science night to be an inspiration and motivation for students to really take on an adventurous project that they may not have otherwise been motivated to do. My hope is that our math/science night would remove anxiety or stress from students and empower them instead.

Year 2: I would not because the focus is on math/science learning, and a Science Fair would focus on students following the scientific process to conduct experiments and display them in an understandable format. It would be great to organize both on different occasions.

Which activities were most successful? Teacher and/or student favorites?

- Slime in a bag
- High school hands-on activities
- Astronomy
- Rockets
- The math competition is always a huge success, because students are eager to demonstrate their knowledge and win a medal.
- Any activities involving food or sweets are also very successful; such as the gum-drop polyhedrons, or (in the past) Phases of the Moon with Oreo Cookies.
- Any activities that demonstrate with fire, explosions, or materials that students do not have access to on an independent basis - such as walking on glass, lying on a bed of nails, pulling a tablecloth out from under a set table, flying a remote control shark, or making marshmallows expand beyond their size.
- Any activities that provide them with something to take home: math competition medals, tangram pictures, pattern quilt pieces, gum-drop polyhedron sculptures.

Did you have students from your school volunteer? If so, in what capacity?

Year 1: Kermit King had an established GATE program, which allowed students to work with and develop each science activity that they wanted to sponsor for the event. They had a designated meeting time, which facilitated their participation during the school day.

Year 2: Fourth- and fifth-grade students who are leaders and self-managers made activity posters, shared announcements on stage, facilitated and graded the math competition, assigned half-hour slots to assist in activity stations, and set-up and cleaned-up activities before and after the event.

In the future, our goal is to have students develop and manage science experiments that they develop completely on their own.

What resources did you find most helpful?

Year 1: Hands down, our local high school's physics teacher, Mark Fairbank, and his students have been a huge support for our project. Our students LOVE coming in and seeing students from our high school demonstrating fascinating science activities. They develop, design, and demonstrate all of their own work. They are well informed and relate exceptionally well to our students.

In addition, our local university Cal Poly faculty and students have done an amazing job preparing and presenting incredible activities for our students. Their access to better equipment and college-level supplies takes our science presentations to another level.

Both of these contributors are invaluable to making our Science Night a success.

And, of course, we have to acknowledge our own PTA, which helps to coordinate volunteers as well as takes care of our food and financial needs for the evening.

The involvement of our entire school site staff and the support of our principal is what helps to make our Math/Science Night event - Kermit King's Math/Science Night.

Year 2:

- Student and Community clubs (including Cal Poly Clubs)
- Cal Poly faculty and students
- PTA providing pizza and refreshments for attendees and volunteers

How long did it take to set up?

Year 1: Three hours
Year 2: Two hours

How long did it take to clean up?

Year 1: Two hours
Year 2: One hour

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

- Leads: Charlie Berry and Jillian Jaeger coordinated activity set-up and outside club participants
- All 17 teachers and staff helped with participation in the Year 2 event, as did the site principal
- PTA coordinated pizza and refreshment orders and sales

How much time was needed to plan the Science Night and what was the timeline in planning the event?

- 4 months in advance
  - Select date
  - Book outside presenters
    - Paso Robles High School
    - Central Coast Astronomical Society
    - Cal Poly Students
    - Junior High Endeavor Academy
    - Atascadero High School Robotics Club
    - Amateur Rocket Club
  - Contact Kermit King PTA to confirm financial support, food sales, and volunteer
  - File Use of Facility Request
  - Staff Meeting: inform staff of the date
  - Request staff input for appropriate grade level ideas
  - Determine grade level reps to organize grade level volunteer
- **2 Months in Advance**
  - Staff Meeting: finalize grade level activities
  - Post poster in staff lounge for volunteer sign-ups
  - Involve GATE / Self Manager students
  - Letter of Commitment
  - Hold regular meetings to allow students to master station requirements
  - Allow students to organize all materials needed for their station
  - Have students sign up to work 30-minute shifts
  - Order medals for math competition: 6 Gold, 6 Silver, 6 Bronze (Jones School Supply)
- **1 Month in Advance**
  - Create materials list for mass purchase
  - Save ALL receipts
  - Make posters for each activity
  - Print CA State Standards
  - Create self-guided activity directions with examples, next steps, and real-world connections
  - Run photocopies for each station (180 recommended)
  - Organize all materials for each station in separate boxes
  - Reconfirm outside presenters and space/table requirements
  - Double check the number of support people attending
  - Determine food/drink needs for HS students & student volunteers (approx. $100)
- **2 Weeks in Advance**
  - PTA send home RSVP flyer for food #'s & additional parent volunteers for set up & tear down
  - Post event on Facebook page and school web page
  - Reconfirm outside presenters and space/table requirements
  - Update social media pages
  - Update school marquee
  - Student Council to make daily morning announcements
  - Put up posters around school publicizing event

- **1 Week in Advance**
  - PTA RSVP flyer
  - Auto-dialer reminder
- **1 Day Before**
  - Auto-dialer reminder
  - Motivational assembly from an outside presenter
  - Begin set-up in advance (weather permitting)
- **Day of Event**
  - Have parents/students help set up
  - PTA to set up pizza distribution (two deliveries: one for student volunteers & one for the event)
  - Set up supplies and special recycling bins for plastic water bottles (one by each exit)
- **After Event**
  - Hand-write thank you notes to PTA and all outside presenters

Would you make the Science Night longer or shorter next time? Why?

Year 1: We considered running the event from 5:30-7:30 instead of 6-8 p.m. At first, we scheduled the event to begin at 6 because we wanted working parents to be able to attend. We also made sure that pizza and water were available to ensure that parents wouldn't have to cook at home or feed the kids before coming. However, during both events (the 2nd event even more pronounced), parents and students began arriving early, before all presenters had finished setting up. In the future, we may open the doors at 5:30 for those who can attend earlier, and close a little bit earlier in order to allow students to return home earlier on a school night.

Year 2: Same, because it is neither too early nor too late for most families.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

Paso Robles High School, Mark Fairbank: mfairbank@pasoschools.org
Central Coast Astronomical Society, David Major: Davercb1@charter.net
Cal Poly, Dr. Lola Berber-Jimenez: lberberj@calpoly.edu
Endeavor Institute, Steve Kliewer: 805-801-2245, S.Kliewer@sbcglobal.net / http://endeavourinstitute.org
Amateur Rocket Club

When did you host the Science Night and what factors were considered when choosing the dates?

Jan. 26th, 2012 and January 17, 2013
We considered the lunar phase for astronomy, daylight savings time, baseball/softball/soccer practice, the main office calendar, that there were no community sports (after soccer season, but before baseball/softball starts), and that there was a minimum school day the following day to help tired students and staff.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

We received all very positive comments from school families, school board members, and other attendees. It is becoming an "excited expectation" for families every year.

The PTA wants to do it twice a year if possible! Also, our PTA has given us feedback on the number of attendees and the number of families that have dinner with us during our event. This helps us to better plan for food as well as the supplies needed to adequately stock each center.

The response from students and family members was overwhelming. They were so happy with this "all ages" family event that they requested that we host one twice a year. (We politely declined.)

We also received very positive comments from our district-level administrators and school board members, who were very impressed with our entire school's commitment to the project.

This past year, our state testing math scores improved substantially—perhaps a nice side effect of having such an event???

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

1. **Magnet races:** use opposite poles to race magnets on a race track
2. **Polyhedrons:** use coffee stirrers and gum drops to make 3-D shapes
3. **Nastea:** drink tea and eat M&M's to see effects of tea on tongue taste receptors
4. **Slime:** combine ingredients to make slime in a plastic bag to take home
5. **Grade level math competition:** each grade level tested for speed and accuracy; medals given out for 1st, 2nd, and 3rd place in each grade level
6. **Pattern Quilt:** use geometric stickers to make designs to add to collaborative quilt on butcher paper
7. **Tangrams:** challenged students to use geometric shapes to recreate designs provided to students (3rd grade KK teachers)
8. **Got Your Number/Bean Bag toss:** hop scotch/math facts skills; based upon age & skill level (1st grade KK teachers)
9. **Endeavour Institute:** variety of robotics/physics models for students to explore
10. **Remote-controlled helium shark for students to manipulate**
11. **Froggie Math:** students use math facts to develop various equations
12. **Central Coast Astronomical Society:** variety of telescopes on the field to view celestial objects
13. **Phases of the Moon:** Oreo cookies to learn lunar phases
14. **Circulatory systems:** to learn function of human circulatory system
15. **Vacuum Chamber:** exploring the effects of pressure on marshmallows and shaving cream (Cal Poly)
16. **Geoboards:** explore geometric shapes and properties using rubber bands; examples were provided (5th grade KK teachers)

17. **Paso Robles High School Students:** multiple demonstrations of physics and chemistry, including but not limited to walking on glass and lying on a bed of nails. (These activities vary each time, as students select which presentations to bring. These activities are not submitted to KK prior to the event.)

