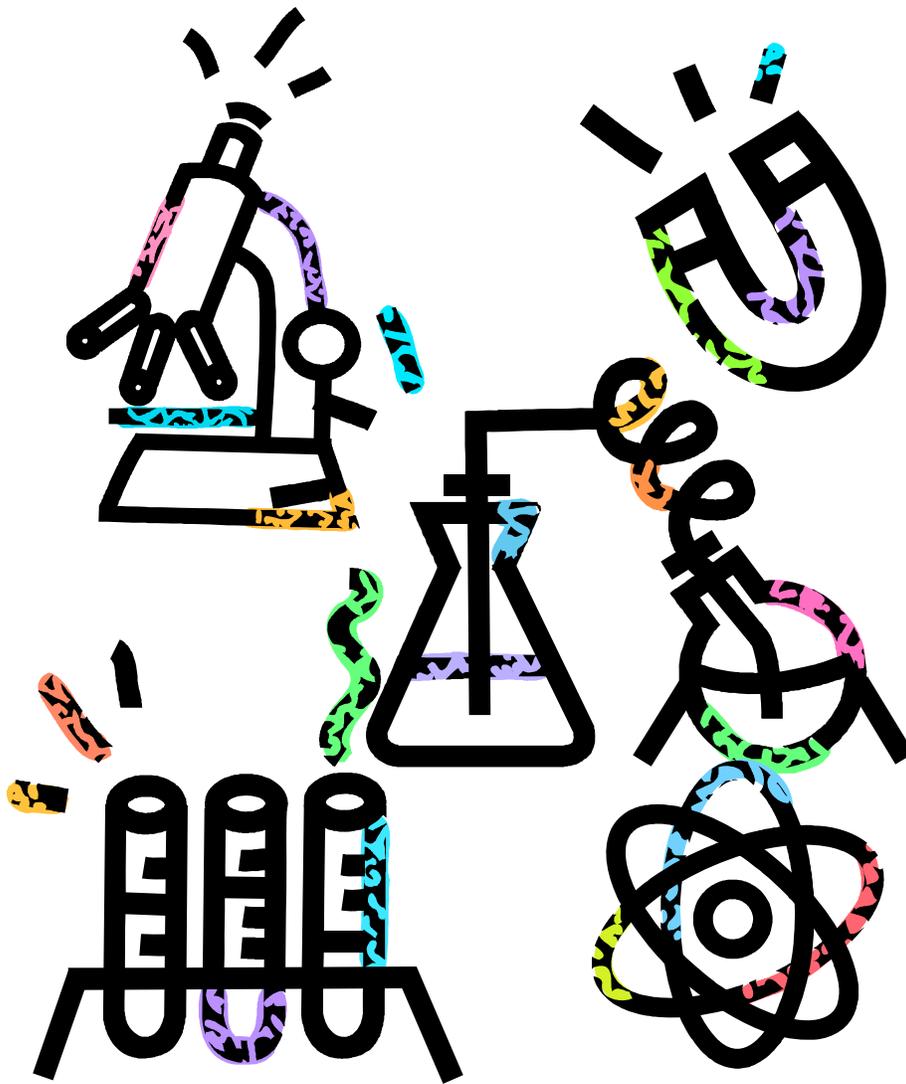


After Dinner Science



Grab and go project developed by:



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Table of Contents

	Page
How to Use Grab and Go	3
Sample Meeting Schedule	4
Why Don't Vampires Like Garlic? Food Trivia and Facts	5
Lessons:	
1. Color Changing Milk	6
2. Eating Nails for Breakfast	7
3. Poor Man's Lava Lamp	8
4. Splitting the Smartie	9
5. Mentos Geyser	10 -11
6. Chocolate Lava	12
7. Aunt Ginny's Gum Drops	13
8. Burstin' Bubbles	14
9. Chomp and Glow	15
References	16

