COOKING UP SCIENCE

4-H AGGIE
ADVENTURES
FOR KIDS

UtahStateUniversity
COOPERATIVE EXTENSION

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COOKING UP SCIENCE

Aggie Adventures for Kids

CAMP DESCRIPTION:

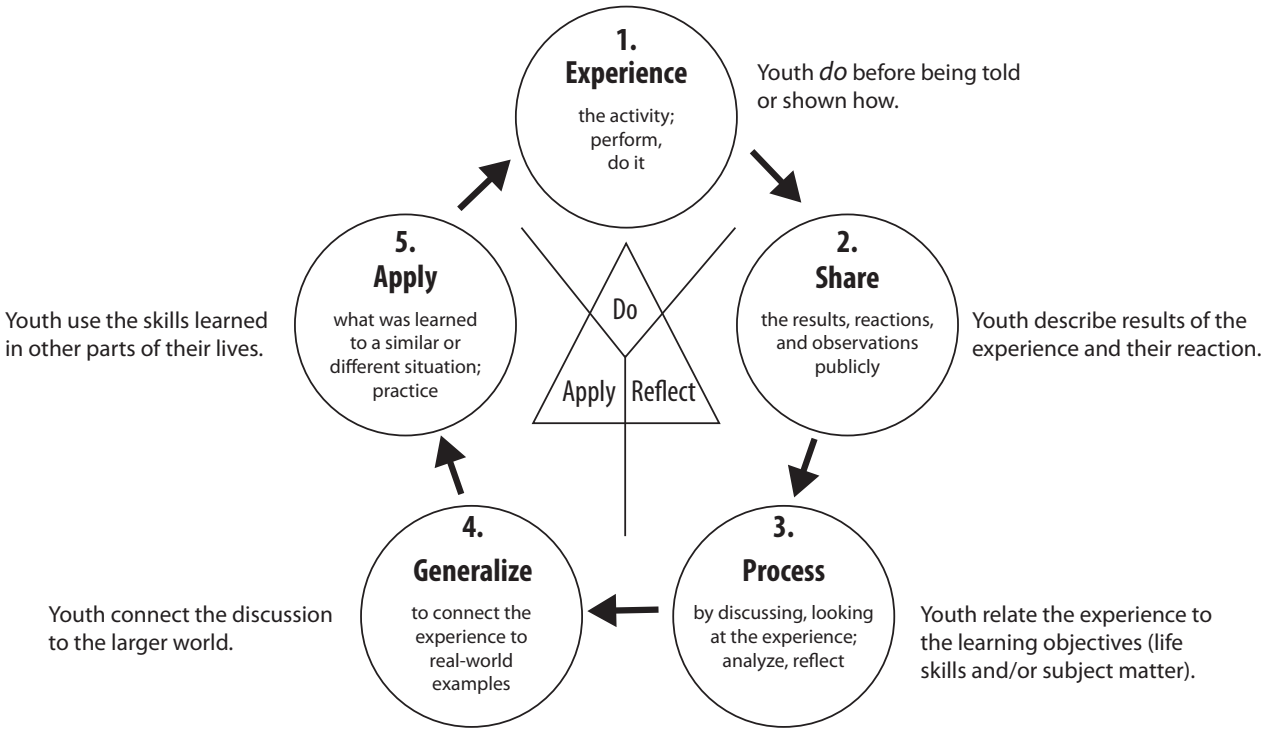
This camp involves exploring basic biology, chemistry, and physics using common items from the kitchen. We'll make rock candy, mix up some cornstarch goo, and extract iron from your morning cereal!

GOAL:

To have students understand the work of scientists and to see the aspects of performing experiments. Campers will work closely with food and perform many experiments. Students will also be able to relate to the work of scientists by doing hands-on and meaningful activities.

4-H "LEARNING BY DOING" - DO, REFLECT, APPLY LEARNING MODULE

The "Do, Reflect, Apply" approach allows youth to experience the learning process with minimal guidance from adults. Instead of being told the answers from activities, youth are exposed to experiential learning by using the following module:



Experiential learning is based on the theory of "learning from experiences". This camp and its activities are based on the "Do, Reflect, Apply" module, which will allow youth to: experience the activity, reflect on new knowledge, and apply the new knowledge and skills in many aspects of life.

COOKING UP SCIENCE

Aggie Adventures for Kids

CAMP RULES:

1. Have a good attitude
2. Once split into groups you cannot change groups
3. Do not wander off without a counselor
4. Listen to instructions

SET UP:

Arrange tables and chairs into groups that allow 4-6 campers to be at each area. Allow for space between groups to complete activities. If possible identify an outdoor space that can be used for active games. Both the indoor and outdoor space should be evaluated for potential safety hazards. Safety hazards should be addressed before camp starts.

GETTING STARTED:

Divide campers into small groups. This will depend on the size of the camp, but the groups should consist of 3-5 campers. Have one youth counselor in charge of each group of students if possible.

Let campers choose a name for their group. Keep the group names on theme with the camp. Let them choose from a list of different food groups. Each group will be able to share their food group with the camp. The counselors will help the campers for their group "sharing time."

EXAMPLES OF FOOD GROUPS:

Bread, Cereal, Rice, and Pasta Group (Grains)
Vegetable Group
Fruits Group
Milk, Yogurt, and Cheese Group (Dairy)
Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group (Proteins)
Fats, Oils, and Sweets Group

**The times listed throughout this curriculum are the suggested times for a five day camp, held for three hour per day. We listed these times as a convenience only. The length of time needed to complete each activity is listed, so times and activities may be adapted to fit the needs of different camps.

COOKING UP SCIENCE

Aggie Adventures for Kids

Dear Campers,

We're excited to have you join us at the 4-H Aggie Adventures Cookin' Up Science Camp where we'll explore basic biology, chemistry, and physics using common items from the kitchen. We'll make rock candy, mix up some cornstarch goo, and extract iron from your morning cereal!

The Cookin' Up Science camp will be held (DATE), from (TIME) in the Agriculture Systems Technology and Education building on the USU campus. Enclosed in this packet is a map to the ASTE building and the drop-off area near the building. If you have not yet paid the camp fee, please bring it the first day of camp (check or cash). Please read the following information and the enclosed forms, and contact us if you have any questions or concerns.

- In the Cookin' Up Science camp we will be working with many different food ingredients, so please make a note of any food allergies on the accompanying 4-H Medical History form.

- We may be spending some time outdoors, so please dress appropriately for the weather conditions.

- No toys or electronics will be allowed at camp. If you bring a cell phone, please turn it off or keep it on silent.

- Parents and guardians, please read and sign the enclosed 4-H Code of Conduct and Medical History forms. Campers who cannot abide by the Code of Conduct may be asked not to return.

- During camp, the Aggie Adventure staff can be reached by cell phone at (___) _____.

We'll see you soon!

4-H Aggie Adventures for Kids

EXAMPLE OF CAMP LETTER

Aggie Adventures for Kids

(CAMP NAME)

We're excited to have you join us at the (Name of Camp) Science camp where we'll (Camp description, description of activities).

The (Name of Camp) will be held (Date) from (time to time) at the (place). Enclosed in this packet is a map to the (_____) building and the drop-off area near the building. If you have not yet paid the camp fee, please bring it the first day of camp (check or cash). Please read the following information and the enclosed forms, and contact us if you have any questions or concerns.

- We may be spending some time outdoors, so please dress appropriately for the weather conditions.
- No toys or electronics will be allowed at camp. If you bring a cell phone, please turn it off or keep it on silent.
- Parents and guardians, please read and sign the enclosed 4-H Code of Conduct and Medical History forms. Campers who cannot abide by the Code of Conduct may be asked not to return.
- During camp, the Aggie Adventure staff can be reached by cell phone at (_____).

We'll see you soon!

4-H Aggie Adventures for Kids

YOUTH COUNSELOR

Information and Responsibilities

(For the Youth Counselor)

We are excited to have you participate as a youth counselor in our Aggie Adventure Summer Camp Program. The Aggie Adventure Camps are designed to give youth ages 4-11 opportunities to explore the world around them. As a counselor, you will assist the camp staff in running these camps. We look forward to working with you this summer.

We have included some important information that will help you as counselors to create a positive camp experience for everyone.

COUNSELOR RESPONSIBILITIES:

- Counselors will have their own small group of approximately 5-6 campers. Because of this, counselors must model appropriate behaviors at all times. Any counselor that does not display appropriate behaviors will not be allowed to participate in the program.
- Counselors are expected to teach their group in small group activities, and help manage all campers during large-group activities. Some camps will take field trips that require leaving campus. During field trips, counselors are responsible for keeping track of their groups.
- Counselors will be given staff T-shirts that they must wear during the camps. All other attire should be modest and weather appropriate as we will be spending time outdoors.

DAILY PROCEDURES:

- Be at the camp 30 minutes before camp starts to help set up.
- Stay after camp ends approximately 30 minutes or until camp is cleaned up.
- Know the activities that you will be teaching your groups that day (counselors will be provided the camp activities in advance).
- Have a positive attitude and help campers have a good time at the camps. If you are having fun, the campers will too.

SCHEDULE:

- Each counselor has been assigned specific weeks to come and volunteer at the camps. Once you have agreed to work at a camp, you must come on time every day you are scheduled.
- If something comes up and you have advanced notice that you will be unable to work a specific camp, you may call another counselor and see if they are willing to trade camps with you. If this happens, please notify the camp staff of the change immediately.

COUNSELOR INCENTIVES:

- Upon completion of 100 volunteer hours, or five camps, counselors will receive a life skill activity of their choice (piano lessons, ski pass, horseback riding lessons, guitar lessons, etc.).
- Incentives will be arranged with camp staff before counselors begin their volunteer hours.
- Counselors will receive their incentives at the end of the summer camp program.

EMERGENCIES:

- If any accidents happen, report them to the camp staff immediately.
- In case of an emergency, help keep the campers calm and follow directions given by camp staff.

UTILIZING
the Youth Counselor
(For the Facilitator)

GOALS:
- To teach knowledge and life skills which enhance quality of life.
- To create opportunities which promote positive youth development.

COUNSELOR RESPONSIBILITIES:
- Counselors will have their own small group of approximately 5-6 campers. Because of this, counselors must model appropriate behaviors at all times. Any counselor that does not display appropriate behaviors will not be allowed to participate in the program.
- Counselors are expected to teach their group in small group activities, and help manage all campers during large-group activities. Some camps will take field trips that require leaving campus. During field trips, counselors are responsible for keeping track of their groups.
- Counselors will be given staff T-shirts that they must wear during the camps. All other attire should be modest and weather appropriate as we will be spending time outdoors.
- Counselors are encouraged to interact with ALL campers in appropriate manners. They need to know that they are also considered "adults" in this situation.

DAILY PROCEDURES:
- Counselors are required to be at the camp 30 minutes before camp starts to help set up.
- Counselors are also required to stay after camp ends approximately 30 minutes or until camp is cleaned up.
- Counselors should get to know the activities that you will be teaching your groups that day (counselors will be provided the camp activities in advance).
- Counselors should be reminded to have a positive attitude and help campers have a good time at the camps. If you are having fun, the campers will too.

COUNSELORS IN THE CLASSROOM/INVOLVEMENT:
- Counselors should ALWAYS be encouraged to work with their groups and be involved in the activities for the day.
- It's important that counselors are encouraged to work with campers. Camps can be effective for campers as well as counselors.
- Counselors can be an effective classroom management tool. They should be encouraged to walk around their group and help their campers. By encouraging participation by all campers, behavioral and disruptive issues will be decreased.
- It's also important to realize that counselors are not only there to be the "run-around" people. Keep them involved throughout each activity.
- Always encourage TEAMWORK among counselors and campers. It's important that this is emphasized.