What were your motivations for having Family Science Night?

Initially, our motivation came from the CaMSP requirement of doing a continuing application. We had always wanted to do an event of this nature, but the project gave us just enough push to break through our fears and make it a reality. Although the event takes a lot of time and planning, the commitment from our fellow teachers and students helped to make this night an overwhelming success. We want to give students and families an environment where they can explore and learn about science and math concepts in a fun, non-assessed way.

What advice would you give a school trying to start a Family Science/Math night?

Year 1: My number one tip for other schools would be to get your entire teaching staff involved. Their participation helps to disseminate a lot of the responsibility and it also helps to get students of all grade levels excited to participate. Kids also love to see their teachers after hours.

My second tip would be to involve your local high school. The dynamic of older kids working with younger kids is very positive. Their energy and enthusiasm takes the event atmosphere to a higher level.

Definitely tap into your PTA for initial funding, and support. They have access to many volunteers who are happy to help with set-up and clean-up.

Lastly, look to your local community for additional presenters, partners, or sponsors. Whether it is a local club, community college, or university, most scientists are really excited to share their passion with local children. Leave no stone unturned!

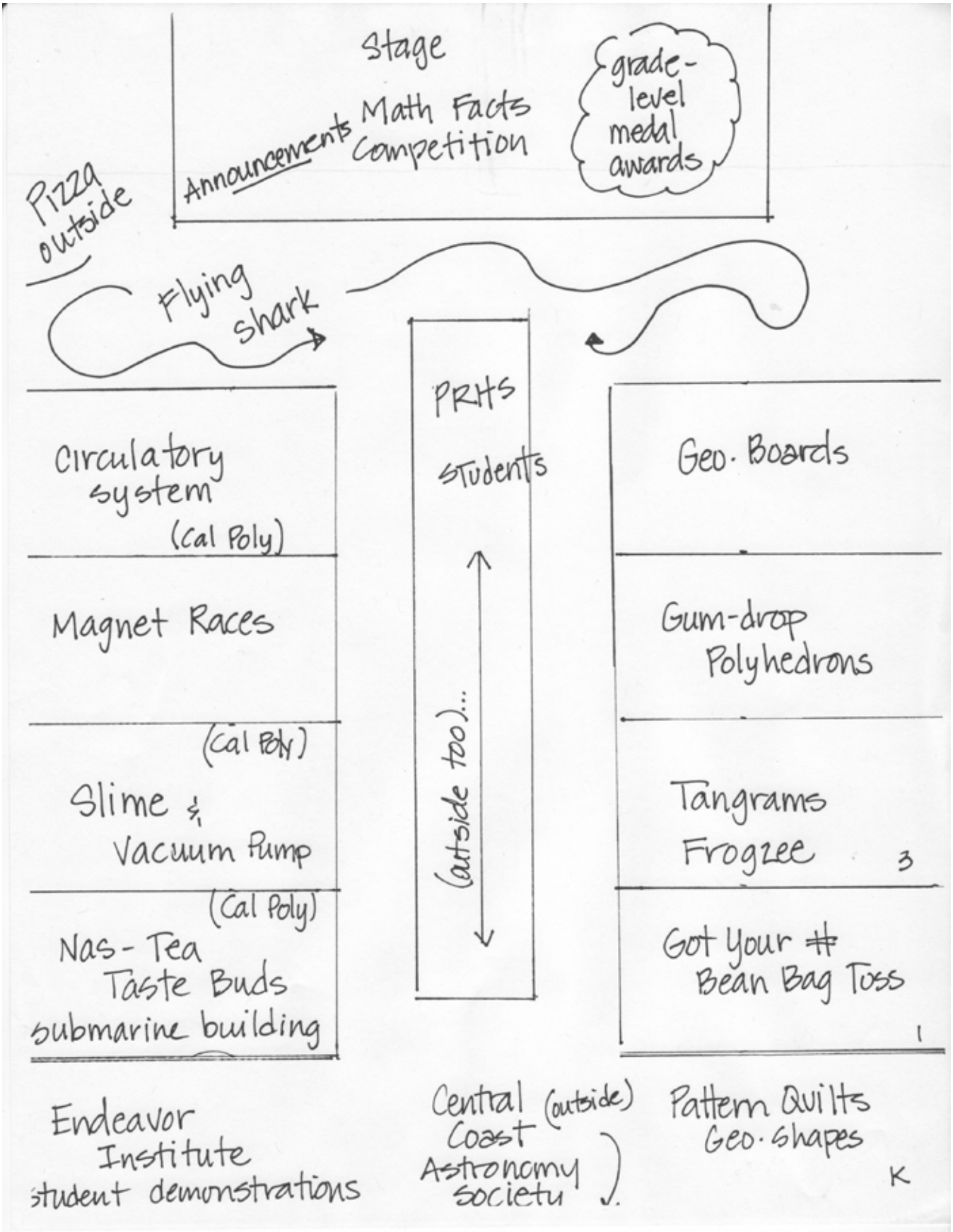
Year 2: Start simple and keep what works, eliminate/change what does not work. Get PTA and staff support/help as much as possible. Keep it fun and interesting for the students!


MAGNET
RACES
SANLUIS


NAS-"TEA"
TASTE-BUDS
CAL POLY


OOBLECK
SOLID
LIQUID
CIRCULATORY
SYSTEM

Kermit King Elementary multi-purpose room (Year 1)



Kermit King Elementary multi-purpose room (Year 2)

Math Competition on stage

Magnet Races

Digestive System

Cal Poly Slime

Cal Poly Nastea

Endevour Acadamy

Coffee Stirrer/Gumdrop/Polyhedron

Froggie Math

High School Science

Equation Number Recognition Toss

Geometric Pattern Quilt

Kermit King ELEMENTARY SCHOOL
A California Distinguished School

Math & Science Exploratorium
Family Fun for All Ages!

Bring the whole family to participate in fun hands-on math and science activities!

- Participate in grade-level math competitions with a chance to earn a medal!
- Interact with Mr. Fairbanks & Paso Robles High School student science demonstrations!
- Come and meet with Cal Poly students and play with amazing science gadgets!
- Meet Steve Kliewer of the Endeavor Institute and experience hands on activities!
- Explore the stars with the San Luis Obispo Astronomy Club!

Thursday, January 17th 6:00-8:00 pm

In the Multi-purpose Room

Free entry!

Pizza and drinks will be available for purchase.
Please RSVP to let us know you're coming.

Math & Science Exploratorium

_____ _____
Family Name # of persons attending

_____
Phone number (if volunteering)

I would like to help set-up for the Math & Science Exploratorium Family Night
To join the Set-up Committee, please meet in the multi-purpose Room
@ 4:00pm on Thursday, January 17th

I would like to help with clean-up for the Math & Science Exploratorium Night.

Find "Kermit King PTA" on Facebook – Become a "fan" for updates!
Visit us on the web at www.kermitkingpta.org !!

Pat Butler Elementary School

700 Nicklaus St.
Paso Robles, CA 93446
805-237-3407
Contact: Trina Nicklas, tnicklas@pasoschools.org

Approximately how many people attended?

250

Who attended? (Parents, students...)

- Parents
- Students
- Former students
- Presenters
- Relatives
- Board members
- District administration

How did you spread the word about your Science Night? (Flyers, newsletters...)

We advertised our Science Night in a few different ways. First, we included a "shout out" about Science Night in our monthly newsletter. Next, we sent home a flyer to all the student homes. We also sent personal invitations designed by the Science Fair project students to all the board members and district administration. We put a message on the school web site that advertised the event. Finally, we used a telephone auto-dialer a day or two before the event reminding families to attend.

Where did you host your Science Night?

- Multi-purpose room
- Outside

What was the start and end time?

5:30-7:30 p.m. We began setting up for the event after 3:00 p.m. that day and finished clean-up and left before 9:00 p.m. Guest presenters began showing up with their equipment after 4 p.m.

Was your event a Math and Science Night or specifically a Science Night?

Our event was strictly a Science Night. In the previous two years, we had organized a Math and Science Night, and we'd noticed that most of the attendees were most interested in the science activities. So, this year, we decided to focus on that subject area alone. Also, we were cramped for space with all the wonderful support from the Paso Robles High School physics students and the Cal Poly undergraduate students. Finally, we had hosted math benchmark tests on the stage during prior Math and Science Nights, which was a lot of fun for students and adults alike. However, this year, we had Science Fair projects to display, and the stage seemed like the best use of space.