How to use the Grab and Go project bag

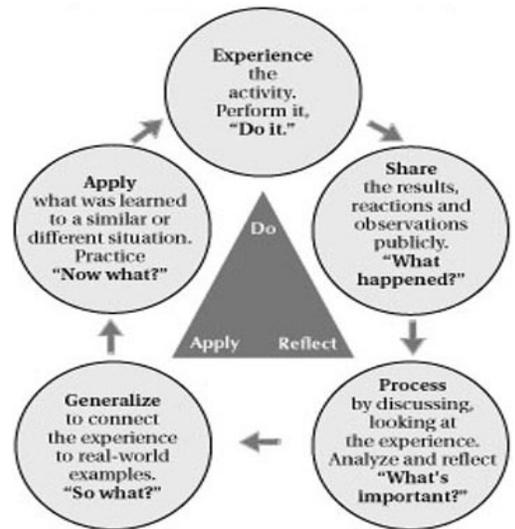


This After Dinner Science Grab and Go Project Kit is designed to give you the chance to explore a project topic. The bag can be geared for use at project meetings, club meeting activities, demonstration ideas, and Clover Kids exploration. Day camps have been created using these materials. There are lesson plans and equipment to help make the learning more hands on, interactive and fun. Using this resource with 4-H project literature enhances the experience even further.

This Grab and Go kit has all that you need to lead a group of young people through a terrific life skills experience. The models that help provide a positive youth development experience in 4-H are the Experiential Learning Model and the Iowa Targeting Life Skills Model.

Experiential Learning Model:

Each activity follows this model and provides volunteers with formulated questions for 4-H members to achieve and apply the identified skills that are learned.



Targeting Life Skills Model
Patricia A Hendricks
Iowa State University

Project Objectives:

1. To learn about the science of food by participating in hands-on food experiments.
2. To learn goal setting, planning and record keeping by recording food experiment results.
3. To practice personal safety and healthy lifestyle choices by participating in project activities.
4. To demonstrate leadership traits by communicating and cooperating in team settings.
5. To develop critical thinking, problem solving and decision making skills by completing food science experiments.

4-H



Make a World of Difference





Sample Meeting Schedule

Early Activity:

As youth come in let them draw a picture of what a scientist looks like. Discuss results when they are finished. Discuss any stereotypes that might exist in the drawings.

Pledges

Roll Call:

- Name different types of scientists.
- Name different equipment used in conducting experiments (lab coat, goggles, test tubes, beakers, tweezers).

Business

When members are recognized during the meeting they should raise their hand and say "mad science."

Program:

- Choose several science activities in the project book.
- Have a skill-a-thon using an activity from the kit.
- Go on a field trip.
- Have a guest speaker.
- Teach demonstration techniques using an activity from the kit.

Recreation:

"It matters knot"

Explain the principle of matter found in Aunt Ginny's Gum Drops activity. Gather youth and ask them to stand in a tight circle. Have each youth grab hands from 2 different people in the circle creating a "knot." The challenge is to figure a way of untangling themselves without breaking hands and ending up standing in a circle from where they first started.

Refreshments:

Serve Gatorade out of a beaker and place trail mix in test tubes.



Bits and Bites

Why don't vampires like garlic?

Food Trivia and Facts

- Soda or pop? This drink makes up more than 25% of all the drinks chugged in America. Every year, Americans drink more than 15 billion gallons or 60 billion liters!
- Americans eat more than 1 billion pounds of popcorn every year. — about 70 quarts per person.

Centuries ago people thought garlic was magical. They thought it could cure diseases, help aches and pains and give people courage. Since vampires don't like strong odors, they kept away from it.