SUGGESTED DAILY TOTE

Aggie Adventures for Kids

In addition to the supplies needed for the various experiments, activities and games each day, there are supplies you will use every day of camp. We suggest creating the "everyday" tote that includes:

SUPPLIES:

- Crayons/Markers
- Scissors
- Glue/Glue Sticks
- Tape
- Craft sticks
- Paper towels
- Measuring spoons
- Measuring cups
- Plastic spoons
- Name tags
- Pencils
- First Aid Kit
- Games that can be used for opening and closing (during pick up or drop off)
- Camper Registration/Medical Information Forms

GROCERY LIST
and Daily Supplies

DAILY SUPPLIES: Scissors, crayons, glue, tape, craft sticks, paper towels, measuring spoons, measuring cups, plastic spoons, name tags, pencils.

DAY 1

- (per camper) glue, dirty pennies, taco sauce
- (per group) 3 cups table sugar (sucrose) clean glass jar, pencil or butter knife, string, measuring cups and spoons
- (per group) pan or bowl for boiling water and making solution, spoon or stirring rod, two mixing bowls, two 10 oz. plastic cups, 1 clear film canister or other small container
- (per group) Borax, small plates, 91% Ice cold Isopropyl Rubbing Alcohol (NOT 70% - you may need to search several stores to find this) or Absolute Ethanol (best), toothpick, 1 cone-shaped #4 size coffee filter, Clear shampoo (such as Suave Daily Clarifying),
- (per group) (6) 2-liter bottle of diet soda, Geyser Tube (stevespangler.com), a roll or box of Mentos (candy mints) fruity and minty, ice
- (per group) green food coloring, vinegar, tomato paste, salt, strawberries (fresh or frozen), Table salt (non-iodized) Meat tenderizer (not seasoned)
- blender
- **Optional smoothie (per group) 10 oz. bag frozen strawberries, banana, 1 c. orange juice, 4 – 8 Tablespoons honey, Extra fruit as needed, Drinking cups for class, (Optional): 8-12 oz ice cream, Yogurt or tofu

DAY 2

- (per group) baking soda, vinegar, grape juice, paper cups, dinner plate, super strong magnet, paper towels, chart paper and brown craft paper
- (per group) lemon juice, orange juice, grape juice
- (per camper) bread, butter, plastic knives, hard boiled egg, a fresh egg
- (per camper) Ziploc bag, dried lima beans, plastic sandwich bags, small plastic cup or milk container, soil, paper, cotton Q-tip
- Plastic scoop (for soil)
- A desk light with a bulb (or an iron), toaster, box of Total cereal

GROCERY LIST
and Daily Supplies

DAILY SUPPLIES: Scissors, crayons, glue, tape, craft sticks, paper towels, measuring spoons, measuring cups, plastic spoons, name tags, pencils.

DAY 3

- (per camper) 1 Pop Rocks package, magnifying glasses, spoon or craft stick to stir the mixture
- (per camper) white glue (e.g., Elmer's glue - makes an opaque ball) or blue or clear school glue (makes a translucent ball)
- (per camper) 2 small plastic cups, marking pen, metric ruler, Ziploc plastic baggie
- (per camper) cotton Q-tip, 1 tablespoon sugar, 1/2 cup milk or half & half, 1/4 teaspoon vanilla
- (per camper) 6 tablespoons rock salt, 1 pint-size Ziploc plastic bag, 1 gallon-size Ziploc plastic bag, ice cubes, tall clear glass, raisins, club soda that has a lot of bubbles
- (per group) 9" balloon (optional), 12 or 16-ounce bottle of soda (optional)
- (per group) Borax, cornstarch
- (per group) food coloring, measuring spoons
- (per group) 3 white socks, 3 red socks, 3 black socks, 3 thermometers
- (per group) milk (whole or 2%), dinner plate, dish-washing soap
- watch

DAY 4

- (per group) liquid soap, large clear drinking glass, 2-liter soda bottle cut in half, napkins, cotton balls, paper cups, 25 toothpicks, plastic cups
- (per group) vegetable oil, salt, sugar, baking soda, vinegar, cooking oil, heavy cream, a snack to put the butter on
- (per group) gravel, sand
- (per group) 11 gumdrops, skim milk, white vinegar, 2 eggs
- (per group) microwave safe bowl, microwave, strainer, jar with a lid
- (per group) bubbles and a bubble wand, 2 large, clear containers (like a clear plastic or glass bowl), small clear cup, bowl, spoon

GROCERY LIST
and Daily Supplies

DAILY SUPPLIES: Scissors, crayons, glue, tape, craft sticks, paper towels, measuring spoons, measuring cups, plastic spoons, name tags, pencils.

DAY 5

- (per camper) plastic straw, raw potato, paper towel, Wintergreen lifesavers
- (per group) carbonated water - flavored or plain in plastic bottles (do not use glass bottles as the liquid may accidentally freeze in the bottle, causing it to explode
- (per group) large bucket, ice, rock salt, thermometer
- (per group) large mixing bowl, cookie sheet, square cake pan, or something similar, pitcher of water, spoon, gallon size Ziploc bag
- (per group) cornstarch, 2 drops corn oil, Ziploc bag, food coloring
- a wide mouth juice bottle, hardboiled eggs, several strips of paper (2X6 inches), matches, plastic drip cloth to cover the floor, one box of cornstarch (16 oz..)
- Bubble Gum Kit. (purchased at www.stevespanglerscience.com)

DAY 1
COOKING UP SCIENCE

Activities for the day:

Camper Check In
Starter Activity
Sugar Crystals
Homemade Slime
The Cleaning Power of Taco Sauce
Extracting DNA from Strawberries
Exploding Diet Coke

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WEEK CAMP: 9-12 STARTER ACTIVITY

Aggie Adventures for Kids

9:00-9:15 Starter Activity:	• Have kids go outside with the counselors to play a game, while you finish registering all the campers. Example Starter Activities: • Children will sit in a circle, say their name and favorite ice cream. • On stickers or pieces of paper, write several animal names (make sure that each animal is written twice). Children can't talk, but they have to find their partner making the noise of that animal. • The name game: Everyone sits in a circle. The first person says their name. The person on the left says their own name plus the first persons name. The next person says their own name, the 2nd person's name and the 1st person's name. This continues until the last person must name everyone in the circle. • Have a coloring page or crossword puzzle for kids to be working on while other kids arrive. • Have kids play a quick game outside with counselors.
9:15-9:25 Science Camp Basics to Know:	• Talk to campers about what they think a scientist is. Tell them that a scientist is according to the dictionary a person who studies science. And science is knowledge (of something) acquired by study or also the observation, identification, description, experimental investigation, and theoretical explanation of phenomena. • This means to me that scientist figure out why big/ little things happen that have to do with chemicals, nature, all sorts of things. Talk about how scientists have to perform experiments to figure out the answers to their questions. How they have to try different experiments with different components etc. Explain to campers that we will be performing experiments and sometimes they may not work exactly how we planned. That's part of being a scientist sometimes you think things are going to work that don't etc. This can be frustrating but we just have to keep working on the experiment or activity.

SUGAR CRYSTALS

Aggie Adventures for Kids (9:25 - 9:45)

What to Do:

1. Tie the string to a pencil or butter knife. If you have made a seed crystal, tie it to the bottom of the string. Set the pencil or knife across the top of the glass jar and make sure that the string will hang into the jar without touching its sides or bottom. However, you want the string to hang nearly to the bottom. Adjust the length of the string, if necessary.
2. Boil the water. If you boil your water in the microwave, be very careful removing it to avoid getting splashed!
3. Stir in the sugar, a teaspoonful at a time. Keep adding sugar until it starts to accumulate at the bottom of the container and won't dissolve even with more stirring. This means your sugar solution is saturated. If you don't use a saturated solution, then your crystals won't grow quickly. On the other hand, if you add too much sugar, new crystals will grow on the undissolved sugar and not on your string.
4. If you want colored crystals, stir in a few drops of food coloring.
5. Pour your solution into the clear glass jar. If you have undissolved sugar at the bottom of your container, avoid getting it in the jar.
6. Place the pencil over the jar and allow the string to dangle into the liquid.
7. Set the jar somewhere where it can remain undisturbed. If you like, you can set a coffee filter or paper towel over the jar to prevent dust from falling into the jar.
8. Let the crystals grow until they have reached the desired size or have stopped growing. At this point, you can pull out the string and allow the crystal to dry. You can eat them or keep them. Have fun!
9. If you are having trouble growing sugar crystals, you may want to try some special techniques.
10. Helpful Tips:
    - Crystals will form on a cotton or wool string or yarn, but not on a nylon line. If you use a nylon line, tie a seed crystal to it to stimulate crystal growth.
    - If you are making the crystals to eat, please don't use a fishing weight to hold your string down. The lead from the weight will end up in the water - it's toxic. Paper clips are a better choice, but still not great.

continued...

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will see how crystals form and will make their own rock candy.

MATERIALS:
- 1 cup water
- 3 cups table sugar (sucrose)
- Clean glass jar
- Pencil or butter knife
- String
- Pan or bowl for boiling water and making solution
- Spoon or stirring rod

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

SUGAR CRYSTALS CONTINUED...

Aggie Adventures for Kids (9:25 - 9:45)

Reflect:

- Why do we have to boil water?
- How do you think this works?
- How long do you think it will take?

Apply:

- It's easy to grow your own sugar crystals! Sugar crystals are also known as rock candy since the crystallized sucrose (table sugar) resembles rock crystals and because you can eat your finished product. You can grow beautiful clear sugar crystals with sugar and water or you can add food coloring to get colored crystals. It's simple, safe, and fun.

Adapted from: http://chemistry.about.com/od/growingcrystals/ht/blsugarcrystal.htm

HOMEMADE SLIME

Aggie Adventures for Kids (9:45-10:05)

What to Do:

1. Mix together 3/4 cup warm water, 1 cup glue and several drops of green food coloring in first bowl.
2. In second bowl, mix together 4 teaspoons borax and 1 and 1/3 cups warm water.
3. Pour contents of the first bowl into the second, but do not stir. Let it sit for 1 minute, then lift the now con-gealed slime out of the bowl.
4. Divide slime so that each child has a piece to play with. The glue in slime can make it stick to certain fabrics. To minimize, accidents, give each little monster a Ziploc bag to take it home in.

Reflect:

- What happened when we added the borax and warm water?
- Why is it sticking together?
- Would it make a difference if we added more borax?

Apply:

- The Steve Spangler slime recipe is based on the classic polyvinyl alcohol (PVA) formula with sodium tetraborate (Borax) as the cross-linking agent. Doesn't that sound impressive? Just rattle that off at the next cocktail party and you'll be the talk of the evening.
- The PVA solution even has a preservative added to give it a longer shelf life and to fight off those little germ-infested hands.
- Turn this ever popular science activity into a real learning experience that is filled with real fun.

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will be able to experiment with slime and chemical reactions!