Please list any other planned activities. (Dinner, bake sale, math contest...)

The Pat Butler PTA organized the food and drink for the event. They ordered pizzas and sold them by the slice. They also brought in drinks and cookies for sale. One of our teachers, Dolores Alexander, volunteers at Zoo to You. She brought in an armadillo to share at the event. It was very successful. We also had a Science Fair display on stage. Fifth grade honor students participated in the event, for which they had prepared for weeks in advance.

If you had Science Fair on the same night, would you recommend having a Science Fair/ Science Night?

We did have a Science Fair on the same night as our Science Night. I recommend that we do the same thing again in years to come. The fifth-grade participants were able to get geared up for Science Night. In addition, it increased the turnout at the event because all Science Fair students attended as well as many of the dignitaries that were personally invited by the students. Science Night is a great venue for the Science Fair students to show off their projects to the rest of the school community. It is important that adults and students alike are exposed to some of the great projects that our students are mastering.

Which activities were most successful? Teacher and/or student favorites?

The most popular activities usually involve a little danger. Many students participated with the nail bed, the broken glass, and the plasma globe that stands your hair on end. Students absolutely love the shark that floats around the room, often with students at the control. Younger students were very excited about the Harry Potter potions and the fossils. The Moon Phases, with Oreo cookies, is always popular.

Did you have students from your school volunteer? If so, in what capacity?

This year, the students did not volunteer. I wanted them to be free to show off their Science Fair projects to their families and special guests. In the past, we have had the students work the activity centers and manage the benchmark math tests. Of course, this year, we did not conduct benchmark math tests. Teachers and adult volunteers manned the activity stations.

What resources did you find most helpful?

The first year, our best resource was Anna Louise Emrich! She was the matriarch of Science Night in our district. Human resources have been the most helpful. Our Science Nights would not be nearly as successful without the support of Mr. Mark Fairbank and our partners at Cal Poly! Regarding the Science Fair projects our students presented, I used several books as resources to help guide our timeline and project organization.

How long did it take to set up?

Two hours

How long did it take to clean up?

One hour

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

The lead teachers for planning and carrying out the Science Night event were Trina Nicklas, Kathy Dale, Diane Harris, and Terri Pearl. We also had five other teachers help out at the event with their grade level station. In addition, we had the support of the principal as well as the night custodian. Three other teachers simply attended the event.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

- 4 to 5 months in advance: schedule a date for the event. At this time, check the calendar to preclude daylight savings time. Also, check the site calendar to avoid school site conflicts. Complete the Use of Facility paperwork.
- 3 months prior: arrange for guest presenters, such as Mr. Fairbank's physics group, Cal Poly, and the Central Coast Astronomical Society.
- 6 weeks prior: inform the staff of the event and ask for suggestions for grade level science standards and activities to use.
- One month prior: meet with participating staff, identify each of the grade level activities, and make a materials list. Contact the PTA and remind them of the date and arrangements for food and drink at the event. Confirm that the PTA will continue to sponsor the event financially. Include a blurb of Science Night in the monthly newsletter. Students can create personal invitations for the district administrators and board members.
- 2 weeks prior: have one staff member make all the necessary purchases and save the receipts. Gather all materials necessary for each activity and organize them into plastic containers. Email reminders to guest presenters. Confirm staff support at the event.
- 1 week prior: send home the flyer. Make posters for each of the grade level activity stations and include the specific state standard. Remind the office staff of the auto dialer 2-3 days prior to the event. Collect monetary donations for the Astronomy club from the principal.
- Day of the event: set up posters above table locations. Cover tables with plastic tablecloths. Set up each of the activity stations. Coordinate with the PTA to feed the guest presenters from the high school and college.
- Night of the event: clean up all tables and put away all materials.
- Week following the event: send thank-you letters to guest presenters and voluntary staff supporters. Reflect and make notes for next year.

Would you make the Science Night longer or shorter next time? Why?

We would not change the time frame. It worked out perfectly. It worked well for our guest presenters to get in, set up, and clean up in a timely fashion, even on a school night. Also, it is great to have this event on a Thursday evening, because then there is only one more work day in the week. It is exhausting to coordinate and conduct the event.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

Mark Fairbank and his physics students: mfairbank@pasoschools.org
David Majors and the Central Coast Astronomical Society: davercrb1@charter.net
Dr. Lola Berber-Jimenez and Cal Poly students: lberberj@calpoly.edu

When did you host the Science Night and what factors were considered when choosing the dates?

We hosted the Science Night on Thursday, February 28, 2013 from 5:30-7:30 p.m. Many factors were considered when selecting the date. First, we feel it is important to schedule the event prior to daylight savings time, so that it gets dark earlier, so we can take advantage of the night sky for astronomical observations. Second, we wanted to have the event before many students got involved in spring athletics. Third, it is important to consult our site calendar to make sure there are no conflicts. Finally, it is critical that our date is feasible for the important guest presenters. We have held previous Science Nights at our school. Last school year, it was on Thursday, February 23, 2012 from 5-7 p.m. Our first year, Math & Science Night was on Thursday, April 7, 2011.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

We received feedback on our Science Night from several sources. Most were in the form of comments. We also received email responses and a letter from the superintendent. Most parent comments consisted of their gratitude for a fun, educational evening. I received emails saying people felt our Science Night was a successful event. Many of my students that made Science Fair projects received special notes in the written portion of their projects from the board members and district administrators that attended.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

1. **Kinder:** phase change activity with ice and salt.
2. **First grade:** teeth exploration with mirrors and a handout. Also a perspective activity with drawings on either side of a paper plate. Yarn on either side of the plate assisted to turn it back and forth quickly, portraying an interesting perspective.
3. **Second grade:** fossil imprints. Students made fossil imprints using clay. Shells and fish fossils were available.
4. **Third grade:** moon phases. Students used Oreo cookies to arrange the particular moon phases.
5. **Fourth grade:** circuits. Students created simple and parallel circuits. There were also materials set up for magnetism exploration.
6. **Fifth grade:** Harry Potter potions. Students explored reactions with Mentos, vinegar, and green dye. Wands and safety glasses were available. Fifth-grade honor students conducted Science Fair experiments, which they displayed on stage.
7. **PRHS Physics students:** a multitude of activities. Bed of nails to lay down on. Broken glass to stand in barefoot. Gravity tracks for marbles. Pulling a tablecloth out from under a set of dishes. Plasma globe that stands people's hair on end. Track to display centrifugal force. String and cup telephones.
8. **Cal Poly faculty and students:** density experiments in fish tanks. Atmospheric air pressure experiments using marshmallows. Acid tastings and reactions. Shark floater/flyer density experiment.

What were your motivations for having Family Science Night?

Three years ago, our motivation was to complete an assignment for the CaMSP grant. That first event was so successful that we wanted to make it an annual event. Last year, we had our second annual Math & Science Night, and it was not to fulfill our "Continued Application," as I had already done science journals with my class for that requirement. Finally, this year, we had our third annual Science Night. We have put this event on the calendar as an annual function. Next year, Science Night will be on the Adjunct Duty Schedule, and several teachers will receive points for coordinating and running the event.

What advice would you give a school trying to start a Family Science/Math night?

Go for it! Make sure to plan early with a checklist. Get as many people on board as possible to help with the event. Try to have several adults responsible for running an activity table. Work to involve a couple of other organizations to excite kids about science. Don't try to plan too much; keep it simple the first time.

Stage Area

Stage Area to Display Science Fair Projects

Stage Area to Display Science Fair Projects

Stage Area

Seating Area to Dine

Seating Area to Dine

Doors to kitchen

Side Doors

First Grade
Teeth self examination
Perspective experiment

Kindergarten
Phase Changes Observation

Third Grade
Moon Phases

Second Grade
Fossil Creations with Clay

PRHS Physics Table
Making phones

Bed of Nails

Fourth Grade
Electrical Circuits & Magnetism

PRHS Physics Table
Centrifugal Force Track

Stand in Broken Glass

Fifth Grade
Harry Potter Potions

PRHS Physics Table
Gravity Tracks

Cal Poly LBDL
Acidic Taste Tests & Reactions

PRHS Physics Table
Tablecloth experiment

Cal Poly LBDL
Pressure Experiments using marsh-mallows

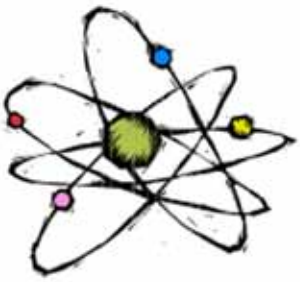
PRHS Physics Table
Static Electricity Generator

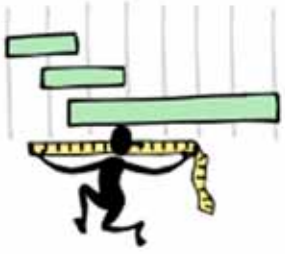
Cal Poly LBDL
Density Experiments in Fish Tanks

Front Doors

EXPERT ADVICE

Pat Butler's Math & Science Night





Please join us

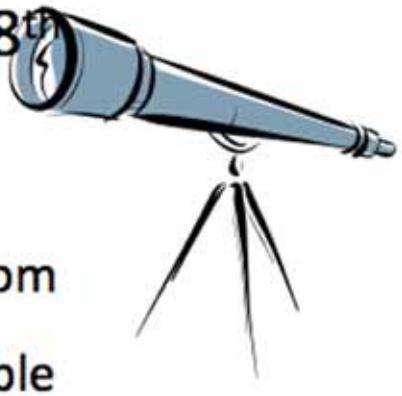
for a night filled with

hands-on activities

and tons of fun!

