Grades K to 6

What you need:
• Empty pop bottle
• 250ml of vinegar
• 15ml baking soda
• 5ml dishwashing liquid
• Dirt or clay or paper mache
• Food colouring (optional)

What to do:
1) Place the pop bottle in the shallow tray.
2) Mould the dirt or clay around the bottle to make the volcano.
3) Pour the baking soda into the bottle.
4) Add the dishwashing liquid.
5) Add the food colouring to the vinegar and pour into the bottle.

What’s going on?
A chemical reaction occurs between the baking soda and the vinegar, producing carbon dioxide gas. The gas creates enough pressure to force the liquid out of the bottle. Foam is produced because of the gas and the liquid mixing with the detergent.
Making A Simple Plant Press

Grades 1 to 9

What you need:
• Two pieces of thick, corrugated cardboard 23cm x 30cm (heavy packing boxes are good sources of thick cardboard).
• Six to ten sheets of newspaper, folded in half, or cut to the same dimensions as the cardboard.
• Four heavy duty rubber bands.
• Heavy objects to weight the press down (bricks or heavy books).

What to do:
1) Collect a plant specimen from your yard or school grounds. Try to collect only common or weedy types of plants. Do not collect rare or endangered plants, such as wild orchids. Be careful not to disturb or injure other plants when you are collecting your specimen.
2) Create a sandwich with the newspaper sheets between the cardboard pieces.
3) Carefully place the plant specimen between the newspaper sheets, making sure that there are several sheets on top and underneath the plant. Also, make sure that the plant is spread out and its leaves are flat.
4) Tightly secure the plant press with the rubber bands.
5) Place the bricks or heavy books on the plant press.
6) Wait for a few days until your plant specimen has dried. Remove it carefully from the press and tape it to a piece of heavy paper, or a page in a scrapbook.

What else you can do:
Collect different kinds of plants at different times of the year. When you tape them to your scrapbook pages, record where and when you found them. Look at pictures of plants in books from the library and see if you can identify the plants. Write the names of plants in your scrapbook.

Building Your Own Bog

Grades 1 to 6

What you need:
• Fish tank
• Some bog moss
• A layer of peat – 3 to 5 cm thick to cover the base of the tank
• Distilled water

What to do:
1) Cover the base of the tank with a layer of peat.
2) Saturate the peat with water.
3) Place the bog moss in the tank, on top of the peat.
4) Using distilled water, water the tank daily, if necessary, so that the water level remains just below the moss.

What's going on?
The peat makes the water acidic. Moss prefers an acidic environment to grow well. In a bog environment, like the one in the tank, the cycle is set up. Old moss dies and forms peat. This new peat makes the water acidic and helps more moss to grow. As long as the moss receives water regularly, the cycle will continue forever! This is how a bog is formed.
Spellbound Spaghetti

What you need:
• Water
• Large clear glass jar or vase
• Baking soda
• Vinegar
• Food colouring
• Large spoon
• Three strands of dried, uncooked spaghetti

What to do:
1) Put 750ml of water in the glass jar or vase. Add a few drops of food colouring, if you wish.
2) Add 30ml of baking soda.
3) Break three strands of spaghetti into small pieces of various lengths and add them to the jar.
4) Stir in 80ml of vinegar and watch what happens. Does the spaghetti float or sink? When the spaghetti starts to slow down, add more vinegar.

What’s going on?
A chemical reaction between the baking soda and the vinegar produces carbon dioxide gas that forms bubbles on the spaghetti. The bubbles float the spaghetti to the top. At the top, the bubbles burst, the spaghetti sinks, and the process starts all over again.

What else you can do:
Cook some pasta and observe if it expands when it is cooked. Pasta is a high-carbohydrate (starch) food. As it cooks, the molecules that make up the starchy relax and unfold, forming new bonds and creating a network that traps water molecules. The result? The pasta doubles in size.

This day in Science History
May 31, 1859
Big Ben, the most famous clock in the world began keeping time in London, England. Actually, Big Ben is the name of the bell inside the clock tower, not the clock.

June 15, 1956
The Vancouver Aquarium opened its doors on this date. The largest aquarium in Canada, it has over 7,000 fish, 10,000 invertebrates, 125 snakes, frogs, turtles and newts, and 45 birds and mammals.

April 30, 1932
John Cockroft and Ernest Walton announced that they had split the atom.

August 10, 1954
Work began on the St. Lawrence Seaway, a joint Canada—United States project to provide passage for ships between the Great Lakes and the Atlantic Ocean, avoiding the long, dangerous voyage around South America.