1. The most popular day to eat out in the United State is _____.
(Saturday)
2. Americans eat _____% of their meals away from home.
(35%)
3. _____ million people in America suffer from food poisoning every year.
(66)
About _____ become so ill that they die from it.
(5000)
4. In a year, you should drink about _____ cups of water.
(3000 or 710 liters)
5. Cashew nut shells are poisonous. True or False
(True)
6. Granny Smith apples are favorites of many. But is this fruit named after a real person?
(Yes)
(Maria Ann Sherwood was born in England in 1799. She married Thomas Smith and they moved to Australia. She grew this tree in her backyard. By 1896 this apple was being shipped around the globe.)
7. During your lifetime you will eat about ____ chickens, ____ cows, ____ sheep and ____ pigs.
1400=chickens 21=cows 14=sheep 12 =pigs
8. What spice is called "king of the spices"?
(Pepper) (It comes in black, white, green, and pink. It is one of the most used spices in the world.)
9. What is the third most popular item sold at grocery stores?
(Breakfast cereal, after sodas and milk)
10. If you're cool as a cucumber it means you're pretty relaxed. But are cucumbers really cooler?
(yes, scientists have proven that cucumbers are full of water, which makes them 20 degrees cooler than the temperature of air.)

Source: [Everything but the Kitchen Sink](#). Wishinsky, Frieda and Elizabeth MacLeod. Scholastic 2008.

Lesson 1 Color Changing Milk

Did you know? Milk is mostly water but it also contains vitamins, minerals, proteins and fat. Fats and proteins are sensitive to changes in the milk. When you add liquid soap, the weak chemical bonds that hold the proteins in solution are altered. The molecules of protein and fat change shapes in all directions. The food color molecules are bumped and shoved (kind of like bumper cars). At the same time, soap molecules combine to form a micelle, or cluster of soap molecules. These micelles distribute the fat in the milk. This rapidly mixing of fat and soap causes swirling and churning where a micelle meets a fat droplet.

Another reason the color explodes is because of the water surface tension. Liquid soap breaks the water surface tension allowing the colors to mix throughout the milk.

Life Skills:	Head	Critical Thinking
	Heart	Cooperation
	Hands	Contribution to Group Effort
	Health	Healthy Lifestyle Choices

Materials:

- 1 plastic plate
- Liquid soap (Dawn works best)
- Cotton swab
- Food coloring
- Room temperature milk (whole, skim, cream, 2%, and others)
- Water



Steps:

1. Pour just enough milk into the plate to cover the bottom.
2. When the milk is still put a drop or two of each food color on the milk (keep drops close together in the center of the plate).
3. Observe what happens to the food color.
4. Dip the cotton swab into the soap and then into the center of the milk. Hold the swab in the milk for a few seconds and see what happens.
5. Repeat the experiment using water in place of milk.
6. Try other kinds of milk and see what happens.

Debriefing:

- Share: What did we just do?
- Process: What happened to the food color?
- Generalize: What happens with different types of milk?
What kind of milk produces the best swirling of color?
- Apply: What if we used cold or hot milk? How would it change the experiment?
What happens when water is used instead of milk?
What is surface tension? Protein? Fat? Molecules?

Source: Steve Spangler Science. www.stevespanglerscience.com

Lesson 2 Eating Nails for Breakfast?

Did you know? Is the mineral Iron in your diet? Read the food guide label on Multi-Grain cheerios or other grain cereals. It “says” it provides 100% of needed daily iron, but is it really there?

Life Skills:	Head	Critical Thinking
	Heart	Cooperation
	Hands	Contribution to Group Effort
	Health	Healthy Lifestyle Choices

Materials:

- Bowl
- 2 cups of multi-grain cheerios
- Ziploc bag
- Water
- Fork
- Plastic coated magnet
- Paper Towel



Steps:

1. Take 2 cups of the cereal and place in a zip loc bag and seal.
2. Gently make sure the air is out of the bag and smash the cereal until it's a fine powder.
3. Pour powdered cheerios into a bowl.
4. Add 3 cups of water.
5. Stir with a plastic coated magnet for 30 seconds more or less.
6. Pull out the magnet. See if there are iron filings on the magnet.
7. Wipe on a white paper towel.

Debriefing:

Share:	What did you observe?
Process:	What did you learn about iron? What did you learn about iron and the daily allowance in breakfast cereal?
Generalize:	What key points have you learned? Why is it important to have plenty of information before making decisions?
Apply:	How can you use what you have learned to choose healthy breakfast cereals?