Thursday, February 28th

5-7 p.m.



Pat Butler Multipurpose Room

Pizza & drinks will be available

Virginia Peterson Elementary

2501 Beechwood
Paso Robles, CA 93446
805-466-8113
Contact: Anna-Louise Emrich, aemrich@pasoschools.org

Approximately how many people attended?

300-400

Who attended? (Parents, students...)

- Parents
- Students
- Board members

How did you spread the word about your Science Night? (Flyers, newsletters...)

We have a sign in front of our school that lists up-coming activities. We include an announcement of the Science Night in our annual calendar that is issued at the beginning of the year. Leading up to the event, we send home flyers. Finally, we have an automatic calling system to contact each home. Our student council is very much involved and they make announcements in each classroom.

Where did you host your Science Night?

- Multi-purpose room
- Classrooms
- Outside

What was the start and end time?

5-7:30 p.m.
Before the event, our PTA sells pizza so that we can start early and families can eat dinner at the event. Set-up starts at 2:30 and clean-up ends between 8 and 8:30 p.m.

Was your event a Math and Science Night or specifically a Science Night?

This is a Math AND Science Night.

Please list any other planned activities. (Dinner, bake sale, math contest...)

The PTA sells pizza, not as a money maker, but as a convenience for the families. We also have a Math Olympics, or grade-level competition, on the stage. Students in a grade compete with each other in a timed, very short, but comprehensive quiz. The first, second, and third place winners receive Olympic-like medals. The very first Math and Science Night we had, years ago, was during the winter Olympics and set the theme. Probably will this year, too!

If you had Science Fair on the same night, would you recommend having a Science Fair/ Science Night?

Science Fair and Invention Convention are parts of our open house in the spring. Those are more of demonstration-type events, whereas Math and Science Night is a teaching time for students to explain the standards that they are learning.

Which activities were most successful? Teacher and/or student favorites?

Goo or slime made by the students from the Cal Poly chemistry club. Last year we had the robotics club from Cal Poly, and that was fun, too. The parents love seeing what their students are doing. Our local astronomy club brings their telescopes, and the kids can see planets and constellations. One year it rained, and the club explained how the telescopes worked, inside. Believe it or not, people liked that, too. Finally, our own high school physics teacher brings his students to demonstrate walking on glass … oh WOW!!

Did you have students from your school volunteer? If so, in what capacity?

The students are in charge of each station. They are the instructors for the evening. They do everything!!! Primarily the 4th and 5th grade students who are in student council do the work. Obviously the more responsible the better, but they seem to rise to the occasion.

What resources did you find most helpful?

The Internet is incredible—my "go to spot" for activities now. Way back when we started, I searched out books in our library that had simple "hands on experiments" that students could handle with a minimum of supervision.

How long did it take to set up?

The actual physical set up takes one day.

How long did it take to clean up?

The clean-up, or clearing out of the multi-purpose room, takes about one-two hours. BUT it is really just transferred into my room, so that the cafeteria can be used the next day. I finally get it all sorted out in about a week.

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

There are really only two teachers involved with this evening, me and another teacher who works with the students involved with the Math Olympics event.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

Our student council starts right after winter break by surveying which science standard each grade level would like to focus on this year. Once that is established, I work with the council members to find an activity that will demonstrate the specific standard. When we have found the activities, we round up the supplies needed and the council members practice teaching it. Finally, they make posters listing the standards and the objectives. There are usually 4-6 weeks during which this is done. Meanwhile, in SEPTEMBER I start making contacts with the guest speakers who do demonstrations for us.

Would you make the Science Night longer or shorter next time? Why?

Over the years, this time slot has seemed to work well.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

Each elementary school in our district now has its own Math and Science Night. Each site is a little different and runs independently. We always include the high school science department as well as Cal Poly, the state university near us. This last year, we used local water control boards, the air quality control board, the district food service manager and private, science-related businesses, including a solar firm that is building a solar farm near us.

When did you host the Science Night and what factors were considered when choosing the dates?

We have been having a Science Night for about ten years. Lately, we have planned the event for the first moonless night in February. After the winter holidays, it excites the students and gets them involved in school again. January is too soon after the break to get prepared. We need a moonless night because we have a guest astronomer who comes with his telescopes and we are able to see Jupiter. Also, because it gets dark early, the event can be held earlier in the evening.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

We get feedback from everyone involved: parents, students, fellow teachers, administrators, and presenters.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

SCIENCE

1. **Kindergarten:** recycling relay race. Objects are identified as recyclable or not.
2. **First grade:** environments. Pictures of animals are placed in front of different colors to identify camouflage.
3. **Second grade:** solar movement. Sunrise and sunset at different times of the year, attaching a cut out sun to a paper plate that is marked with the different seasons and a map of the world.
4. **Third grade:** food webs. Given pictures of different animals, insects, the sun, and plants, parents and students are encouraged to form a web or cycle.
5. **Fourth grade:** magnets. Given a variety of objects, only those made of metal are attracted to magnets.
6. **Fifth grade:** chemistry. Gumdrop molecules.
7. **Guest speakers**
8. **School food service manager:** chia seeds. Explained their nutrition value and history. He also provided tastes.
9. **High school:** a variety of objects including a Vandergraph generator.

10. **Upper Salinas Water district:** interactive display on erosion. A local landscape architect brought plants that should be planted in a drought environment.
11. **The air quality board:** penguin mascot and posters on air conditions.
12. **Astronomy club:** telescopes.
13. **Cal Poly rocket club:** rockets.
14. **Cal Poly chemistry club:** a number of experiments including the slime making activity.
15. **Topaz Solar Farm representative:** power-point presentation of the construction; explained how solar energy works.

MATH

16. **Kindergarten:** plays bingo to recognize numbers between 1-100.
17. **First grade:** make change to recognize coins.
18. **Second grade:** use number rods to demonstrate regrouping or decomposing when adding or subtracting.
19. **Third grade:** make factor arrays.
20. **Fourth grade:** make colored paper cut-out to create equivalent fractions.
21. **Fifth grade:** demonstrates geometry by making cut out paper prisms, counting vertexes, edges, and faces.
22. **Math Olympics**

All activities, Science and Math, have activities to take home with the family.

What were your motivations for having Family Science Night?

We wanted to let the students teach their parents what they were learning in science and math. We are a bi-lingual community, but there is no language barrier when a child is teaching his or her parents. We also believe that science and math are important for the future of our country and our students. Besides, they are so much fun. This has become the best-attended night activity during our school year.

What advice would you give a school trying to start a Family Science/Math night?

Go for it!! Let the students lead, and don't worry: it will build on itself. Each year will be bigger and better than the last.


Making
Music

Virginia Peterson Elementary MPR

Stage: Math Olympics

PRHS	5th grade science	**PRHS**	5th grade math
	4th grade science		4th grade math
	3rd grade science		3rd grade math
	2nd grade science		2nd grade math
	1st grade science		1st grade math
	Kinder science		Kinder Math

Virginia Peterson Elementary Classrooms

Classrooms:

MPR	classroom demo		classroom demo	playground
		classroom demo	classroom demo	astronomer
PTA pizza		classroom demo	classroom demo	
		classroom demo	classroom demo	

Virginia Petersen Elementary MPR
Stage: Math Olympics

Winifred Pifer Elementary School

1350 Creston Road
Paso Robles, CA 93446
805-769-1300
Contact: Charla Zukowski, czukowski@paso schools.org
Lisa Tibbetts, ltibbetts@pasoschools.org

Approximately how many people attended?

2012: 250+
2013: 300+

Who attended? (Parents, students...)

- Parents
- Teachers
- Students
- Siblings
- Administrators
- School board members
- Parents and students from other schools in the community

How did you spread the word about your Science Night? (Flyers, newsletters...)