November 16, 1966
The Leonid meteor shower – the greatest meteor shower on record – occurred at night. Up to 2,340 meteors per minute streaked across the Arizona sky.

Tiny Plants – Big Pop

What you need:
• One package of yeast
• 30ml of sugar
• 250ml warm water
• 2 litre plastic pop bottle
• Cork
• Vaseline

What to do:
1) Put some Vaseline on a cork that fits the opening of the pop bottle.
2) Measure some warm water from the tap and pour it into the pop bottle.
3) Add the yeast and sugar.
4) Stir gently.
5) Watch and listen.

What’s going on?
Yeast are tiny plants. They convert sugar and water into alcohol and carbon dioxide gas. It is the carbon dioxide that builds up inside the pop bottle until the pressure is enough to push out the cork with a pop. Be careful – keep the bottle pointed in a safe direction, away from living and breakable objects.

This day in Science History
December 15, 1654
Three hundred years of weather reports. The oldest known weather station was established in Tuscany, Italy to record daily temperatures.

October 3, 1922
Half a century before fax machines became widely used C.F. Jenkins sent a facsimile picture over telephone lines between government buildings in Washington, D.C.

September 3, 1962
The Trans-Canada Highway – at 7,790 kilometres, the longest national highway in the world – was completed. It begins in St. John’s, Newfoundland and ends in Victoria, British Columbia.

April 30, 1815
The greatest volcanic eruption in modern history began. Tambora on the Indonesian Island of Sumbawa spewed out 148 - 176 cubic kilometres of rock and the volcano lost 1,250 metres off its top.

May 3, 1836
John Whiting patented baking powder. When the powder gets moist, it releases carbon dioxide gas, causing baked goods to rise.
Creating Your Own Paper

Grades 4 to 6

What you need:
• Two fine nylon screens (20cm x 30cm) in wooden frames
• Construction paper (any colour) and white paper
• Plastic tub approximately 60cm x 50cm
• Good sponge
• Blender
• Blender
• Cornstarch (60ml per tub)

What to do:
1) Rip the paper into small pieces for the blender.
2) Add water to the blender (3/4 full), then add the paper.
3) Turn the blender on for approximately 40 seconds to make pulp.
4) Fill the tub with water (3/4 full).
5) Put the pulp from the blender in the tub.
6) Using the pulpy water in the tub, continue to make more pulp in the blender until the pulp solution is thick (approximately six to seven mixes).
7) Use one of the screens and slowly screen out the pulp.
8) Place the second screen over the pulp in the first screen, and sponge or towel it dry. The pulp will now be like paper.
9) Remove the paper and let it dry.

This day in Science History

September 25, 1956
The first transatlantic telephone cable started operation. It carried 48 phone lines and connected Britain, Canada, and the United States.

January 30, 1947
A blizzard raged in Regina, Saskatchewan for 10 days – the worst storm in Canadian history. A train was found buried in a snowdrift one kilometre long and eight metres deep.

February 25, 1968
Discovery of the first pulsar was made by Dr. Jocelyn Bell of Cambridge, England. Pulsars are spinning space articles that emit rapidly pulsating radio signals.

April 20, 1888
The world’s largest termite mound was found at Hayes Creek in the Australian outback. The mound measured 6.4 metres high – that’s taller than a giraffe!

July 6, 1885
French doctor Louis Pasteur made the first vaccination for rabies. His vaccine saved the life of a nine year old boy, and many more people since.

H2O on the Go
Grades 4 to 8

What you need:
• Aluminum foil pie plate
• Piece of string about 45cm long
• Scissors
• Nut from a bolt (or another small weight)
• Eraser
• Ruler
• Tape
• Water source
• Pencil

What to do:
1) Cut the circular bottom of an aluminum foil pie plate. Make eight equally spaced cuts toward the centre of the foil circle. End each cut about 2cm from the centre.
2) Use a ruler to fold one edge of each section of the plate to make small ledges.
3) Punch a hole in the centre of the plate and push the pencil through it. The pencil should fit snugly in the hole; secure the pencil in place with tape.
4) Hold the wheel under a slow stream of water (e.g. garden hose or kitchen faucet) so that the water hits the blades. Let the ends of the pencil rest lightly between your thumbs and index fingers. The wheel should turn smoothly.
5) Increase and reduce the flow of water. What happens to the wheel?
6) Tie one end of a piece of string to the pencil and attach a weight. The water wheel should wind the string onto the pencil, lifting the weight.