Source: Johmann, Carol A. and Rieth, Elizabeth J. (1996). Gobble Up Science. Creative Teaching Press, Inc.

Lesson 3 Poor Man's Lava Lamp

Did you know? This experiment is about carbon dioxide. Why it works: Carbon dioxide (the bubbles you see) from the club soda build up in the wrinkles of the raisins. The gas attaches to the raisins and they eventually lift the raisins to the surface. Once the bubbles (gas) escapes on surface, the raisins sink to the bottom again to repeat the cycle. The effect lasts longer in a sealed bottle of club soda because less carbon dioxide is able to escape.

Life Skills:

Head	Problem Solving
Heart	Cooperation
Hands	Leadership
Health	Character

Materials:

- Bottle of Club Soda
- About 6 to 10 raisins
- Drinking glass

Steps:

1. Open the bottle of club soda.
2. Drop in a few raisins.
3. Reseal the cap tightly on the bottle.
4. You can also do this in a drinking glass as well.
5. Compare the raisin action in the bottle vs. the glass.

Debriefing:

Share: What did you observe?
Process: Try using diet soda vs. regular soda– what happens?
What happens if you use warm vs. cold soda?
Generalize: What key points have you learned?
Apply: How does carbon dioxide work?

Source: Johmann, Carol A. and Rieth, Elizabeth J. (1996). Gobble Up Science. Creative Teaching Press, Inc.



Splitting the Smartie

Did you know? Chromatography is a method of separation. It is used by the police and the F.B.I. to analyze certain evidence at crime scenes!

Life Skills:

Head	Problem Solving
Heart	Social Skills
Hands	Contributions to group effort
Health	Self-Discipline

Materials:

- Coffee filter
- Tube of Smarties
- Small cup of water
- Plate



Steps:

1. Place the filter paper on the plate on a flat surface in front of you.
2. Place a Smartie in the center of the paper.
3. Dip your finger into the water and hold it above the Smartie allowing a little water to cover the sweet.
4. Repeat fairly slowly until the Smartie is quite wet and the circle of water on the paper is about 5 cm across.
5. Leave.
6. In a while you should be able to see rings of color around the Smartie.
7. You may now eat the Smartie.

Debriefing:

- Share: What did you observe?
- Process: How long did it take to see the rings of color around the Smartie?
- Generalize: What did you learn about hydrophilic action?
What did you learn about capillary action?
- Apply: What else besides oil might be a hydrophobic molecule?

What happened:

The color in the sugar coating of the Smartie shell dissolves in the water. The water is drawn out through the paper by capillary action and moves in a growing circle. The different inks which make up the Smartie color move at different speeds and so they are separated. At the “molecular level” smaller hydrophilic molecules migrate faster through the paper. Hydrophilic means a “water-loving” substance as opposed to hydrophobic compounds which are not soluble in water. Cooking oil is an example of a hydrophobic substance. The colors that migrate the furthest from the candy have less of a mass than the ones closest to the candy. Note that once the shell is wet, the Smartie is not so crispy!

Source: Kathy Booher and Jill Stechschulte, Extension Educators, NCI. 2008.

Lesson 5 Mentos Geyser

Did you know? On April 23, 2008, students in the Belgian city of Leuven set a world record by simultaneously launching 1,360 of these Mentos Geysers! Besides making rockets with cola and Mentos, you can also make rockets. By unscrewing the lid until a thin stream of soda shoots out and by slamming the bottle horizontally on the ground, pressure is created and causes the bottle to launch!

Life Skills:	Head	Learning to Learn
	Heart	Concern for Others
	Hands	Leadership
	Health	Self-responsibility



Materials:

- 2 liter of Diet Pepsi or Diet Coke
- Roll of Peppermint Mentos

Steps:

1. Find a flat space outside!
2. Carefully open the bottle of soda. Make sure it is on a flat surface so it won't tip over.
3. Place the Mentos in a paper funnel over the soda bottle or using the test tube baby bottle in your kit.
4. Don't drop them in the bottle just yet! Make sure everyone is standing back.
5. Drop the Mentos in the bottle at the same time and then get back as fast you can!
6. The eruption will start as soon as the first Mentos hits the soda.
7. They will want to do it again and of course you oblige them :)



Debriefing:

- Share: Pretend you just saw this on TV. What happened?
- Process: Why use diet soda instead of regular soda?
- Generalize: What is going on in this experiment with the Mentos?
- Apply: What else could we do with this experiment? How is this a similar effect when cooking potatoes or pasta in boiling water?