Initially, we passed out "Save the Date" flyers with students, about one month before the big night, to stir up awareness and excitement. It was also announced on the calendar in our weekly school newsletter. We placed a big banner on the gate in front of the school that was visible from the street. We again passed out flyers a week before, and a small flyer the day before the event. Science Night was also announced over the intercom during morning announcements, closer to the date. We notified administrators and school board members via email.

Where did you host your Science Night?

- Multi-purpose room
- Outside

What was the start and end time?

Both years, the events were scheduled from 5:30–7:30 p.m.

Was your event a Math and Science Night or specifically a Science Night?

Our events were Science Night, with only science activities. In the future, we might add some math activities.

Please list any other planned activities. (Dinner, bake sale, math contest...)

The PTA hosted a pizza dinner with drinks, for a nominal fee.

If you had Science Fair on the same night, would you recommend having a Science Fair/ Science Night?

We considered this but felt that it would be too much preparation to include a Science Fair for our first few events. However, it was discussed that we might open classrooms for Science Fair projects in the future.

Which activities were most successful? Teacher and/or student favorites?

The science activities that were the most successful or popular seemed to be the ones that involved food or water, or make-and-take activities.

- Gumdrop Polyhedrons
- Chemistry in a Baggie
- Moon Phases
- Poly-worms
- Anatomy of a Seed
- Hoop Glider
- Build a Submarine

Did you have students from your school volunteer? If so, in what capacity?

Yes. We had Student Council members paint posters, help with set-up, volunteer at science activity centers, and assist with clean-up.

What resources did you find most helpful?

All of our outside resources (Cal Poly, Paso Robles High School, and Central Coast Astronomical Society) added fun and excitement to our event.

How long did it take to set up?

2 ½ hours

How long did it take to clean up?

About one hour

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

At our site, we are fortunate to have seven teachers involved in the CaMSP project. We met regularly and planned, coordinated, and hosted the event. Each person took on a different task to make the night a success. As it got closer to the night of the event, we placed a sign-up sheet in the lounge to solicit help from other staff members to help set-up, to run a science center, or to help with clean-up. About ten other staff members were willing to help the day of the event.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

- In January, we met as a team to discuss the date and do initial planning (about 3 months in advance). We scheduled and reserved the multi-purpose room at that time. The outside resources (Cal Poly, Paso Robles High School, Central Coast Astronomical Society) were then contacted and scheduled.
- In February, we met to gather ideas for the science stations. Each team member (seven of us) was to plan and prepare two activities for the event.
- In March, we got together and looked at each activity. We confirmed the arrival time and placement of our outside resources. Before leaving on spring break, "Save the Date" flyers were sent home with students to build excitement for the event.
- In the second week of April, we met to make posters for each activity (painted by Student Council members). The event was listed in our weekly school newsletter, and an email was sent to administrators and School Board members.
- The day before the event, we met to put final touches on the posters, gather needed equipment from our science lab and resource room, and take care of any last minute details.
- The day of the event, we set up each science station (with the help of student and staff volunteers). Doors opened at 5:30.

Would you make the Science Night longer or shorter next time? Why?

Two hours seemed to be the perfect amount of time for students and family members to explore all of the hands-on activities.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

- Cal Poly State University, Dr. Lola Berber-Jimenez, lberberj@calpoly.edu
- Paso Robles High School: Mark Fairbank/Anthony Overton
- Central Coast Astronomical Society

When did you host the Science Night and what factors were considered when choosing the dates?

We have hosted two Science Nights: Thursday, April 26, 2012 and Thursday April 25, 2013. We chose those dates because they were after our spring break and before CST testing. We felt this would be a fun way to have hands-on activities that could provide review and prepare our fifth graders for the CST Science test.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

We had very positive feed back for both events. Parents, students, administrators, and school board members all expressed that they had a great experience at the event. It was very successful and met, or really exceeded, the team's expectations for the evening.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

Our school site has hosted two Family Science Nights: 2012 and 2013. From the beginning, we decided that each year would offer new activities, with a three-year rotation.

2012:

1. **Gumdrop Polyhedrons:** Students created polyhedrons using coffee stirrers (or toothpicks) and gumdrops, observing the similarities with well-ordered arrays of atoms and molecules and geometric figures.
2. **Drops on a Penny/Surface Tension:** Using an eyedropper (pipette), students tried to get as many water drops on the surface of a penny before the surface tension broke.
3. **Moon Phases:** Students created the various moon phases on Oreo cookies.
4. **Poly-Worms:** Chemical reactions (cross-linking polymerization) that end up looking like little worms in a cup.
5. **Make a Circuit:** Students built different circuits (parallel and series) using batteries and wire.
6. **Chemistry in a Baggie:** Students observed chemical reactions by placing various substances in a plastic baggie.
7. ***Bed of nails:** Students laid on a bed of nails without injury.
8. ***Walking on glass:** Students walked barefoot on glass without injury.
9. ***Tablecloth trick:** Students successfully (most of the time) pulled a tablecloth out from under a set table.
10. ***Plasma Globe:** Students held onto an electrically charged globe that made their hair stand out on end.
11. ***Build a Submarine:** Students built objects and observed what makes them submerge and come to the surface.

2013:

1. **Rock testing:** Students tried to determine the type of rock they have by performing various diagnostic tests.
2. **Fossil Find:** Students hunted for "fossils" in a tub of sand and classified them on a provided chart.
3. **Hoop Glider:** Students used various sizes of cardstock hoops, attached them to a straw to form a plane without wings, then flew them outside.
4. **Static Electricity Can Race:** Students charged a balloon with wool and used it to make aluminum cans race across the tabletop.
5. **Color Changing Milk:** Students used a cotton swab to add a drop of dish soap into milk with various food color drops; they observed the chemical reaction.
6. **Making Music:** Students played simple songs by tapping on water glasses filled with various levels of water.
7. **Experience Gravity:** Students experienced various several gravity devices.
8. **Magnet Exploration:** Students played with magnets and observed their effects on various objects.
9. **Nastea:** Students observed how drinks or foods consumed affect their taste buds.

10. **Sink or Float:** Students experienced the property of density by observing various objects (sink or float?) in a fish tank of water.
11. **Anatomy of a Seed:** Students diagrammed parts of a plant. Students planted various bean seeds to take home.

** These activities were brought by outside resources and were available both years.*

What were your motivations for having Family Science Night?

In the past, a Family Fun Night (similar to a carnival), hosted by Student Council, was held on our school site in the spring. We decided that we wanted an event that was fun, academic, and free to students. We also thought that it would be a great way to bring hands-on science experiences, learned through our science grant, CaMSP, to our school community.

What advice would you give a school trying to start a Family Science/Math night?

Our advice would be to plan early, collaborate with colleagues, delegate tasks, and take advantage of outside resources and community members in your area.

Winifred Pifer's Family Science Night

Stage

1. Cal Poly- Build A Submarine

2. Invisible Ink

3. Fossil Sorting

4. Experience Gravity

5. Rock Testing

6. Anatomy of a Seed

7. Cal Poly- Nastea

PRHS

Mark Fairbanks

PRHS

Mark Fairbanks

PRHS

Mark Fairbanks

8. Cal Poly- Vacuum Chamber

9. Color Changing Milk

10. Hoop Glider

11. Static Electricity

12. Build a Circuit

13. Magnet Exploration

14. Cal Poly- Slime in a Baggie

*Outside: Sink & Float

Lillian Larsen Elementary

1601 L Street
San Miguel, CA
805-467-3216
Contact:
Holly Moore: hmoore@smjusd.k12.ca.us

Approximately how many people attended?

65 people

Who attended? (Parents, students...)

- Parents
- Students
- Future students

How did you spread the word about your Science Night? (Flyers, newsletters...)

I incorporated my Science Night into Open House.

Where did you host your Science Night?

Classroom

What was the start and end time?

6-7:00 p.m.

Was your event a Math and Science Night or specifically a Science Night?

Science Night

Please list any other planned activities. (Dinner, bake sale, math contest...)

None

If you had Science Fair on the same night, would you recommend having a Science Fair/ Science Night?

I think I would want to do a Science Night separate from my Science Fair. I would do the Science Night first and then the Science Fair, so that all the attention would be on the projects created by the students.

Which activities were most successful? Teacher and/or student favorites?

The electromagnet and making blood were the most successful. The 5th-grade students and parents loved the blood mixture. I heard more comments while parents were doing that lab than any other. The 4th-grade parents enjoyed creating the electromagnet and were completely amazed at how much their children knew about electricity and magnets. Huge success!

Did you have students from your school volunteer? If so, in what capacity?