MATERIALS:

- Two mixing bowls
- Measuring cups and spoons
- Glue, Borax
- Green food coloring
- Water

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: http://www.stevespanglerscience.com/

GAME & CLEANING POWER OF TACO SAUCE

Aggie Adventures for Kids (10:05-10:20, 10:20 - 10:50)

What to Do:

1. Place several tarnished pennies on a plate and cover them with taco sauce. Use your fingers to smear the taco sauce all over the surface of the penny. Remember to wash your hands... and don't lick your fingers (pennies are really dirty).
2. Allow the taco sauce to sit on the pennies for at least two minutes.
3. Rinse the pennies in the sink and look at the difference between the top side that touched the taco sauce compared to the bottom side. Taco sauce is an incredible cleaning agent!

Which ingredients are responsible for making the taco sauce work?

1. Place two or three equally tarnished pennies on each of four plates. Use masking tape or a note card to keep track of which ingredients are on which penny.
2. Cover the pennies with the various ingredients and allow them to sit for at least two minutes.
3. Rinse the pennies from each plate with water and write down your observations in your science notebooks.

Did any of the cleaners work? No. All of the results showed they did a terrible job. As an experiment, let's combine more than two ingredients and see if we can get them to work together!
Let's try another test using different combinations of tomato paste, vinegar and salt.

1. Place two or three equally tarnished pennies on each of three plates. Make three signs that say "Tomato Paste + Vinegar", "Salt + Vinegar", and "Tomato Past + Salt".
2. Cover the pennies with each of the mixtures and give the ingredients at least two minutes to react.
3. Rinse the pennies under water and write down your observations in your science notebooks.

continued...

TIME: 45 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
To understand different chemicals and to predict which chemical will work most effectively in cleaning the pennies.

MATERIALS:

- Dirty Pennies - try to collect tarnished pennies that all look the same
- Taco Sauce - Mild sauce from Taco Bell way used for these tests
- Vinegar, Tomato Paste, Salt, Water
- Small plates

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

CLEANING POWER OF TACO SAUCE CONTINUED...

Aggie Adventures for Kids (10:05-10:20, 10:20 - 10:50)

Reflect:

- Which penny was the shiniest?
- How did it work?
- What happened when we put tomato paste and vinegar on the penny?

Apply:

- The winner and best cleaner is the mixture of vinegar and salt.
- Neither vinegar or salt by themselves cleaned the pennies, but when they were mixed together they react. Lemon juice and salt has been tested on cleaning many metals and pennies and does a great job.
- However, these ingredients will not work alone. They need to be combined in order to make a great cleaner. Now you can clean all of your pennies with taco sauce! (Quoted from Steve Spangler)

Adapted from: http://www.stevespanglerscience.com/

EXTRACTING DNA FROM STRAWBERRIES

Aggie Adventures for Kids (10:50 - 11:20)

What to Do:

1. Measure 2 teaspoons (10 ml) of shampoo into a small cup.
2. The lipid bilayer of the cell membrane and nuclear membrane are broken down by soaps, such as lauryl or laureth sulfate found in shampoo and dish soap. [FYI: When you wash dishes, the fats (grease) are removed from your dishes by the dish soap.] Shampoo also contains EDTA (ethylene diamine tetraacetic acid), which binds to cations such as Mg2+. Cations are sometimes used as cofactors that help enzymes work properly – without the cofactor, the enzyme can't function. One enzyme that is detrimental to DNA is nuclease, which breaks down the DNA. EDTA binds to Mg2+ and prevents it from assisting nucleases in their destruction of DNA.
3. Add 2-3 pinches of salt (NaCl) to the shampoo.
4. The positively-charged sodium ions (Na+) are attracted to the negative charge of the DNA. This creates a "shield" around the DNA molecules and causes them to stick together (coalesce). This enables the DNA to precipitate out of the solution when added to alcohol in a later step. Salt also causes proteins in the fruit mixture to denature and precipitate out of the solution.
5. Add 4 teaspoons (20 ml) of tap water. Mix with a spoon, but try to avoid creating bubbles in the solution. DNA is soluble in water.
6. Add 1 pinch or shake of meat tenderizer. Mix until dissolved.
7. Meat tenderizer contains the molecule, papain, which breaks down certain proteins, including other enzymes. The meat tenderizer helps to protect the DNA by breaking down nucleases. The meat tenderizer also breaks down other proteins in the fruit mixture. [FYI: Papain is found in the papaya fruit! Meat tenderizer causes meat to become more tender because the papain breaks down some of the proteins that make the muscle cells "tough".]
8. You may use the fruit of your choice for the next step! Some fruits that we suggest: 3-4 fresh or thawed frozen strawberries, 1/2 pint of blueberries, 1/2 nectarine, or 1/2 banana.
9. Place the fruit in a blender container. Add approximately the same volume of water. (For the 1/2 banana, add 1 cup of water.) Place the top securely on the blender container and blend for about 20 seconds until the fruit mixture is the consistency of a smoothie (not too thick or too thin) – add fruit or water as needed.**

TIME: 30 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
To understand that everything is living and holds DNA,.

MATERIALS:

- Clear shampoo (such as Suave Daily Clarifying)
- 1 clear film canister or other small container
- Table salt (non-iodized)
- Meat tenderizer (not seasoned)
- Two 10 oz. plastic cups
- Fruit (blueberries, strawberries-fresh or frozen, nectarines, bananas, kiwis, etc.)
- 91% Ice cold Isopropyl Rubbing Alcohol (NOT 70% - you may need to search several stores to find this) or Absolute Ethanol (best)
- Water, Blender, Toothpick, Ice
- 1 Cone-shaped #4 size coffee filter
- 2 teaspoons

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

continued...

Adapted from: Carolyn A. Zanta, UIUC-Hughes Biotechnology Education and Outreach Program (www.life.uiuc.edu/hughes/footlocker) (activity modified from Iowa State University Biotechnology Center)

EXTRACTING DNA CONTINUED...

Aggie Adventures for Kids (10:50 - 11:20)

10. **NOTE: If you don't have a blender, you can partially thaw frozen strawberries, add water, and mush the strawberries in a cup with a fork or use a potato masher.
11. Blending or mashing the fruit with water caused some of the cells in the fruit to break open. Because DNA has a negative charge, it is able to dissolve in the water. Many other cell parts will not be soluble in water.
12. Add 4 teaspoons (20 ml) of the fruit puree to the cup containing the shampoo solution. Gently mix with a spoon for 5 minutes. Try not to create too much foaming – this will interfere in the filtration step and may damage the long, fragile DNA molecules. Save the remaining fruit puree in the blender container. This may be used to make a smoothie.
13. Place a cone-shaped coffee filter into a cup. The bottom of the filter must not touch the bottom of the cup. Fold the edge of the filter over the cup.
14. After the fruit-shampoo mixture has been mixed for approx. 5 minutes, pour it into the coffee filter. Filter the mixture for approx. 5 minutes (until there are at least 4 teaspoons (20 ml) of liquid in the cup).
15. Filtering the soapy fruit solution through a coffee filter removes extra cell debris (cell membranes, precipitated proteins, and excess fruit pieces that didn't get completely pureed in the blender). Because the DNA molecules are soluble in the water, they are able to pass through the filter.
16. You may carry out the following step in any small clear container – a clear plastic film canister works well. Pour 4 teaspoons (20 ml) of ICE COLD 91% Isopropyl Rubbing Alcohol into this small container (approx. 1/2 full).
17. To the small container of cold alcohol, add 2 teaspoons (10 ml) of the filtered fruit solution. There will be 2 layers in your container. Do not mix these layers! After a few minutes, you should see a white "glob" forming in the solution. This is DNA! You can try to "spool" out this DNA using a toothpick or swizzle stick. To save the DNA, remove it from the container and place it in another container containing only alcohol.
18. DNA molecules are soluble in water BUT not in an alcohol solution. When the fruit DNA solution comes in contact with alcohol, the long, stringy DNA molecules precipitates into the alcohol. You can see this long, stringy precipitated DNA. What you see is thousands of DNA molecules that are stuck together. [FYI: Pure DNA is a colorless molecule. Any color that you may see in your fruit DNA is caused by fruit pigment molecules that got trapped in the stringy DNA. CAUTION: Rubbing alcohol is POISONOUS!]

Reflect:

- Why did you have to shake the strawberry solution?
- Why do you think you needed to add the soap?
- What was the purpose of the cold alcohol?

Apply:

- DNA is found in the cells of all organisms. DNA is a very long, stringy molecule that has a negative charge. Each chromosome in a cell is made of a single long DNA molecule, which may have millions of nucleotide bases. [FYI: If the 46 DNA molecules from the chromosomes of one of your cells were placed end-to-end, they would be up to 8 FEET LONG, but so thin that you couldn't see them!] In this laboratory, we will extract DNA from a variety of fruit cells.

STRAWBERRY SMOOTHIES (OPTIONAL)...

Aggie Adventures for Kids (10:50 - 11:20)

What to Do:

1. To the remaining fruit puree from STEP #5 (could be a mixture of different fruits), add:
2. 1 banana, 1 cup orange juice, 4 - 8 Tablespoons honey (to taste), and 5 - 10 oz. frozen strawberries. You may optionally add tofu (12.3 oz) or yogurt to your smoothie mixture. If you have too much fruit puree, you may need to blend in 2 batches.
3. Blend until desired consistency. Pour into small cups.
4. Enjoy your "DNA smoothie" and your isolated fruit DNA! (Can you taste the DNA in your smoothie?

Reflect:

- What did you like best about this activity?

Apply:

- When you eat a meal, you are eating the cells of organisms (muscle cells of meat, leaf cells of lettuce, tuber cells of a potato, etc.).
- The amount of DNA in the genome of each species of organism is different, but many plants have greater amounts of DNA than humans do.
- To simplify things, let's say the average plant has 10 feet of DNA (compared to approx. 8 feet in humans).
- Scientists at Iowa State University estimate that we eat an average of 50 million (50,000,000) cells in a single meal.
- If an average plant cell has 10 feet of DNA, that means we eat almost 100,000 MILES of DNA in a meal!

TIME: 30 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
To understand that everything is living and holds DNA,.

MATERIALS:

- 10 oz. bag frozen strawberries
- 1 extra banana
- 1 c. orange juice
- 4 – 8 Tablespoons honey
- Extra fruit as needed
- Drinking cups for class
- Optional: 8-12 oz ice cream, Yogurt or tofu

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: Carolyn A. Zanta, UIUC-Hughes Biotechnology Education and Outreach Program (www.life.uiuc.edu/hughes/footlocker) (activity modified from Iowa State University Biotechnology Center)

GAME & EXPLODING DIET COKE

Aggie Adventures for Kids (11:20 - 11:35, 11:35 - 11:55)

What to Do:

1. This activity is probably best done outside in the middle of an abandoned field, or better yet, on a huge lawn.
2. Carefully open the bottle of soda. Position the bottle on the ground so that it will not tip over.
3. Unwrap the whole roll of Mentos. The goal is to drop all of the Mentos into the bottle of soda at the same time (which is trickier than it looks). One method for doing this is to roll a piece of paper into a tube just big enough to hold the loose Mentos. You'll want to be able to position the tube directly over the mouth of the bottle so that all of the candies drop into the bottle at the same time.
4. Don't drop them into the bottle just yet! Warn the spectators to stand back. Okay, you're going to drop all of the Mentos into the bottle at the same time and then get truckin' (move out of the way... so long... bye- bye... hasta la vista!)
5. Have each kid in the group contribute to putting in mentos, counting down, measuring, etc.
6. It's just like fireworks on the 4th of July. The spectators erupt, of course, in a chorus of ooohs and ahhhs. Someone yells out, "Do it again" and you do.

Reflect:

- Does it matter what kind of Mentos we use?
- Does it matter what kind of soda we use?
- What would happen if we only added half of the Mentos?

continued...

TIME: 35 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will learn about gasses and eruptions using diet coke and candy.

MATERIALS:

- A roll or box of Mentos (candy mints) Fruity and minty
- 2-liter bottle of diet soda (get many different kinds of soda). Either diet or regular soda will work for this experiment, but diet soda is less sticky when you're cleaning it up!
- Geyser Tube (stevespangler.com)

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: http://www.stevespanglerscience.com/

EXPLODING DIET COKE CONTINUED...

Aggie Adventures for Kids (11:20 - 11:35, 11:35 - 11:55)

Apply:

- Here's the question of the day... Why do Mentos mixed with soda produce this incredible eruption? You should know that there is considerable debate over how and why this works.

- While we offer the most probable explanations below, we also understand and admit that other explanation could be possible... and we welcome your thoughts.

- As you probably know, soda pop is basically sugar (or diet sweetener), flavoring, water and preservatives. The thing that makes soda bubbly is invisible carbon dioxide gas, which is pumped into bottles at the bottling factory using tons of pressure. Until you open the bottle and pour a glass of soda, the gas mostly stays suspended in the liquid and cannot expand to form more bubbles, which gases naturally do.

- But there's more... If you shake the bottle and then open it, the gas is released from the protective hold of the water molecules and escapes with a whoosh, taking some of the soda along with it. What other ways can you cause the gas to escape? Just drop something into a glass of soda and notice how bubbles immediately form on the surface of the object.

- For example, adding salt to soda causes it to foam up because thousands of little bubbles form on the surface of each grain of salt. Many scientists, including Lee Marek, claim that the Mentos phenomenon is a physical reaction, not a chemical one.

- Water molecules strongly attract each other, linking together to form a tight mesh around each bubble of carbon dioxide gas in the soda. In order to form a new bubble, or even to expand a bubble that has already formed, water molecules must push away from each other. It takes extra energy to break this "surface tension." In other words, water "resists" the expansion of bubbles in the soda.

- When you drop the Mentos into the soda, the gelatin and gum arabic from the dissolving candy break the surface tension. This disrupts the water mesh, so that it takes less work to expand and form new bubbles. Each Mentos candy has thousands of tiny pits all over the surface. These tiny pits are called nucleation sites - perfect places for carbon dioxide bubbles to form. As soon as the Mentos hit the soda, bubbles form all over the surface of the candy.

- Couple this with the fact that the Mentos candies are heavy and sink to the bottom of the bottle and you've got a double-whammy. When all this gas is released, it literally pushes all of the liquid up and out of the bottle in an incredible soda blast. You can see a similar effect when cooking potatoes or pasta are lowered into a pot of boiling water. The water will sometimes boil over because organic materials that leach out of the cooking potatoes or pasta disrupt the tight mesh of water molecules at the surface of the water, making it easier for bubbles and foam to form.

Adapted from: http://www.stevespanglerscience.com/

DAY 2
COOKING UP SCIENCE

Activities for the day:

Camper Check In
Mixing It Up
Ghost In Your Kitchen
Butter the Toast
Which Egg is Raw?
Dancing Cereal
Plant the Lima Beans

UtahStateUniversity
COOPERATIVE EXTENSION

MIXING IT UP

Aggie Adventures for Kids (9:15 - 9:35)

What to Do:

1. Dissolve 1 tablespoon of baking soda in 1/2 cup of water.
2. Mix 1 tablespoon of vinegar with another 1/2 cup of water.
3. Fill glass half full with grape juice
4. Slowly add some of the baking soda mixture to the grape juice, then notice what happens.
5. Now, add some of the vinegar mixture. Observe
6. Alternate the solutions and record the results.

Reflect:

- What did the baking soda do in the grape juice?
- What happened when you added the vinegar?
- What colors did you see?

Apply:

- In your acid and base tests, you should have discovered that vinegar is an acid and baking soda is a base.
- Whenever an acid and base are mixed together, they react chemically to produce a salt.
- The foaming grape juice in the experiment was a result of a chemical reaction. The different colors you saw came from the way the light bounced off the foaming grape juice.
- The foaming bubbles bend, shape, and separate the light into its component colors. The changing thickness of the foam bubbles broke up the light to make tiny rainbows.

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
This activity gives campers the opportunity to witness chemical reactions.

MATERIALS:
- Baking soda
- Vinegar
- Water
- Grape juice
- 3 cups

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: Spotlight on Science: Cooking Up Science Kit (purchased from: http://mailjust4me.com/crafts/cookinupscience.htm)

GHOST IN YOUR KITCHEN

Aggie Adventures for Kids (9:35 - 9:55)

What to Do:

1. Write a message on a piece of paper with lemon juice using the cotton bud (make sure kids put it on pretty thick)
2. Leave it to dry.
3. Use the Iron to make their messages appear as if from no where.
4. During the drying time go outside and play a game.

Reflect:

- What happened when we added heat to our lemon juice?
- Does it matter how much lemon juice we used?
- Do you think this experiment would work with other juices?

Apply:

- An organic substance will turn into black carbon when heated.
- The lemon juice contains carbon and remains invisible until it is heated enough to start to burn and the carbon is released.
- Lemon juice is acidic and weakens paper.
- When paper is heated, the remaining acid turns the writing brown before discoloring the paper.

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will be experimenting with and learning about chemical reactions.

MATERIALS:

- Paper
- A cotton Q-tip
- Lemon Juice
- Orange Juice
- Grape juice
- A desk light with a bulb (or an iron)

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

BUTTER THE TOAST

Aggie Adventures for Kids (9:55 - 10:10)

What to Do:

1. Butter the toast.
2. It is generally best to put something on the floor such as newspaper.
3. Push the toast off the table at the sort of speed you might accidentally knock it off while having breakfast.
4. Which way up does it land?
5. Repeat the experiment 5-10 times. Does it actually normally land butter side down?
6. Have student recording what is happened on a sheet of paper you make up for them.

Reflect:

- Why do you think it's landing on the butter side?
- Does it make a difference what kind of butter we use?
- What would happen if we dropped it from a really high place?

Apply:

- When we tried this we found that the toast landed butter side down six out of six times, although it is just about possible to get it to land butter side up if you push the toast off very slowly.
- There have been lots of explanations for this problem ranging from bad luck to aerodynamics, but it is actually quite simple.
- When the toast is falling off the table it starts to rotate
- The speed of this rotation will depend on how fast you push the toast off the table, but at the sort of speed you normally push things off table they will have enough time to turn over before it hits the floor.

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will be able to see a simply experiment with probability!

MATERIALS:

- Toaster
- Bread
- Butter
- Plastic knives
- (Have some for the kids to have too)

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

WHICH EGG IS RAW? & GAME

Aggie Adventures for Kids (10:10 - 10:30, 10:30 - 10:45)

What to Do:

(All About Dry Ice)

1. Spint the egg on the table, stop it quickly with your finger, and then release it.
2. Try it with the other egg.
3. Is there a difference?

Reflect:

- Does it matter what kind of eggs we buy?
- Are there other ways to tell of the egg is raw or boiled?

Apply:

- When you stop the hard boiled egg it just stops. When you touch the raw egg it stops, but if you let go again quickly it will start moving again. So you can tell it's raw.
- Raw Egg: the center is quite liquid so even if you stop the shell moving the centre will keep going for a short time.
- Hard Boiled Egg: the hard boiled egg is solid so moves as one piece. So when it stops it stops.

TIME: 35 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will use problem solving skills to figure out which eggs are boiled and which are raw.

MATERIALS:
- Hard boiled egg
- A fresh egg

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

DANCING CEREAL

Aggie Adventures for Kids (10:45 - 11:15)

What to Do:

1. Open the box of Total cereal and pour a small pile of flakes on the plate. Crush them into tiny pieces with your fingers. Spread out the pile so it forms a single layer of crumbs on the plate. Bring the magnet close to the layer of crumbs (but don't touch any) and see if you can get any of the pieces to move. If so, that piece may contain some metallic iron (or it could be something else). Take your time.
2. Firmly press the magnet directly onto the crumbs but don't move it. Lift it up and look underneath to see if anything is clinging to the magnet. Several little pieces may be stuck there. Is it the magnet, static electricity, or just sticky cereal? Clean off the magnet and scrape the pile of crumbs into the plastic bag from your kit. Set it aside for now.
3. Pour water into the plate and float a few flakes on the water. Hold the magnet close to (but not touching) a flake, and see if the flake moves toward the magnet. (The movement may be very slight, so be patient.) With practice, you can pull the flakes across the water, spin them, and even link them together in a chain. Hmmm... there must be something that's responding to the closeness of the magnet.
4. Measure 1 cup of Total cereal into a quart size Ziploc bag. Fill the bag at least half full with water. Carefully seal the bag, leaving an air pocket inside. Mix the cereal and the water by squeezing and smooshing the bag until the contents become a brown, soupy mixture. This may take a long time. In fact, you may want to let it sit for an hour so the cereal softens completely. Warm water will speed up the process. Don't move onto the next step until the cereal is completely dissolved!
5. Make sure the bag is tightly sealed and lay it on a flat side in the palm of your hand. Place the super-strong magnet on top of the bag. Put your other hand on top of the magnet and flip the whole thing over so the magnet is underneath the bag. Slowly slosh the contents of the bag in a circular motion for 15 or 20 seconds. The idea is to attract any free moving bits of metallic iron in the cereal to the magnet.

continued...

TIME: 30 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will experiment will cereal, iron, and magnets.

MATERIALS:
- Box of Total Cereal (very important)
- Super Strong Magnet
- Ziploc bag
- Water
- Dinner plate

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

DANCING CEREAL CONTINUED...

Aggie Adventures for Kids (10:45 - 11:15)

1. Use both hands again and flip the bag and magnet over so the magnet is on top. Gently squeeze the bag to lift the magnet a little above the cereal soup. Don't move the magnet just yet. Look closely at the edges of the magnet where it's touching the bag. You should be able to see tiny black specks on the inside of the bag around the edges of the magnet.
2. Keep one end of the magnet touching the bag and draw little circles. As you do, the iron will gather into a bigger clump and be much easier to see. Few people have ever noticed iron in their food, so you can really impress your friends with this one. When you're finished, simply pour the soup down the drain and rinse the bag.

Reflect:

- What happened when we put the magnet and the cereal together?
- Do you think other cereal does this?

Apply:

- Many breakfast cereals are fortified with food-grade iron particles (metallic iron) as a mineral supplement.
- Total Cereal is the only major brand of cereal that claims to contain 100% of your recommended daily allowance of iron. The chemical symbol for iron is Fe. Many people believe that metallic iron is digested in the stomach, and eventually absorbed in the small intestine. However, there is a growing number of nutritionists who do not buy these claims and believe that the metallic iron simply passes through your system.
- Hmmm? Sounds like some great research for a science fair project! If all of the iron from your body was extracted, you'd have enough iron to make only two small nails. However, iron is found in a very important component of your blood, called hemoglobin. Hemoglobin is the compound in red blood cells that carries oxygen from your lungs so that it can be utilized by your body. It's the iron in hemoglobin that gives blood its red appearance.
- A diet deficient in iron can result in fatigue, reduced resistance to diseases, and increased heart and respiratory rates. Food scientists say that a healthy adult requires about 18 mg of iron each day. So, as you can see, iron is a very important part of what you and your friends and family need to stay healthy

Adapted from: http://www.stevespanglerscience.com/

PLANT THE LIMA BEANS

Aggie Adventures for Kids (11:15 - 11:45)

What to Do:

1. First of all, soak the seed only overnight.
2. Invite children to work in small groups to prepare the first experiment. Provide children with a plastic cup. Assist them in filling their cups halfway with soil. Place two lima beans in the soil. Cover with more soil. Add water. Write each child's name on a piece of masking tape and attach to the cups. Place the cups in a plastic bin or container to prevent it spilling and keep them in a sunny area of the room.
3. For the next experiment, provide each child with a plastic sandwich bag, a damp paper towel, and two lima beans. Ask children to carefully wrap their lima beans in the damp paper towel and then place them into the plastic bags. Label children's bag with their names. Find another sunny area in the classroom to place the bags.
4. Plan a time each day for children to observe the growth of their beans. Remind children to water their beans when the soil feels dry and to dampen the cloth if it becomes dry.