What happened:

The soda is basically sugar or diet sweetener, flavoring, water and preservatives. The thing that makes the soda bubbly is carbon dioxide which is an invisible gas. Carbon dioxide is pumped in using tons of pressure at the factory. Until you open the bottle the gas mostly stays suspended in the liquid and cannot expand to form more bubbles, which gases naturally do.

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, water molecules must push away from each other. It takes extra energy to break the surface tension. Water is actually resisting the expansion of bubbles in soda.

When Mentos are dropped into the soda, the gelatin and gum Arabic from the 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.

Source: Steve Spangler Science. www.stevespanglerscience.com

Lesson 6 Chocolate Lava

Did you know?

Chocolate is made from vegetables called cocoa beans! In fact, Christopher Columbus was said to have brought back cocoa beans to Spain for King Ferdinand from his fourth visit to the New World.

Life Skills:	Head	Learning to Learn
	Heart	Social Skills
	Hands	Teamwork
	Health	Character

Materials:

- Chocolate fudge mix and ingredients listed on box
- Saucepan
- 2 baking dishes
- Hotplate



Steps:

1. An adult will help in the kitchen with the stove or hot plate.
2. Make the fudge mix as written on the package.
3. As the fudge begins to boil pour half of it into a baking dish.
4. Begin to stir the other half for 10 minutes as it begins to cool down.
5. Pour this fudge that is cooled into the second baking dish.

Debriefing:

- Share: Observe the consistency of the mixtures. . How does it move as it was poured?
Process: What does it look like as you move the pan around as you pour?
Generalize: What happened to the surface of the baking pans?
Apply: Look at pictures of Hawaii and volcanic rock. What does lava look like?

What happened:

Two types of lava flow from volcanoes, they are named from the Hawaiian language. The fudge that was put in the first pan, as it was hot, flowed smoothly and formed a flat surface. This is similar to the texture of pahoehoe lava. Pahoehoe (pronounced pa-hoy-hoy) lava can form lava tubes and an undersea formation called pillow lava. The other fudge that was cooled formed lumps and makes a lumpy surface in the pan. This has an appearance like aa lava. Aa (pronounced Ah-Ah) lava produces sharp and twisted rocks that are difficult to walk on.

Source: Kathy Booher and Jill Stechschulte, Extension Educators, NCI. 2008.

Lesson 7 Aunt Ginny's Gum Drops

Did you know? Matter is anything that has mass and takes up space. There are three kinds of matter: liquid, solid, and gas. Let's see what kind of matter we will be observing today. All matter contains tiny particles called molecules. So why isn't all matter the same? In a gas, molecules are very far apart and they move about quickly in all directions. In a liquid, the molecules are closer together. They move about in all directions, but they do not move very far because they keep colliding. In a solid, the molecules fit together very tightly. Because of this, the molecules move together as one unit like a marching band.

Life Skills:

Head	Keeping Records
Heart	Sharing
Hands	Teamwork
Health	Self-responsibility



Materials:

- package of Jell-o
- bowl
- cup of water
- paper plate
- dropper
- fork
- index cards
- markers

Steps:

1. Your Aunt Ginny is famous for her home made gum drops. You remember the ingredients needed but not the exact recipe or the amounts. Today you will experiment using the ingredients given to make gum drops.
2. Using the dropper, slowly add 1 to 3 drops of water to the bowl of gelatin. Count to five.
3. Slowly swirl the bowl in a circular motion.
4. Use your fork to gently remove your results from the bowl.
5. Repeat the process. Use different amounts of drops of water. Record your results.
6. Aunt Ginny heard about your recipe. Write on a recipe card the ingredients and steps to make the best gum drops.