My students were the instructors. They helped their parents conduct the experiments and helped them when they struggled. My students then provided explanations about each of the labs.

What resources did you find most helpful?

The science kit from our textbook and the resources I received during the CaMSP grant.

How long did it take to set up?

Two hours

How long did it take to clean up?

One hour

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

Holly Moore: I was the only one in charge of this project.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

Due to the fact that this event was during our Open House, I didn't have to do much but send out letters notifying parents that we would be having a Science Night in conjunction with our Open House. The week before Open House, I pulled out all the labs that students would help their parents conduct and made several copies of lab sheets and diagrams.
I teach a combo 4/5 class, so the biggest issue I had was limited space to display all the labs for each grade level.

Would you make the Science Night longer or shorter next time? Why?

I would like to have a longer Science Night next year, because students and parents had to wait sometimes to conduct the experiments. Also, having limited space in the classroom made maneuvering around the room difficult.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

My students from my class presented the labs to their parents.

When did you host the Science Night and what factors were considered when choosing the dates?

My Science Night was during our school Open House, which was May 22. I wanted students to showcase what they had learned this year in science, so the students served as the teachers. Parents conducted experiments while students explained the process. Parents loved this and were very impressed with what their children had learned, and students felt proud that they were able to teach their parents something they didn't know.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

I received feedback from the parents in my class. They were so excited and impressed at what their children knew about science. This year, I had parents and students from other classes come in and conduct experiments. My students jumped in and helped if the younger students needed assistance. It really was wonderful to watch.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

4th Grade

1. **Identifying Rocks and Minerals:** How are minerals identified?
   Classify by using the chart provided into two groups: metallic minerals (shiny like metal) and nonmetallic minerals (dull or glassy). Record your results.
2. **What Owls Eat:**
   Student/Parents used tweezers and a toothpick to gently pull apart the pellet into small pieces. Next, they looked at each piece through the hand lens and recorded their observations. Finally, they classified the items found into groups to determine what owls eat.
3. **Static Electricity: How do Charges Behave?**
   Parents used a balloon to create static electricity.
4. **Electromagnets:**
   Parents created an electromagnet using a battery, a nail, and wire.

5th Grade

1. **Make blood:**
   Students helped parents make blood:
   Recipe: Cheerios, red food coloring (red blood cells), water bottle 1/4 full with 2 drops of yellow food coloring (plasma), mini marshmallows (white blood cells), purple pompoms (platelets)
2. **Diagramed the Water Cycle:**
   A blank diagram was filled in after students instructed parents what the water cycle was.
3. **Animal and Plant cells:**
   Students/Parents labeled a plant and a animal cell.
   5th-grade parents took a quiz on the human body

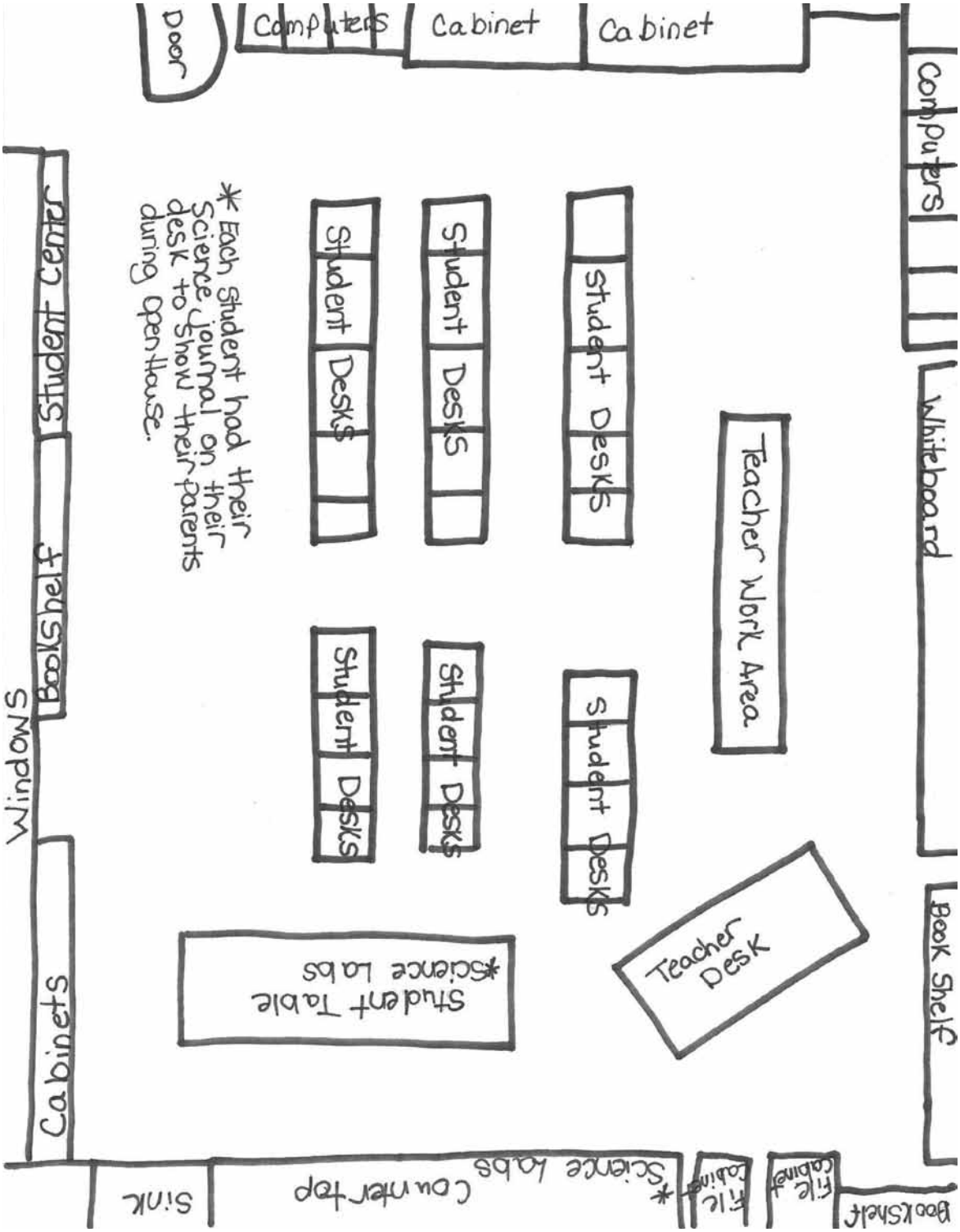
What were your motivations for having Family Science Night?

I really wanted to do a whole school Science Night, but I couldn't get the teacher or parent involvement that I needed. Therefore, I decided to do one in my classroom. This was my third year doing a Science Night in conjunction with Open House. I feel that it is a great way for students to showcase what they have learned during the year. Parents love conducting the experiments, and I enjoy watching my future scientists explain how to conduct experiments to their parents. Very rewarding!

What advice would you give a school trying to start a Family Science/Math night?

I would say that if you don't have the parent involvement or teachers willing to help, don't let that discourage you. You can start small and have it in your classroom like I have. Every year, it seems I have more families coming in during Open House to explore the science labs that I have set up. I hope that next school year I can have a school-wide Science Night.

Lillian Larsen Elementary Science Night



EXPERT ADVICE

Vineyard Elementary School

2121 Vineyard Drive
Templeton, CA 93465
805-434-5840
Contact: Susan Sonne, ssonne@templetonusd.org

Approximately how many people attended?

250

Who attended? (Parents, students...)

- Parents
- Students
- Siblings
- Grandparents
- Staff from other sites

How did you spread the word about your Science Night? (Flyers, newsletters...)

We spread the news about the upcoming event by sending out flyers on two separate dates. Teachers also included information about the event in their weekly/monthly classroom newsletters. We also had the Science Night posted on the district and school websites. Flyers were distributed at our school site as well as at the K-2 elementary and middle school sites.

Where did you host your Science Night?

- Multi-purpose room
- Classrooms
- Outside

What was the start and end time?

Our start time was 5:00 for the Science Expo, and our first Science Night went from 6-7:15 p.m. For the second event, we shortened the Family Science Night night by 15 minutes to make it just one hour long.

Was your event a Math and Science Night or specifically a Science Night?

Our event was a Science Expo and Family Science Night combined.

Please list any other planned activities. (Dinner, bake sale, math contest...)

We had hot dogs and hamburgers available for purchase from Tastee Freeze and drinks provided by the PTO. Proceeds from the sales went to the PTO, which helped supply prizes for the Science Expo.

If you had Science Fair on the same night, would you recommend having a Science Fair/Science Night?