Reflect:

- How does our lima bean grow?
- Would it grow if we left it in the shade?
- Can you give a plant too much water? Too little water?

Apply:

- Lima beans are seeds! They need sunlight to grow water too!
- Just like us, plants need sunlight and nutrients to stay alive. So you think people need sunlight? We do!
- It's good for you to be in the sun, but remember to wear sunscreen when we go outside to keep our skin healthy!

TIME: 30 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will see how the sun helps grow our food and will get to take the plant home. We will be observing our beans all week!

MATERIALS:

- Dried lima beans
- Paper towels
- Plastic sandwich bags
- Small plastic cup or milk container
- Soil
- Chart paper and brown craft paper
- Marker
- Plastic scoop (for soil)

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

DAY 3
COOKING UP SCIENCE

4-H AGGIE ADVENTURES FOR KIDS

Activities for the day:

Camper Check In
Pop Rock Science
Polymer Bouncy Ball
Color Changing Milk
Making Ice Cream
Dancing Raisins
Hot Colors

UtahStateUniversity
COOPERATIVE EXTENSION

POP ROCK SCIENCE

Aggie Adventures for Kids (9:10 - 9:35)

What to Do:

1. Close Examination – Look at a Pop Rock closely with a magnifying glass to see if you can see the little bubbles.
2. Liquid Test – Put a few Pop Rocks on a plate and pour some water on them to see what happens.
3. The Crush Test - Pop Rocks don't have to be mixed with a liquid to pop. Try crushing a few big pieces on the table using the back of a spoon and you'll hear the loud POP! Remember, the popping sound you hear comes from bursting the high pressure bubble of carbon dioxide. Crush a Pop Rock in your teeth and you'll hear the same cool popping sound of the gas escaping.
4. How Much Carbon Dioxide Gas is in a Packet of Pop Rocks? You'll have to waste a whole package of Pop Rocks for this experiment (or you can just learn from our results).
5. Start by pouring an entire package of Pop Rocks into an empty balloon (a 9" balloon works well). You'll also need a 12 or 16 ounce bottle of your favorite soda.
6. Open the bottle of soda and attach the balloon, but do not let the Pop Rocks fall into the soda just yet. After the balloon is attached, you can lift up on the balloon to allow all of the Pop Rocks to fall into the soda. Predict how big the balloon will get when the Pop Rocks mix with the soda. You might be surprised by what you see.

Reflect:

- Why didn't the balloon inflate?
- How do you think this works?

TIME: 25 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will see how candy can turn into science!

MATERIALS:
- 1 Pop Rocks package
- 9" balloon (optional)
- 12 or 16-ounce bottle of soda (optional)
- Magnifying glasses

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

continued...

POP ROCK SCIENCE (CONTINUED...)

Aggie Adventures for Kids (9:10 - 9:35)

Apply:

- Pop Rocks start like any other hard candy by combining sugar, lactose (milk sugar), corn syrup and flavoring. These ingredients are heated to the boiling point and the hot sugar mixture is mixed with carbon dioxide gas under high pressure (about 600 pounds per square inch, or PSI). The process causes tiny high pressure bubbles of carbon dioxide gas to form in the candy.
- When the hot candy mixtures cools and the pressure of the gas is released, the hard candy shatters into tiny pieces of carbonated candy. If you look carefully at the candy under a magnifying glass, you'll see the tiny bubbles - each containing a small amount of carbon dioxide gas under high pressure (600 PSI). When the candy melts in your mouth, the 600 PSI bubbles of gas are released with a loud popping sound. Very cool!
- In the experiment with the balloon, mixing Pop Rocks with soda is a physical reaction - not a chemical reaction. The soda dissolves the candy and releases the small bubble of carbon dioxide gas from the Pop Rock. Believe it or not, most of the carbon dioxide in the balloon came from the soda. Dropping Pop Rocks into soda causes some of the carbon dioxide from the soda to escape. That's the real reason why the balloon inflates.
- So, will you explode if you eat Pop Rocks and drink soda? No... but you might get a pretty nice burp out of the deal.

POLYMER BOUNCY BALL

Aggie Adventures for Kids (9:35 - 10:00)

What to Do:

1. Label one cup 'Borax Solution' and the other cup 'Ball Mixture'.
2. Pour 2 tablespoons warm water and 1/2 teaspoon borax powder into the cup labeled 'Borax Solution'. Stir the mixture to dissolve the borax. Add food coloring, if desired.
3. Pour 1 tablespoon of glue into the cup labeled 'Ball Mixture'. Add 1/2 teaspoon of the borax solution you just made and 1 tablespoon of cornstarch. Do not stir. Allow the ingredients to interact on their own for 10-15 seconds and then stir them together to fully mix. Once the mixture becomes impossible to stir, take it out of the cup and start molding the ball with your hands.
4. The ball will start out sticky and messy, but will solidify as you knead it.
5. Once the ball is less sticky, go ahead and bounce it!
6. You can store your plastic ball in a sealed ziploc bag when you are finished playing with it.
7. Don't eat the materials used to make the ball or the ball itself. Wash your work area, utensils, and hands when you have completed this activity.

Reflect:

- Why do you think we added glue to the mixture?
- What happened when we decided to knead the ball?

Apply:

- Balls have been toys practically forever, but the bouncing ball is a more recent innovation. Bouncing balls were originally made of natural rubber, though now bouncing balls can be made of plastics and other polymers or even treated leather. You can use chemistry to make your own bouncing ball. Once you understand the basic technique, you can alter the recipe for the ball to see how the chemical composition affects the bounciness of the ball, as well as other characteristics.
- The bouncing ball in this activity is made from a polymer. Polymers are molecules made up of repeating chemical units. Glue contains the polymer polyvinyl acetate (PVA), which cross-links to itself when reacted with borax.

TIME: 25 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will experiment with kitchen supplies and polymers to create their own bouncy balls.

MATERIALS:

- Borax
- Warm water, cornstarch, food coloring (optional)
- White glue (e.g., Elmer's glue - makes an opaque ball) or blue or clear school glue (makes a translucent ball)
- Measuring spoons, spoon or craft stick to stir the mixture
- 2 small plastic cups or other containers for mixing
- Marking pen
- Watch with a second hand
- Metric ruler
- Ziploc plastic baggie

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

COLOR CHANGING MILK

Aggie Adventures for Kids (10:00 - 10:20)

What to Do:

1. Pour enough milk in the dinner plate to completely cover the bottom and allow it to settle.
2. Add one drop of each of the four colors of food coloring - red, yellow, blue, and green - to the milk. Keep the drops close together in the center of the plate of milk.
3. Find a clean cotton Q-tip for the next part of the experiment. Predict what will happen when you touch the tip of the cotton Q-tip to the center of the milk. It's important not to stir the mix just touch it with the tip of the cotton Q-tip.
4. Place a drop of liquid dish soap (the Dawn brand works well) on the tip of the cotton Q-tip. Place the soapy end of the cotton Q-tip back in the middle of the milk and hold it there for 10 to 15 seconds. Look at that burst of color! It's like the 4th of July in a bowl of milk: mini-explosions of color.

Reflect:

- What happened when we added soap to the milk?
- Does it work more than once?
- Do you think it makes a difference what kind of milk we use?

Apply:

- Milk is mostly water but it also contains vitamins, minerals, proteins, and tiny droplets of fat suspended in solution. Fats and proteins are sensitive to changes in the surrounding solution (the milk).
- When you add soap, the weak chemical bonds that hold the proteins in solution are altered. It's a free for all! The molecules of protein and fat bend, roll, twist, and contort in all directions. The food color molecules are bumped and shoved everywhere, providing an easy way to observe all the invisible activity.
- There's another reason the colors explode the way they do. Since milk is mostly water, it has surface tension like water. The drops of food coloring floating on the surface tend to stay put. Liquid soap wrecks the surface tension by breaking the cohesive bonds between water molecules and allowing the colors to zing throughout the milk. What a party!
- Repeat the experiment using water in place of milk. Will you get the same eruption of color? Why or why not? What kind of milk produces the best swirling of color: skim, 1%, 2%, or whole milk? Why?

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
It's an explosion of color! Some very unusual things happen when you mix a little milk, food coloring, and a drop of liquid soap. Use the experiment to amaze your friends and uncover the scientific secrets of soap.

MATERIALS:

- Milk (whole or 2%)
- Dinner plate
- Food coloring (red, yellow, green, blue)
- Dish-washing soap (Dawn brand works)
- Cotton Q-tip

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: http://www.stevespanglerscience.com/

GAME & MAKING ICE CREAM

Aggie Adventures for Kids (10:20 - 10:40, 10:40 - 11:10)

What to Do:

Milk can become ice cream in five minutes! This homemade ice cream in a bag is a summertime delight for kids and adults alike.

1. Fill the large bag half full of ice, and add the rock salt. Seal the bag.
2. Put milk, vanilla, and sugar into the small bag, and seal it.
3. Place the small bag inside the large one and seal again carefully.
4. Shake until mixture is ice cream, about 5 minutes.
5. Wipe off top of small bag, then open carefully and enjoy

TIPS: To make a larger amount, try doubling the recipe. Anything larger might be too big for kids to pick-up, because the ice itself is quite heavy.

Reflect:

- Why did we need to add salt to make our ice cream?
- Can we make ice cream without ice?

Apply:

- Ice has to absorb energy in order to melt, changing the phase of water from a solid to a liquid.
- When you use ice to cool the ingredients for ice cream, the energy is absorbed from the ingredients and from the outside environment (like your hands, if you are holding the baggie of ice)! When you add salt to the ice, it lowers the freezing point of the ice, so even more energy has to be absorbed from the environment in order for the ice to melt. This makes the ice colder than it was before, which is how your ice cream freezes.
- Ideally, you would make your ice cream using 'ice cream salt', which is just salt sold as large crystals instead of the small crystals you see in table salt.
- The larger crystals take more time to dissolve in the water around the ice, which allows for even cooling of the ice cream.

TIME: 50 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will be making their own ice cream using their own "energy" while also seeing more chemical reactions.

MATERIALS:

- 1 tablespoon sugar
- 1/2 cup milk or half & half
- 1/4 teaspoon vanilla
- 6 tablespoons rock salt
- 1 pint-size Ziploc plastic bag
- 1 gallon-size Ziploc plastic bag
- Ice cubes

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

DANCING RAISINS

Aggie Adventures for Kids (11:10 - 11:25)

What to Do:

1. First, pour the club soda in the glass.
2. Next, drop in half of a raisin.
3. Wait at least 20 to 30 seconds and watch what happens to the raisin (the raisin should rise and fall).

Reflect:

- Can I get something that is heavier than a popcorn kernel to float using bubbles?
- Will a walnut or a super ball float?
- Would a whole raisin float?

Apply:

- The reason why the raisin floats to the top is because the bubbles stick to the sides of the raisin and make the raisin more buoyant.
- Buoyant means that something floats more easily. The bubbles make the raisin float the way a life jacket makes a person float.

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be exploring molecules with this fun, hands-on activity.

MATERIALS:

- Tall clear glass
- Raisins
- Club soda that has a lot of bubbles (this won't work if the club soda is flat)

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: http://pbskids.org/zoom/activities/sci/dancingraisins.html

HOT COLORS

Aggie Adventures for Kids (11:25 - 11:45)

What to Do:

1. Find three pairs of different color socks: white, black, and red.
2. For each pair, take one of the socks and tuck it into the other.
3. Insert a thermometer into the tucked white sock and place it in a sunny window. After 15 minutes, not the sock's temperature.
4. Repeat the experiment with the red and clack socks. Record their temperatures also.

Reflect:

- Why do you think the temperatures were different?
- Which pair of socks' internal temperature was the warmest?
- What color sock would you want to wear on a hot summer day?

Apply:

- Heat is necessary for life. It is important to know where it comes from and how it can be used. Our most important source of heat is the radiation form the sun. Only part of this radiation is absorbed by the Earth. Just the right amount makes it through the Earth's atmosphere to the ground. This keeps the temperature of the Earth's surface and atmosphere at a level that permit life to continue.
- Dark colors absorb light from the sun. The light energy absorbed is transferred into heat energy. The temperature inside the dark sock gets warmer and warmer. Light colors reflect much of the sun's light and heat. The reflected light is not absorbed by the sock. A light colored sock will not get as warm as a dark sock. Remember this if you plan to wear a black t-shirt on a sunny day!

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be exploring sun light and energy.

MATERIALS:
- 3 white socks
- 3 red socks
- 3 black socks
- 3 thermometers

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: Spotlight on Science: Cooking Up Science Kit (purchased from: http://mailjust4me.com/crafts/cookinupscience.htm)

DAY 4
COOKING UP SCIENCE

Activities for the day:

Camper Check In
Cauldron Bubbles
Water Filter
Gumdrop Dome
Plastic Milk
Floating Eggs
Baking Soda Bubbles
Butter in a Jar

UtahStateUniversity
COOPERATIVE EXTENSION

CAULDRON BUBBLES

Aggie Adventures for Kids (9:10 - 9:25)

What to Do:

1. Fill a glass about half full of water.
2. Add about a half inch of oil. Wait for the water and oil to separate into two layers.
3. What do you think will happen when you add salt? Make a prediction.
4. Pour in the salt. What happens? (If nothing happens, add more salt.)

Reflect:

- What happens if you use sugar instead of salt? Or, what happens if you use sand?
- Choose one thing to change (that's the variable) and predict what you think will happen.

Apply:

- What's making the vegetable oil bubbles sink? Salt! Vegetable oil is less dense than water, so it floats on water. When you add the salt, the salt mixes with the vegetable oil.
- This mix of vegetable oil and salt is more dense than the water so it sinks in bubbles.
- When a bubble goes underwater, the oil separates from the salt and the salt dissolves in the water.
- Once the oil separates from the salt, the bubble is again less dense than the water so it floats to the top.

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be exploring water and oil.

MATERIALS:
- Large clear drinking glass
- Water
- Vegetable oil
- About 4 tablespoons of salt

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: http://www-tc.pbskids.org/zoom/printables/activities/pdfs/cauldronbubbles.pdf

WATER FILTER

Aggie Adventures for Kids (9:25 - 9:55)

What to Do:

1. 1 Place the top half of the soda bottle upside-down (like a funnel) inside the bottom half. (Make sure the cap is off.) The top half will be the filter, and the bottom half will hold the filtered water.
2. Predict what each material might remove from the dirty water. Then layer the filter materials (napkins, sand, gravel and cotton balls) inside the top bottle half.
3. Pour the dirty water through the filter.
4. Take apart the filter and look at the different layers. Can you tell what each material filtered from the water? Throw out the filter materials. Then wipe out the bottle and try it again.
5. See if you can make the filtered water even cleaner. Try putting materials in different layers. Or try using different amounts of each material.

Reflect:

- What does the filtered water look like?
- What happens if you use different materials for filtering, such as clay instead of sand? (Change one variable)

Apply:

- We receive our water from the sky. It falls to earth and percolates through the earth, into streams, whirling, tumbling, absorbing light photons, energy and the minerals essential for healthy life.
- When it is drunk, the minerals and energy it offers are absorbed and converted to energy, and it passes back into the earth and the sea - where it evaporates to continue this perfect natural cycle.
- The intricate perfection of the snowflake is testament to water's structural integrity as it falls, pure and new, from the sky.
- Natural water is a rarity today due to industrial contamination, woodland loss and the need for centralized water storage.

TIME: 30 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be testing our skills to see if we can build an efficient water filter.

MATERIALS:

- 2-liter soda bottle cut in half Napkins
- Gravel
- Sand
- Cotton balls
- Paper cup of dirty water (made with dirt, food coloring, cooking oil, bits of paper)

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: http://www-tc.pbskids.org/zoom/printables/activities/pdfs/waterfilter.pdf

GUMDROP DOME

Aggie Adventures for Kids (9:55 - 10:15)

What to Do:

1. Use gumdrops to connect 5 toothpicks in a ring. This is your base.
2. Use 2 toothpicks and 1 gumdrop to make a triangle on one side of the base.
3. Repeat all the way around the base until you have 5 triangles.
4. Use toothpicks to connect the gumdrops at the tops of the triangles. Now how many triangles do you have?
5. Push 1 toothpick into each of the top gumdrops.
6. Use one last gumdrop to connect these toothpicks at the top.

Reflect:

- What happens if you make a base with six sides instead of five sides?
- What happens if you build squares rather than triangles on top of the base?
- Choose one thing to change (that's the variable), and predict what you think will happen.

Apply:

- Engineers often use triangles when they design buildings. Did you notice that your dome is made up of lots of triangles?
- That's because triangles are stable shapes. That means they don't bend, twist, or collapse easily when you push on them.
- A square is not as stable as a triangle. Test it. Make a square and a triangle out of toothpicks and gumdrops. Press down on one corner of each shape. How do the two shapes compare?
- Does one bend, twist, or collapse more easily than the other?

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be exploring engineering and design using toothpicks and gumdrops.

MATERIALS:
- 25 toothpicks
- 11 gumdrops

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think the materials are for.

This activity was taken directly from: http://www-tc.pbskids.org/zoom/printables/activities/pdfs/gumdropdome.pdf

GAME & PLASTIC MILK

Aggie Adventures for Kids (10:15 - 10:30, 10:30 - 10:50)

What to Do:

1. I bet you've heard the nursery rhyme "Little Miss Muffet." Remember how she sat on her tuffet eating her curds and whey? But, do you know what curds and whey are?
2. Here's a fun way to find out:
3. Add 4 teaspoons of white vinegar to 1 1/2 cups of skim milk.
4. Microwave the mixture for about a minute. If you're not allowed to use the microwave, be sure to ask an adult to help you.
5. After a minute, the milk and vinegar will be separated into two parts, a liquid and a solid.
6. Now, when you stir the milk, the curds become a "blob."
7. When you strain the liquid off, you can make the blob into one big lump.
8. Let it cool off, and then you can play with it. It feels like rubber.
9. You can form the blob into shapes. If you leave it out, it will harden.

Reflect:

- How does this work?
- What happens when we add the Baking Soda and Vinegar together?

Apply:

- Here's what happened to the milk. By adding the vinegar, you have created a chemical reaction that separated the milk into two parts, a solid-the curds-and a liquid-the whey. The protein in the curds is what makes it act like rubber.
- A hundred years ago, people took milk and used it like this to make plastic.

TIME: 35 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be testing our skills using milk to make a chemical reaction.

MATERIALS:
- Skim milk
- White vinegar
- Microwave safe bowl
- Strainer
- Microwave

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: http://pbskids.org/zoom/activities/sci/plasticmilk.html

FLOATING EGGS

Aggie Adventures for Kids (10:50 - 11:05)

What to Do:

1. Fill a glass half full with water. Place an egg into the water. The egg will sink because it is more dense than the water.
2. Start adding salt to the water one tablespoon at a time. Help the salt dissolve by stirring it into the water.

Reflect:

- How much salt do you have to add to get your egg to float?
- What happens if we use sugar instead of salt?
- What if we add dish soap to the water?

Apply:

- Ready for us to float the science scoop? Adding salt to the water squishes more molecules into the water.
- This makes the water more dense. When there was no salt in the water, the egg was more dense than the water and it sank.
- Adding salt to the water makes the water more dense than the egg which makes the egg float.
- If you weigh a cup of saltwater and a cup of fresh water, the saltwater will weigh more than the fresh water even though it is taking up the same amount of space (a cup).
- This is because the saltwater is more dense than the fresh water.

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be testing density the density of eggs and water.

MATERIALS:

- Water
- 2 eggs
- Liquid soap
- Cooking oil
- Salt
- Sugar
- Glass
- Tablespoon

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: http://pbskids.org/zoom/activities/sci/makeaneggfloat.html

BAKING SODA BUBBLES

Aggie Adventures for Kids (11:05 - 11:25)

What to Do:

1. Put 1/4 cup baking soda in a clear container.
2. Then add 1 cup of vinegar.
3. The mixture of vinegar and baking soda will bubble. It's making carbon dioxide.
4. Blow some bubbles into the container and watch how they float on the carbon dioxide. The bubbles are floating where the carbon dioxide and air meet.
5. The carbon dioxide stays at the bottom of the bowl because it is more dense than the air in the bowl. The bubbles float on top of the carbon dioxide because they are filled with air and the air is less dense than the carbon dioxide.

Reflect:

- How does this work?
- What happened when we added baking soda to vinegar?

Apply:

- Pretend that you had two balloons and you filled one with air, and the other one with the same amount of carbon dioxide. The balloons would be the same size, because the gas in them takes up the same amount of space.
- But, if you weighed both balloons, the one with the carbon dioxide would be heavier. This means that it's denser than the balloon with air in it.

TIME: 20 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be testing density using baking soda and bubbles.

MATERIALS:

- 1/4 cup of baking soda
- 1 cup of vinegar
- Bubbles and a bubble wand (you can get this at most toy stores)
- 2 large, clear containers, like a clear plastic or glass bowl
- Small clear cup
- Bowl
- Spoon

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: http://pbskids.org/zoom/activities/sci/bakingsodabubbles.html

BUTTER IN A JAR

Aggie Adventures for Kids (11:25 - 11:50)

What to Do:

1. All you do is put some heavy cream into a jar with a lid.
2. Screw the lid on tight and begin to shake it.
3. Keep shaking the cream back and forth until it thickens. In about 10 minutes, it will turn to butter.
4. The glob is butter! The liquid that's leftover is buttermilk.

Reflect:

- How does this work?
- Can you think of any other liquids you can separate into parts?

Apply:

- The cream has little globs of fat and protein. When you shake the jar, you get the fat and the protein that are moving around in the cream to stick together.
- When you shake the jar, the little fat and protein globs in the cream hit each other and stick together, forming a larger and larger glob.

TIME: 25 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will see how a liquid can separate into two parts.

MATERIALS:
- Heavy cream
- Jar with a lid
- A snack to put the butter on

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: http://pbskids.org/zoom/activities/sci/butter.html

DAY 5
COOKING UP SCIENCE

Activities for the day:

Camper Check In
Egg in a Bottle
Instant Freeze Soda
Straw Through Potato
Bubble Gum Science
Cornstarch Goo
Cornstarch Plastic
Candy Sparks

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EGG IN A BOTTLE

Aggie Adventures for Kids (9:10 - 9:25)

What to Do:

1. The trick here is to find an egg that is just a little bigger than the mouth of the bottle; preferable medium size eggs. The other little secret is to grease the mouth of the bottle with a vegetable oil so the egg slides right in!
2. Start by smearing some vegetable oil around the mouth of the bottle.
3. Have the adult light a match and set the strip of paper on fire. Quickly put the burning strip into the bottle. Be careful not to accidentally burn your fingers.
4. Immediately cover the mouth of the bottle with the egg. In just seconds, the egg will start to wiggle around on the top of the bottle, the fire will go out, and some invisible force will literally "push" the egg into the bottle. That's amazing!

Reflect:

- How does this work?
- Would this work with other items?

Apply:

- The burning piece of paper heats the molecules of air in the bottle and causes the molecules to move far away from each other. Some of the heated molecules actually escape out past the egg is resting on the mouth of the bottle (that's why the egg wiggles on top of the bottle). When the flame goes out, the molecules of air in the bottle cool down and move closer together. This is what scientists refer to as a "partial vacuum." Normally the air outside the bottle would come rushing in to fill the bottle. However, that darn egg is in the way! The "push" or pressure of the air molecules outside the bottle is so great that it literally pushes the egg into the bottle.
- Remember this: when molecules of air heat up, they move far away from each other and take up more space. When molecules of air cool down, they move closer together and take up less space. Now, the challenge is to get the egg out of the bottle. Use what you have learned about air and air pressure to come up with a way to get the egg back out. HINT: Try sneaking a straw along side the egg when you pull it out. If the outside air can get inside the bottle, the water egg will come out!

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be testing gravity and air pressure.

MATERIALS:
- A wide mouth juice bottle
- Hardboiled eggs
- Several strips of paper (2X6 inches)
- Matches

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: www.stevespanglerscience.com

INSTANT FREEZING SODA

Aggie Adventures for Kids (9:25 - 9:50)

What to Do:

1. The demonstration works best if you place the unopened bottles of soda in the refrigerator for a few hours before attempting the activity.
2. Start by filling the bucket or container 3/4 full with ice. Cover the ice with a thin layer of rock salt.
3. Place the cooled bottles of soda in the ice-salt mixture.
4. Place the thermometer in the ice mixture - position the thermometer as close to one of the bottles as possible to get the most accurate reading of the bottle temperature.
5. Watch the thermometer closely. The temperature of the soda needs to get down to about 17°F (that's -8°C) for approximately 10 minutes. If the soda gets any colder, the liquid will freeze prematurely.
6. Once the soda has been at the appropriate temperature for 10 minutes, gently remove the bottle from the ice-salt mixture and open the bottle. Ice crystals should immediately form at the top of the bottle and quickly make their way down to the bottle, creating an instant freeze.
7. Again, never use glass bottles for this demonstration as the soda may accidentally freeze, causing the bottle to explode.

Reflect:

- How does this work?
- Would this work with other items?

Apply:

- When soda is produced, large quantities of additives (like sugar and flavoring) and carbon dioxide bubbles are pumped into water to create bubbly, sugary soda pop.
- These additives are called solutes and when solutes are added to a liquid such as water, the freezing point of the water decreases.
- By lowering the freezing point, the soda has to reach a much colder temperature to freeze than water. However, the concentration of carbon dioxide in the soda is only maintained as long as the bottle is kept sealed.
- As soon as the soda is opened, and you hear that "whoosh" of fizz (carbon dioxide) rushing out of the bottle, the concentration of solutes in the water goes down, and the freezing point goes up. Now, without all that extra carbon dioxide, the soda will freeze much quicker.

TIME: 25 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be working with temperature to instantly freeze soda.

MATERIALS:

- Carbonated water - flavored or plain in plastic bottles. Do not use glass bottles as the liquid may accidentally freeze in the bottle, causing it to explode.
- Large bucket
- Ice
- Rock salt
- Thermometer

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: www.stevespanglerscience.com

STRAW THROUGH POTATO

Aggie Adventures for Kids (9:50 - 10:05)

What to Do:

1. The challenge is quite simple: Stab the straw through the potato without bending or breaking the straw. Most of your guests will think it can't be done but you, of course, know better.
2. As you hold the potato, keep your fingers on the front and thumb on the back and not on the top and bottom. Grab the straw with your writing hand and (this is the secret) cap the top end with your thumb. Hold on firmly to both the straw and the potato and with a quick, sharp stab, drive the straw into and partway out of the narrow end of the spud and not the fatter middle part. You're so cool!
3. Your audience will be impressed and want to try it. Great! Tell them to hold the spud the way you did so they don't stab a finger or thumb with the straw. They may not know the secret so don't give it away just yet. Oh, you may need more stiff straws for them, too.

Reflect:

- How did the straw go through the potato?
- How do you think this works?

Apply:

- The secret is inside the straw: it's air! Placing your thumb over the end of the straw traps the air inside.
- When you trap the air inside the straw, the air molecules compress and give the straw strength; which in turn keeps the sides from bending as you jam the straw through the potato.
- The trapped, compressed air makes the straw strong enough to cut through the skin, pass through the potato, and out the other side.
- Without your thumb covering the hole, the air is simply pushed out of the straw and it crumples and breaks as it hits the hard potato surface. Make sure to keep your fingers out of the way.
- After you stab the straw, take a look at the end that passed through the potato. There's a plug-o'-spud inside the straw. If you should have a finger or thumb or hand in the way of the straw as it collides with the potato, then there will be a plug-o'-you in the straw, too.

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be using the power of air to push a straw through a potato.

MATERIALS:
- Plastic straw
- Raw potato
- Paper towel

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: www.stevespanglerscience.com

BUBBLE GUM SCIENCE

Aggie Adventures for Kids (10:05 - 10:30)

What to Do:

1. Instructions for the "Bubble Gum Kit" are included with the kit at the time of purchase.
2. Chewing gum in class used to get kids in trouble. Now kids are making bubble gum in school to learn about the science of food.
3. This Bubble Gum Kit is one of Steve Spangler's favorite food science kits for kids. The easy to follow directions will guide you through every step of the bubble gum making process. You'll have about 125 grams (1/4 lb) of bubble gum ready to eat in less than 15 minutes from the time you open the kit.

Reflect:

- How do you think this works?
- What's one thing you liked about this activity.

Apply:

- The difference between bubble gum and chewing gum is the gum base. Chewing gum base is a natural gum called chicle harvested from the sap of a tropical tree called a sopapilla tree. This kind of gum is chewy but it will not blow a large bubble. Bubble gum base, on the other hand, is a mixture of starches and polymers made in a laboratory and specially formulated to blow bubbles.
- Believe it or not, chewing gum is actually beneficial. It relieves boredom, eases tension and aids in concentration -- tell your teacher that little fact! It also helps to pull food particles from between your teeth and even freshens breath. Okay, sometimes it freshen breath. A stick of gum containing sugar has about 10 calories compared to sugarless gum which has only 6 calories. Contrary to popular belief, swallowing gum will not do any harm, or so they say.
- Ancient Greeks chewed the gum of the Mastic tree. More than 1,000 years ago the native people of Central America and North America chewed the sap and resins found in trees. Today, the United States is the world's leading manufacturer of gum (go figure!). With all of this fascination with bubble gum, it only stands to reason that bubble gum was invented in 1928 by Walter Diemer, an accountant from Philadelphia.

TIME: 25 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
We will be learning about polymers while making bubble gum.

MATERIALS:
- Bubble Gum Kit. (purchased from stevespanglerscience.com)

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: www.stevespanglerscience.com

GAME & CORNSTARCH GOO

Aggie Adventures for Kids (10:30 - 10:50, 10:50 - 11:15)

What to Do:

1. Tell campers that we are going to learn a little bit about the science of quicksand.
2. Ask the campers if any of them knows what makes quicksand? Tell campers we are going to do our next experiment and let them know how it connects to quicksand.
3. Pour approximately 1/4 of the box (about 4 oz..) of cornstarch into the mixing bowl and slowly add about a half a cup of water. Stir. Sometimes it is easier to mix the cornstarch and water with your bare hands (of course, this only adds to the fun).
4. Continue adding cornstarch and water in small amounts until you get a mixture that has the consistency of honey. It may take a little work to get the consistency just right, but you will eventually end up mixing one box of cornstarch with roughly 1 to 2 cups of water. Notice that the mixture gets thicker or more viscous as you add more cornstarch.
5. Sink your hand into the bowl of "quicksand" and notice its unusual consistency. Compare what it feels like to move your hand around slowly and then very fast. You can't move your hand around very fast! In fact, the faster you thrash around, the more like a SOLID the gooey stuff becomes. Sink your entire hand into the goo and try to grab the fluid and pull it up. That's the sensation of sinking in quicksand!
6. Drop a plastic toy animal into the cornstarch mixture and then try to get it out. It's pretty tough even for an experienced quicksand mixologist.

IMPORTANT - READ THIS!

- Ironically, the cornstarch will not stay mixed with the water indefinitely. Over time, the grains of cornstarch will separate from the water and form a solid clump at the bottom of the plastic storage bag. It is for this reason that you must not pour this mixture down the drain. It will clog the pipes and stop up the drain. Pour the mixture into a zipper-lock bag and dispose of it in the garbage.

continued...

TIME: 45 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
In this experiment, campers will be using ordinary cornstarch to model the behavior of real quicksand and learn about the properties of this mixture

MATERIALS:
- One box of cornstarch (16 oz..)
- Large mixing bowl
- Cookie sheet, square cake pan, or something similar
- Pitcher of water
- Spoon
- Gallon size zipper-lock bag
- Plastic drip cloth to cover the floor
- Water
- Food Coloring

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

This activity was taken directly from: www.stevespanglerscience.com

CORNSTARCH GOO CONTINUED...

Aggie Adventures for Kids (10:30 - 10:50, 10:50 - 11:15)

Slap Test-

1. Pour the mixture onto the cookie sheet or cake pan. Notice its unusual consistency when you are pouring it into the pan. Stir it around with your finger, first slowly and then as fast as you can. Skim you finger across the top of the glop. What do you notice? Sink you entire hand into the glop and try to grab the fluid and pull it up. That's the sensation of sinking in quicksand!
2. Try to roll the fluid between your palms to make a ball. You can even hold your hand flat over the top of the pan and slap the liquid glop as hard as you can. Most people will run for cover as you get ready to slap the liquid, fearing that it will splash everywhere.
3. According to theory, the mixture should stay in the pan. Yeah, right! If your cornstarch water mixture inadvertently splatters everywhere, you will know to add more cornstarch. When you are finished, pour the glop into a large zipper-lock plastic bag for later use.
4. Grab the campers attention and talk to them about the reaction of our glop. How does it compare to quicksand? Have them draw a picture or write a little bit about it in their science notebook.

Reflect:

- Would it make a difference if we added more water? Less water?
- Why does it make a difference if put our hands in slow instead of fast?

Apply:

- When you punch the cornstarch quicksand, you are forcing the long starch molecules closer together.
- The impact of this force traps the water between the starch chains to form a semi-rigid structure.
- When the pressure is released, the cornstarch flows again.
- (All information has been quoted from Steve Spangler)

continued...

This activity was taken directly from: www.stevespanglerscience.com

CORNSTARCH GOO CONTINUED...

Aggie Adventures for Kids (10:30 - 10:50, 10:50 - 11:15)

What is Quicksand?

- Quicksand is nothing more than a soupy mixture of sand and water, where the sand is literally floating on water. Scientifically speaking, quicksand is actually a substance that behaves like both a solid and a liquid at the same time. This is the interesting sensation you experienced with the cornstarch and water mixture. Quicksand is just solid ground that has been liquefied by too much water, and the term "quick" refers to how easily the sand shifts when in this solid-liquid state.
- Quicksand is created when water floods or saturates an area of loose sand and the sand is begins to move around. Think of quicksand as a soupy mixture of sand and water that is constantly being stirred. When the water in the sandy soil cannot escape, it creates a liquid-like soil that can no longer support any weight. If an excessive amount of water flows through the sand, it forces the sand particles apart. This separation of particles causes the ground to loosen, and any weight on the sand will begin to sink through it.
- The quicksand phenomenon can be caused by an uprising of water from something like flowing underground water or even an earthquake where the sand is agitated. You are likely to find quicksand around riverbanks, lake shorelines, marshes, beaches, near underground springs or any place where an uprising of water over saturates and agitates the sand.
- The next time you are standing barefoot on the beach, think about the properties of quicksand. Normally, the grains of wet sand are compressed together tightly and this firm ground easily supports your weight. The friction between grains of wet sand is strong enough to make it easy to build sand castles. However, when the sand on the beach is flooded with an excess amount of water, the agitated sand particles begin to move, separate and quickly wash away right from under your feet!
- This activity is a great example of how to use a model to study something that most of us will never see in person. While the cornstarch and water mixture is not real quicksand, its behavior is strikingly similar. The use of these kinds of models are an important part of a scientist's research into the areas of the unknown.

Escaping from Quicksand

- According to The Worst-Case Scenario Survival Handbook, escaping from quicksand is easier than you might think. Stepping into quicksand is like stepping in a pond of goo.
- Your weight causes you to sink. A person's natural instinct is to thrash around in an attempt to get out. In fact, this is the worst thing you could do because you only succeed in forcing yourself down farther in the quicksand pit.
- The best thing to do is to move slowly to bring yourself to the surface, lie back, and try to float on your back. According to the experts, you'll be able to use your arms to slowly paddle to safety.
- (All information has been quoted from Steve Spangler)

This activity was taken directly from: www.stevespanglerscience.com

CORNSTARCH PLASTIC

Aggie Adventures for Kids (11:15 - 11:30)

What to Do:

1. Place one tablespoon of cornstarch in a plastic Ziploc Bag.
2. Add two drops of corn oil.
3. Add one tablespoon of water.
4. Mix the cornstarch, corn oil and water in the plastic bag by rubbing the outside of the bag with your fingers.
5. Add two drops of food coloring and mix again.
6. Place the bag in a microwave on high for 20-25 seconds.
7. DO NOT completely seal the bag. Be careful!!! It is hot.

Reflect:

- What do you notice about your biodegradable plastic?
- Is your biodegradable plastic the same as the other students?
- What could you make with this biodegradable plastic if you let it harden? Remember it will dissolve eventually.
- What happens to your plastic?
- Form your plastic into a ball (while it is still warm) and describe what it does.
- Compare your biodegradable plastic with the plastic Ziploc bag.

Apply:

- Corn is a versatile crop, used not only in food but in manufacturing. One use for corn is packaging - you know those loose fill packing peanuts that go all over when you open a package? Well, some of those packing peanuts are made of styrofoam.
- Biodegradable loose fill is manufactured by extrusion, similar to breakfast cereals and pastas.

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will be able to experiment with chemical reactions.

MATERIALS:
- 1 tablespoon cornstarch
- 2 drops corn oil
- Ziploc bag
- Water
- Food coloring

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: http://extension.usu.edu/AITC/teachers/pdf/fieldguide1/plastic.pdf

CANDY SPARKS

Aggie Adventures for Kids (11:30 - 11:45)

What to Do:

1. Go into a dark room with no windows.
2. Give each kid a few lifesavers.
3. Have them stand in a circle and look at each other as the bite the candy with their mouths open. This will create a spark.

A variation of this activity:

1. Put a Lifesaver into the sandwich bag. The bag will protect your eyes from flying bits of candy.
2. Make the room as dark as possible. (A rug laid along the bottom edge of the door can block out light.)
3. Wait at least two minutes for your eyes to adjust to the darkness.
4. Put the jaws of the pliers over the bag, with the Lifesaver between the crushing parts. Squeeze the pliers to crush the Lifesaver. The candy should give a flash of blue-green light.

Reflect:

- How did this work?
- Do you think this would work with other candy?

Apply:

- When a sugar crystal cracks, it releases energy in the form of an electrical spark. Like a tiny lightning bolt, this spark is made up of electrons moving through the air.
- In the air, the electrons hit nitrogen molecules and give them some of their energy. Scientists say the nitrogen molecules become excited. The nitrogen can't keep that energy. Just as it does in lightning, the nitrogen releases the energy as light. We see only part of the light. Most of it is invisible ultraviolet light.
- The ultraviolet light gives some of its energy to wintergreen molecules in the candy. Like the nitrogen, the wintergreen becomes excited. Finally, the wintergreen molecules release the energy as blue-green light.

TIME: 15 Minutes

GRADE LEVEL: 3-5

OBJECTIVE:
Campers will learn about charges in candy.

MATERIALS:
- Wintergreen lifesavers
- Dark room

PRIOR TO ACTIVITY:
Make predictions with the campers on what they think will happen.

Adapted from: http://www.highlightskids.com/Science/TryThis/h3TT1205_candySparks.asp

GAME IDEAS

Aggie Adventures for Kids

(Try and keep games to the theme of the camps by switching the names of the games and switching the characters to fit the themes)

BALLOON CATCH

OBJECTIVE: to catch the balloon	DESCRIPTION: All players form a circle around one player in the center. Each person on the circle is given a number. The center player stands with the balloon, holding it with one hand. Without warning, he/ she calls out a number. The person assigned that number rushes forward and tries to grab the balloon before it hits the floor. If he catches it, he becomes the center player. If he fails to catch it, he returns to the circle.
REQUIREMENTS: Number of Players: 10 and up Ages: any age Activity Level: high Equipment: balloon filled with air	

FREEZE TAG

OBJECTIVE: To be the last person standing	DESCRIPTION: It is a normal game of tag with one person it. That person then tags people and if they are tagged, they are frozen. The only way to get unfrozen is to have a person who is not it crawl under your legs.
REQUIREMENTS: Number of Players: 10 and up Ages: 8 and up Activity Level: high Equipment: None	

HOSPITAL TAG

OBJECTIVE: to be last one	DESCRIPTION: The basic rules are the same as tag. One person is "Mr. Yuck" and the others run. When you get tagged you may cover your "wound" with one of your hands. When you get tagged a second time, you may cover your "wound" with your other hand. The third time you get tagged, you are out.
REQUIREMENTS: Number of Players: 10 and up Ages: 8 and up Activity Level: high Equipment: none	

GAME IDEAS

Aggie Adventures for Kids

(Try and keep games to the theme of the camps by switching the names of the games and switching the characters to fit the themes)

GIANTS, ELVES, WIZARDS

OBJECTIVE: to win	DESCRIPTION: This is like paper, rocks and scissors but with actions. The way it works is this: the giants stomp the elves, the elves chase the wizards, and the wizards zap the giants. You will have two teams on opposite sides of a line. Each team will decide on an action to take. Every team member must agree on what action they want. Then on the count of three each team performs their actions. Whomever wins will then chase the other team and tag as many people as they can. The object is to get everybody on one side.
REQUIREMENTS: Number of Players: 10 and up Ages: 8 and up Activity Level: high Equipment: None	

MULTIPLE SPONGE RELAY

OBJECTIVE: fastest team	DESCRIPTION: At one end of the line there is a bucket full of water, and at the other end, an empty bucket. Each is being manned by a counselor. • Team members sit one behind the other in line between the two buckets • To start, the counselor dips the sponge in the water, then the campers pass the sponge back over their heads to the empty bucket at the end. • The counselor at the empty bucket wrings out the sponge, then passes it back to the front of the line. • All sponges may be passed back and forth at the same time. You do not have to wait for one to return to pass the next one • The team to fill their empty bucket first wins.
REQUIREMENTS: Number of Players: any Ages: any Activity Level: high Equipment: lots of sponges, water buckets, empty buckets	

OCTOPUS

OBJECTIVE: to be the last one	DESCRIPTION: Two people are chosen to be the octopuses. The stand in the middle of the field. All the campers are one one side. The counselor in charge calls octopus and the campers all run from one side to the other trying not to get caught by the octopus. If they are caught they must sit down and become seaweed, meaning they can tag someone if they run by them, but they cannot move from where they are sitting, they can tag by using their hands. The last person who isn't caught is the winner.
REQUIREMENTS: Number of Players: medium and large groups Ages: 8 and up Activity Level: high Equipment: none	

GAME IDEAS

Aggie Adventures for Kids

(Try and keep games to the theme of the camps by switching the names of the games and switching the characters to fit the themes)

SMURFS AND GARGAMELS

OBJECTIVE: not to get tagged	DESCRIPTION: You have two teams standing on opposite sides of the area. The smurfs are one team and gargamels are the other. The smurfs try to tiptoe to the gargamels. A neutral person will yell, "smurfs are here". The gargamels then turn around and have to try to tag the smurfs. The smurfs need to run back to their side. The last smurf standing wins. Variation - Red Light Green Light
REQUIREMENTS: Number of Players: 10 and up Ages: 8 and up Activity Level: high Equipment: None	

TYPHOON

OBJECTIVE: fastest team	DESCRIPTION: • One team member sits on the ground at one end of the field while the rest of the team lines up behind the bucket of water. • First runner dips cup into bucket and runs to team member sitting at other end of field • When runner reaches the other team member, he/she throws the water onto him/her and yells "Typhoon" • The runner then takes the place of the sitting member who runs the cup back to the next person in line. • The first team to get all of their members through the relay wins.
REQUIREMENTS: Number of Players: any Ages: any Activity Level: high Equipment: water buckets, plastic cups	

COOKIN' UP SCIENCE NOTEBOOK

4-H AGGIE ADVENTURES FOR KIDS

UtahStateUniversity
COOPERATIVE EXTENSION

COOKIN' UP SCIENCE NOTEBOOK

Aggie Adventures for Kids

DANCING CEREAL	
Prediction:	
Does it matter what kind of cereal we use?	
What does the magnet do?	
How do you think it works?	
STRAW THROUGH POTATO	
Prediction:	
How do you think this works?	
EXTRACTING DNA FROM STRAWBERRIES	
Why did it work?	
THE CLEANING POWER OF TACO SAUCE	
Prediction:	
Which one worked the best?	
Why do you think so?	

COOKIN' UP SCIENCE NOTEBOOK

Aggie Adventures for Kids

GHOST IN YOUR KITCHEN	
Prediction:	
How long did it take for your message to appear?	
What other juices worked?	
EGG IN A BOTTLE	
Prediction:	
How did the egg go into the bottle?	
Do you think we could get it to work any other way? Why?	
CORNSTARCH GOO	
Prediction:	
What happened when slapped the goo?	
Why doesn't it splash?	
CANDY SPARKS	
Prediction:	
How did we get the candy to spark?	