What’s going on?
Water power is based on water at a higher level having more potential energy (stored energy) than at a lower level. When flowing from a high to a low level, water gives up some potential energy. This changes to kinetic energy (energy of motion) as the water falls. Moving water can turn a bladed wheel, transforming the kinetic into mechanical energy. In the past, mechanical energy from water wheels was used to grind grains and saw timber. Today, moving water is used primarily in generating electricity. Power plants are built at the foot of high dams. Powerful jets of water shoot through pipes from a reservoir. The water hits the blades of dozens of water wheels, which turn the electric generators.

This day in Science History

July 30, 1921
Canadian researchers Frederick Banting and Charles Best discovered insulin, the chemical that controls blood sugar levels. In 1923, Banting and Best won the Nobel Prize for the insulin discovery.

September 6, 1952
The Canadian Broadcasting Corporation aired its first television broadcast. The program originated from CBFT in Montreal, Quebec.

November 16, 1896
Was the official opening of the Suez Canal through Egypt. For the first time, ships could sail between Europe and the Far East without having to make the long, dangerous trip around Africa.

December 18, 1869
William F. Semple patented chewing gum. It was a mixture of rubber, sugar and flavouring.

October 25, 1960
The first electric wristwatch was introduced. Before this, watches had to be wound up to keep them running.
A Huff and a Puff  

**Grades 4 to 8**

**What you need:**
- One large plastic bag
- A 2-litre measuring jug full of water
- A marker pen to write on the bag
- A plastic funnel

**What to do:**
1) Grasp the top of the bag, as if you were going to blow it up and burst it.
2) Make the mouth opening wide enough to breathe into it with your mouth open.
3) Squeeze all of the air out of the bag.
4) Breathe twice normally.
5) On the third breath, breathe in as much air as you can.
6) Put the plastic bag to your open mouth.
7) Pinch your nose and breathe out hard all at once into the bag.
8) Bend forward and squeeze every last drop of air out of your lungs.
9) Close the bag tightly at the top.
10) Slide your hand down the neck of the bag, pushing the air to your mouth open.
11) Draw a line on your bag where you’re holding it, in case you lose your grip.
12) Hold the bag firmly and put the funnel in the neck of the bag (you can let the air escape).
13) Carefully pour the water from the measuring jug into the bag until it’s as full of water as it was air.
14) Make a note of how much water you poured into the bag.

**What else you can do:**
Have your friends try this, and then compare your lung capacity with theirs.

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Water Mix Up  

**Grades 7 to 9**

**What you need:**
- Six or more glasses
- Hot water
- Salt
- Corn syrup
- Cooking oil
- A 2-litre measuring jug on the bag
- A paper towel
- A large plastic bag
- A marker pen to write on the bag
- A plastic funnel
- A spoon
- Cold water
- Four different colours of food colouring (blue, yellow, red, green)

**What to do:**
1) Take four glasses. Put cold salt water in one, cold fresh water in one, hot salt water in one and hot fresh water in one.
2) Add drops of different food colouring to each glass and stir. The food colouring makes it easier to tell the liquids apart; it does not affect their density.
3) Take a clean glass and carefully pour into one of the liquids in each glass. Try cold salt water next; cold fresh water next; hot salt water next; and finally hot fresh water. Be careful not to mix the layers as you pour. Add a new layer by tilting the glass slightly and running a new liquid along the side of the glass.
4) Take another clean glass and try pouring the layers in a different order. What happens this time?
5) Experiment with different temperatures of water and different amounts of salt. Then try layers of corn syrup and oil and water.

**What’s going on?**

The heavier the liquid, the greater its density. A liquid less dense than water will float on water; a liquid that is more dense will sink.

**What else you can do:**
Put different food colours (avoid yellow) in a glass of water and a glass of corn syrup. Make a liquid layer creation with oil on the top, water in the middle and corn syrup on the bottom. Try adding the three liquids in different orders. Does changing the order change the final positions of the liquids in the glass? Did you discover that oil is less dense than water but corn syrup is more dense?
Composting Apples and Oranges

**What you need:**
- Four slices of apple or pieces of orange peel
- Transparent tape
- Soil
- A clear bag
- Two pickle jars
- A large spoon

**What to do:**
1. Place two identical slices of apple or orange peel in a clear plastic bag. Tape the bag shut to ensure it remains sealed.
2. Fill the jars with soil and label them 1 and 2. Use the spoon to dig a hole in jar 1, and bury the wrapped fruit.
3. Dig a hole in jar 2 and bury two identical unwrapped pieces of fruit or peel.
4. Moisten the soil in both jars with water.
5. Water the jars ever other day and loosen the soil gently with the spoon. Try not to break the unwrapped fruit or puncture the bag of wrapped fruit.
6. Write down what you think will happen to the fruit in the two jars after one week and after two weeks.
7. At the end of the first week, look in the jars and write down what you see.
8. Carefully scoop out the fruit, leaving the wrapped fruit in the plastic. What changes do you see? Write them down.
9. After you’ve noted the changes, bury the wrapped fruit again.
10. Leave the jars for another week, bury the fruit again.
11. Leave the jars for another week, then write down what you see at the end of two weeks.

**What’s going on?**

Compost forms when organic matter decays or rots. The decay or decomposition of organic matter is brought naturally by decomposers like bacteria, fungi, earthworms and snails, which require oxygen to live. The fruit in the plastic bag simulates the way in which much of our garbage is disposed of—in plastic bags taken to landfill. Plastic bags slow or stop the breakdown process because they prevent oxygen and some decomposers from reaching the organic matter.

Marshmallow House Challenge

**What you need:**
- Toothpicks
- Two books
- Mini-marshmallows

**What to do:**
1. Build a big free-standing structure as you can with 20 toothpicks and 10 marshmallows.
2. Try to have your structure support one book. Then try two books.
3. Try to build another structure with 30 toothpicks and 10 marshmallows (re-use the materials from your first structure). How many books will your second structure support?

**What’s going on?**

This challenge will give you a chance to try out different base shapes for a structure, as well as use some rather unique building materials. Think about which shapes are strong and how these shapes can be combined to make a strong structure. Think about the shapes of bridges, furniture, houses and other buildings, and think up some new shapes to try too!

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May 9, 1873
English archeologist Howard Carter was born in 1873.

Carter found the magnificent underground tomb of Egyptian Pharaoh Tutankhamun in the Valley of the Kings, hidden for thousands of years.

June 30, 1908
A meteorite exploded in the Tugunski forest in Siberia and levelled trees for 1,945 square kilometres. Dust from the explosion caused nights to be abnormally bright for thousands of years.

July 26, 1971
The Lunar Rover, a collapsible electric car, became the first to be driven on the moon. Powered by a 36-volt battery, its top speed was 14 kilometres per hour.

August 3, 1876
Alexander Graham Bell in Brantford, Ontario, successfully made the first telephone call. The military discovered that Jupiter had moons. Before this, people thought that only the earth could have a moon. Galileo helped prove that the sun, not the Earth, was the centre of the solar system.

September 27, 1905
German scientist Albert Einstein published a paper that introduced the relationship between energy and mass, expressed in his formula E = mc². This stands for energy = mass x speed of light squared.

October 8, 1937
Ruth Wakefield invented the chocolate chip cookie. She put chunks of chocolate into cookie dough, thinking that heat would melt the chips. It didn’t—and a new cookie was born.

November 1, 1940
Boys exploring a cave in Lascaux, France found beautiful prehistoric paintings of bison and other animals. The paintings dated from 17,000 years ago. This cave was closed in 1962 because moisture from people’s breath was ruining the paintings.

January 8, 1610
Italian Astronomer Galileo discovered that Jupiter had moons. Before this, people thought that only the earth could have a moon. Galileo helped prove that the sun, not the Earth, was the centre of the solar system.

March 30, 1858
American inventor Henry Lipton patented a pencil with an eraser attached to one end.
Making a Sound Map

Grades 6 to 12

What you need:
• A large piece of paper or card
• A pencil crayon

What to do:
1) Choose a comfortable place to sit in your schoolyard. (This activity requires that you sit quietly for a while and listen to all the sounds around you).
2) Take a piece of paper and draw an X in the middle of it. This shows where you are sitting.
3) Close your eyes and listen.
4) When you hear a sound, open your eyes and make a mark on the paper that represents the sound. For example, wavy lines might mean the wind; a jagged series of lines might mean a bird’s call.
5) Make sure the position of the mark on the paper gives a true idea of the direction and distance of the sound.

What’s going on?
When scientists study noise levels, they might make sound maps. You have just made a sound map of your schoolyard.

What else can you do:
Make a sound map at different times of the day. Compare the maps. What differences can you hear? How many different sounds did you hear? Were there any sounds you had never heard before? Were there any sounds you could not identify?

Seventh Generation Club
Mission Statement

To create a club where First Nations youth can envision their future by recognizing their own energy, the culture of their people, and the teamwork needed to succeed by giving them opportunities to make healthy life choices, participate in their community, and to meet the challenges of life.

The Seventh Generation Club would like to thank the following partners:

Health Canada
Indian and Northern Affairs Canada
First Nations Chiefs' Health Committee
BC Hydro

Administration and coordination is provided by the First Nations Schools Association