Our Science Expo was on the same night. We started with the Science Expo and kept the activities roped off. There were over 50 exhibitors from the 3rd-, 4th-, and 5th-graders. The Expo lasted about 45 minutes. The second year, we had both events together and started the activities after 20 minutes. Some staff would have liked to have them on separate nights, so we could do the Science Night first to get students excited about doing the Expo.

Which activities were most successful? Teacher and/or student favorites?

We had as many participants as possible fill out an evaluation at the end of their explorations. To encourage this, we handed out Fortune Fish to those who completed the form. We discovered this actually kept some adults from filling out the forms, thinking they would save the fish for the kids. We had lots of leftover fish. From those surveys returned, the activities which were commented on most were the Acids we Drink, Balancing Butterflies, Nuudles, Popping Bubbles, and Silly Slime.

Results from Evaluations (comments separated by / marks)

Favorite station:

- Acid station: it showed us which liquids fizz in baking soda / because of the explosion / interactive discussion, engaged the kids / it was cool
- Balancing butterflies: I made it / when there isn't a penny on either side, you can't balance it on the nose / it's cool!
- Nuudles: I made a hat / no loud noise & you can do it for hours / it's fun / you get to make fun things / I liked building structures with them
- Popping bubbles: coming up with reasons of why it worked / it was fun
- Silly slime: getting to make your own slime / it was fun to play with / gooey fun & I got to make slime / I liked making it / it's fun to play with / it is really sticky and messy/ it was fun and I got to play with slime / it was a slime experiment / you got to make awesome slime / it was gross
- Centripetal force: you get to spin a penny with a balloon
- Poly worms: I think it was really cool
- What's shaking: it's building
- Optical Illusion: it taught you to look differently
- Patterns: we bonded
- Invincible balloons: it was fun
- Attractive: it was fun
- Melt-away
- Sinking feeling: interesting
- Hoopster: making airplanes was fun
- They were all great – very easy to jump in and do

Suggestions:

- Make electrical circuits
- More slime
- Hot air balloons
- A volcano
- How to make a light glow
- Airplanes
- More supplies
- Explosions, more explosions!
- Longer time
- Solar creations
- Warm place to eat your food!
- Paper origami canter

Best part:

- The games and food
- I liked doing the projects
- Slime
- Seeing parents and kids 'doing science' together.
- The energy level was fantastic!

Did you have students from your school volunteer? If so, in what capacity?

Students from our site volunteered to hand out the evaluation forms and Fortune Fish. They also handed out some "Try these at Home" activity sheets. The Fortune Fish curl in your hand and tell your fortune; we included a handout of experiments to try with the fish to explain why the fish curl.

What resources did you find most helpful?

The most helpful resources were Cal Poly, science supply magazines/catalogues, and the Internet.

How long did it take to set up?

About an hour

How long did it take to clean up?

About 45 minutes

Who were the lead(s) on planning your Science Night? How many staff members were involved in the event?

The lead was our CaMSP coach with the help and input from all the site's CaMSP participants. This involved 11 teachers in the planning portion. Some members helped determine the date of the event, each person was in charge of at least one activity, and all members helped run stations the night of the event. Additional staff also volunteered to help the night of our Family Science Night and Expo.

How much time was needed to plan the Science Night and what was the timeline in planning the event?

We spent about three months planning for our first Science Night. For the second one, we spent about one month, making sure we had some new activities and all the necessary supplies.

VES 1st Annual Family Science Night planning meetings

- **1st meeting Jan. 18th**
  - Set date of March 24th
  - Looked at samples from other Science Night materials found on the Internet
  - Talked about doing the Science Expo on the same night
- **2nd meeting Jan. 25th**
  - Changed date to March 29th so Cal Poly students would not be on Spring Break
  - Decided to do Science Expo from 5 to 6 and have Science Night follow from 6 to 7:30
  - Went through more samples of Science Night materials and decided which ones might work the best
  - Requested funds from SAC
  - Each group was assigned to explore their options for stations
- **3rd meeting Feb. 24th**
  - Grade-level teams selected which station they were going to be in charge of doing
  - Each team was responsible for planning for 5 stations
  - Informed group of the $700 funds being provided by SAC
  - Discussed that PTO has agreed to have drinks available for purchase that night and that Tastee Freeze will be selling food that evening with 15% to go to the VES PTO
  - Asked Cal Poly to provide materials for Melt Away (black blocks), Solar Creatures (solar-powered crickets), Vacuum Jar, and Plasma Globe.

- **4th meeting March 1st**
  - Started collecting materials list from all teams
  - Had teams check supply room for possible materials to be used
- **Remainder of the month: many impromptu meetings with each grade level team to get final details planned.**
  - Sent home a Save-the Date flyer to parents
  - Developed Family Science Night evaluation form
  - Ordered all materials
  - Filed a Use of Facilities request
  - Had signs made for each station and made colored copies
  - Drew a diagram of room set-up
  - Met with teachers to hand out supplies
  - Collected last-minute supplies from local stores
  - Coordinated times for set-up and clean-up with outside presenters
  - Grade-level teams printed out directions for their stations
  - Teams met to organize their stations and to prepare and gather materials
  - Changed time of event to work with superintendent's calendar, ended 15 minutes earlier
  - Sent home 2nd flyer to remind parents and students of Family Science Night

Would you make the Science Night longer or shorter next time? Why?

We made the event shorter to accommodate staff. This allowed teachers to get home earlier and to be more rested the next day. Students and parents would have liked us to go longer since many had baseball practice our first event and showed up shortly before we started our clean-up.

Which organizations or schools presented in your Science Night? Please include contact information, if possible.

We were very fortunate to have our middle-school students from Mr. Gray's class present their projects on building the best earthquake safe structures. The students rotated responsibilities of presenting the information and having fun with the activities we presented. TUSD Food Service presented Food for Thought. We also had George Stetz (plsgas@sbcglobal.net) display and present his solar system/space travel information. He had many interesting visuals, hands-on items, and a great video of Mars. We also had help from four Cal Poly Liberal Studies students along with Dr. Lola Berber-Jimenez (lberberj@calpoly.edu). For our second year, we added the Central Coast Astronomical Society. They presented an outdoor viewing of the night sky. Their telescopes were a BIG hit with all. We also had a wonderful parent, Sarah Harding, a professor in Cal Poly's engineering program, who brought a pulley display for the guests to interact with for the evening.

When did you host the Science Night and what factors were considered when choosing the dates?

We hosted our first Science Night on March 29th. This date worked best around our schedules and other events planned in the district. Our second event was February 22nd. We changed the date in order to have night sky viewing with the astronomy group. We also had to make sure it was before the end of daylight savings time.

Did you receive any feedback on your Science Night? If so, from whom and what was the feedback?

We received a great deal of feedback from those in attendance. The evaluation helped with that, but we also received many emails. Parents, teachers, students, Cal Poly students, and CaMSP staff all gave us some great feedback. Some examples of the feedback are as follows:

- **From parents and other family members:**
  - The best evening activity you have ever done.
  - The kids are so excited to be here.
  - There is so much to do!
  - My husband, Dan, and I attended our 5th-grade grandson's Vineyard Elementary School Science Night and Expo Fair. It was a very exciting evening for everyone who attended. The children's science projects were so interesting and quite complex. The exhibits ranged from experimenting to determine which paper towel brand was the more absorbent to one creating a magnetic field. One student took apart an owl pellet and reconstructed the skeleton of a rodent that was found in the pellet. The enthusiasm of the students was a delight to witness. In addition, everyone got a chance to try out many experiments.
  - Parental support was huge and it was a very happy event.
  - Just a quick note to say what fun our family had at the Science Fair last night. All three of my kids had a great time doing the hands on experiments. Even Kate got in on the fun. A big thank you to you and all the teachers for spending the extra time planning and putting on this event.
  - I thought the Science Expo was a unique opportunity to have kids explores hands-on experiments that ranged from easy to more challenging. It was also a nice way to introduce science to the younger students and still please the science enthusiasts.
  - Your Science Night met and far exceeded my expectations of what it was going to be.
- **From students:**
  - It was awesome!
  - It was sooo good – making things, making goo.
  - I loved it!
  - The Science Night was enjoyable because I got to do extraordinary experiments.
  - It was delightful to try out all the experiments.
  - All the science experiments were brilliant!
- **From staff:**
  - What a wonderful night full of excitement! I'm very pleased with the way our Science Night turned out. It was so exciting to see people of all ages—little 3-year olds to grandparents—all participating in science experiments together.
  - I would do it again in a heartbeat. It was successful for the students and excellent public relations for the adults in our community. Lesson learned: keep it simple! With so many things to do, the kids didn't want to be at any table for too long. They were too excited … and that's a good thing!
  - When the children and parents were given entry into the science experiments, many flooded to the Silly Slime station. Before I knew it, I had upwards of 12 and 14 kids all jockeying for space and materials to make slime. On reflection, I would make a number of changes to the station. I would divide each of the two table sections into fourths with tape so that only one child could sit and do the activity in each section at a time. I would cover the table with newspaper and provide a single,

two-sided page of directions. I would also have another adult assist me to monitor the number of people and the experiment procedures. No child would be allowed to do the experiments without a parent present to provide assistance as well. Finally, I would cut the time frame down from the 1¼ hours for the evening down to an hour.

- Overall, for having this event for the first time at our site, I think that it went very well. Children were definitely excited and engaged, the parents enjoyed watching their children having fun, and adding the extra dimension of Cal Poly students and experiments was an added bonus for everyone.
- An ample number of activities were provided. I would like to vary a portion of them from year to year in order to sustain interest, but not to have to totally reinvent the wheel each year.
- Move the "Acids We Drink" station closer to the sink for easier clean-up. Fewer people attended the unmanned stations, so we will probably need to recruit more volunteers for next year.

List all science or math activities (title and one sentence description) that were present, regardless of who brought it.

1. **Melt Away:** using conductivity to melt ice
2. **Food For Thought:** figuring out which food choices they felt were the best
3. **Exploring Our Universe:** looking at the solar system and Mars video with a former NASA employee
4. **Solar Critters:** seeing solar power at work
5. **Chemistry in a Baggie:** learning that during chemical reactions the atoms in the reactants rearrange to form products with different properties
6. **Nuudles:** building with biodegradable packing peanuts to see how much weight their structures can support
7. **Patterns?:** organizing and classifying shapes and colors
8. **Invincible Balloon:** studying a property of elastic polymers by passing a thumbtack through an inflated balloon
9. **Popping Bubbles:** using the color patterns of bubbles to predict when the bubble is ready to pop
10. **Silly Slime:** making a gel-like material by changing the physical properties of the polymer formed from white glue
11. **Geology Genius:** determining the identity of three mystery minerals
12. **Poly Worms:** observing a chemical reaction that produces worm-like shapes
13. **Optical Illusions:** understanding how optical illusions can manipulate your brain
14. **Hoopster:** making an airplane without wings
15. **Attractive:** determining which objects are attracted to a magnet
16. **Popping Pepper:** commanding the pepper to jump
17. **Balancing Butterflies:** exploring the concepts of balance and counterweights
18. **That Sinking Feeling:** studying the physical property of density by observing whether different objects sink or float in water
19. **Centripetal Force:** investigating centripetal force using a balloon and a penny

20. **Vacuum Away:** using small vacuum jars with marshmallows
21. **Plasma Globe:** watching the fascinating effects of the plasma ball
22. **Acids We Drink:** combining a variety of juices with baking soda to see which ones have the most acid
23. **Shake Away:** demonstrating student-made quake-proof structures
24. **Circuitry:** making electrical circuits light up a light bulb
25. **Night Sky:** observing planets and stars in the night sky with high-powered telescopes
26. **Constellation Art:** creating a constellation using a spatter technique with white paint
27. **Constellations in the Sky:** using a portable constellation machine to show constellations and hear stories about them
28. **Pulleys do the Work:** learning hands-on how pulleys help lift heavy items

What were your motivations for having Family Science Night?

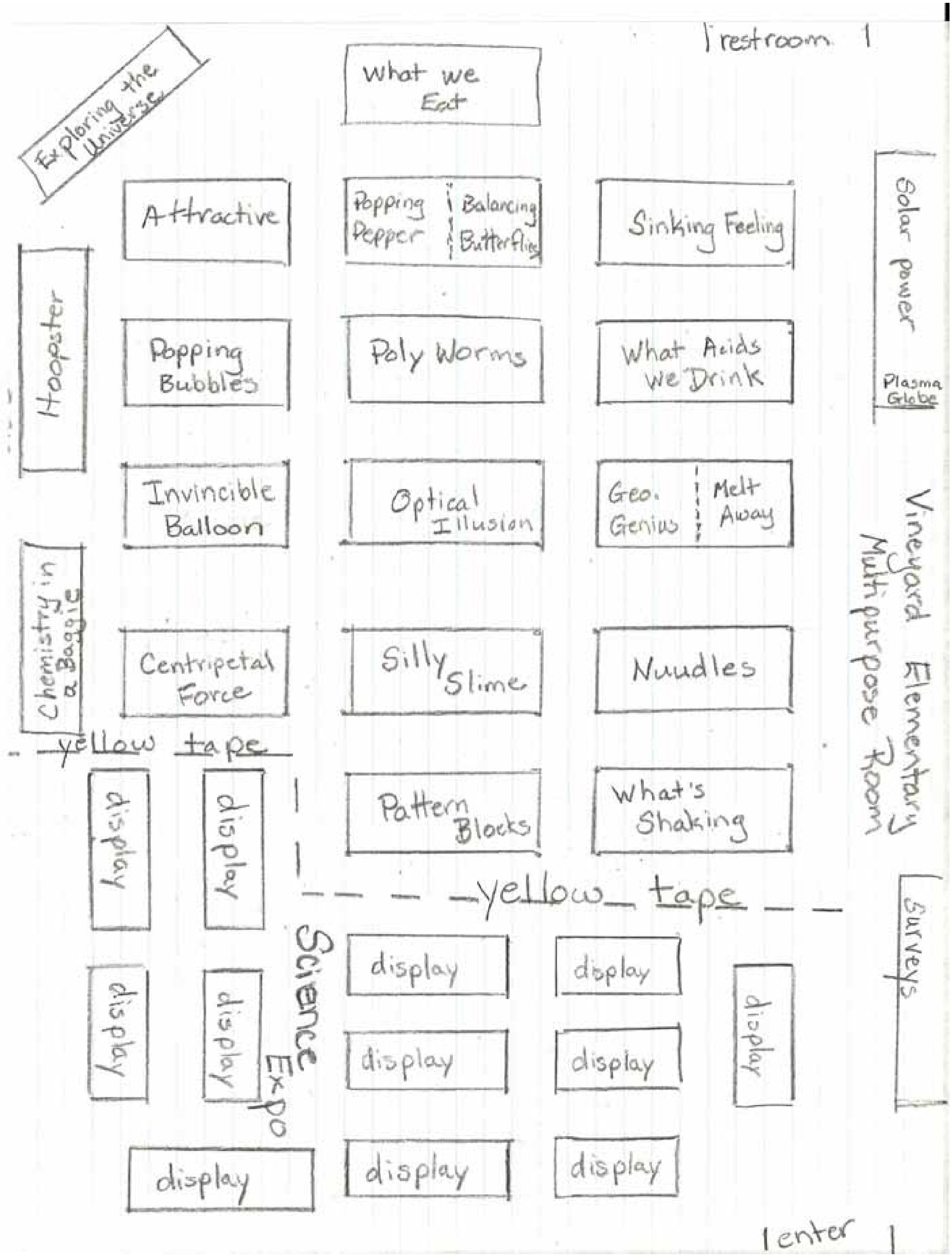
Our original motivation was to get credit for the CaMSP project we needed to do. As we got deeper into the planning, it became something much more important. We all wanted make it a fabulous night for our students.

When asked, one student commented that she did not like science. When I asked why, she said it was boring. I asked her if she was having fun at the Science Night and she said that this was the best night ever! I told her everything she was doing was science and she looked puzzled for a moment and then stated this was great, but science out of books was boring. I then informed her that all of these experiments came from science books. She then proudly proclaimed, "I love science!" That is why we teach and do things like Science Nights.

What advice would you give a school trying to start a Family Science/Math night?

Before you start, look at as many samples of Family Science Night activities as possible. Select a variety of activities that work for the age group you are targeting, but also include some for younger children and older students. If you want to do activities outdoors, make sure that you consider the weather and when it gets dark. The cycle of the moon is also something to consider if you are planning on using telescopes. Start your planning early so that you are not rushed in the final days before the event. Have one person in charge of purchasing all needed items; this prevents people buying duplicate items. Get help from your local colleges or high schools for presentations or to help man your stations. The more stations that are manned, the better the response from participants. Most importantly, HAVE FUN!


Single Pulley System
Dual Pulley System
3 Pulley System
How do Pulleys work?


restroom
What we Eat
Exploring the Universe
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Balancing Butterflies
Sinking Feeling
Solar power
Hoopster
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Vineyard Elementary Multipurpose Room
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Centripetal Force
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yellow tape
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display
Pattern Blocks
What's Shaking
yellow tape
Science Expo
display
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surveys
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CENTRAL COAST SCIENCE PROJECT

Paso Robles Joint Unified School District