Debriefing:

- Share: What did you observe? What happened when you started adding more drops of water? How many drops of water made the best gum drops?
- Process: What did you learn about writing a recipe?
What did you learn about matter?
- Generalize: What key points have you learned?
Why is it important to have plenty of information before making decisions?
- Apply: How can you use these skills in different situations?
What other situations like this have you experienced before?

Source: Department of Curriculum and Instruction, Science, Rockville, Maryland, August 29, 2000
Lee Ann Zimmerman, 2004, College of Education / www.students.dsu.edu

Lesson 8 Burstin' Bubbles

Did you know? The bubbles in the Burstin' bubbles are filled with carbon dioxide. This is a gas that forms when the vinegar (an acid) reacts with the baking soda (a base).

Life Skills:	Head	Problem Solving
	Heart	Communication
	Hands	Contributions to Group Effort
	Health	Personal Safety

Materials:

- Water
- Measuring cup
- Zipper-lock plastic sandwich bags
- Paper towel
- Tablespoon
- Baking soda
- Vinegar

Steps:

- Step 1: The "burstin' bubble" experiment may be messy when the bags pop, so the best place to do this activity is outside. On a rainy day you might want to try it in the bathtub or the sink.
- Step 2: Test your Ziploc baggy to make sure it doesn't leak.
- Step 3: Tear a paper towel into a square about five inches by five inches. Put 1 ½ tablespoons of baking soda in the center of the square, then fold the square like a letter, bringing both top and bottom to the middle. Next, fold the left and right sides to the middles. This should make a nice and tightly folded "time-release" packet.
- Step 4: Pour ½ cup vinegar and ¼ cup of warm water into your open Ziploc bag.
- Step 5: Now for the tricky part. Put your "time-release" packet in the top corner of your bag, and zip the bag closed. Be careful not to drop the packet until you are ready.
- Step 6: Shake the bag and put it on the ground and move away! The bag will puff up and pop with a bang.

Debriefing:

Share: What did you observe? What happened to the bag when the packet was dropped in it?

Process: Some Other things you might try:
Use a different size Ziploc Bag.
Try to use cold water. Does this change your results?
Try a different type of paper to make the time release packet.

Generalize: What key points have you learned?
What happened when you tried the experiment with the above suggestions?

Apply: How can you apply what you have learned about carbon dioxide in other experiments like this one? Why is it important to have plenty of information before making decisions?

Source: www.exploratorium.edu/science-explorer/bubblebomb

Lesson 9 Chomp and Glow

Did you know?

Clarence Crane had been basically a chocolate maker. Chocolates were hard to sell in summer, however, and so he decided to try to make a mint that would boost his summertime sales. In 1912, candy maker Clarence Crane first marketed "Crane's Peppermint Life Savers". In 1913, Crane sold the rights to his Life Savers candy to Edward Noble for only \$2,900.

Mint triggers pain receptors in your mouth as well as exaggerates your taste. That's why things seem much colder or hotter after brushing your teeth with mint paste and then drinking something.

When you chomp down on the candy it splits up the sugar molecules. That causes an electric field in your mouth! Nitrogen gas gives off an ultraviolet radiation, which we can't see. But the UV makes the mint flavoring in the candy give off a blue flash. This flash is called triboluminescence meaning "light and rubbing."

Life Skills:	Head	Critical Thinking
	Heart	Communication
	Hands	Leadership
	Health	Self-responsibility

Materials:

- Mirror
- Wint-O-Green Life Savers
- A dark room

Steps:

1. Stand in front of a mirror in a very dark room and chomp down on a life saver.

Debriefing:

- Share: Describe the activity we just did.
Process: What did you see happen?
Generalize: What causes the sparks?
Apply: What happens after you've had a mint or used mint toothpaste and drank something cold?

Source: Everything But The Kitchen Sink. 2008 Scholastic.

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Notes: