It's All In The Family
Hosting Family Science Celebrations
At Your School And In Your Community

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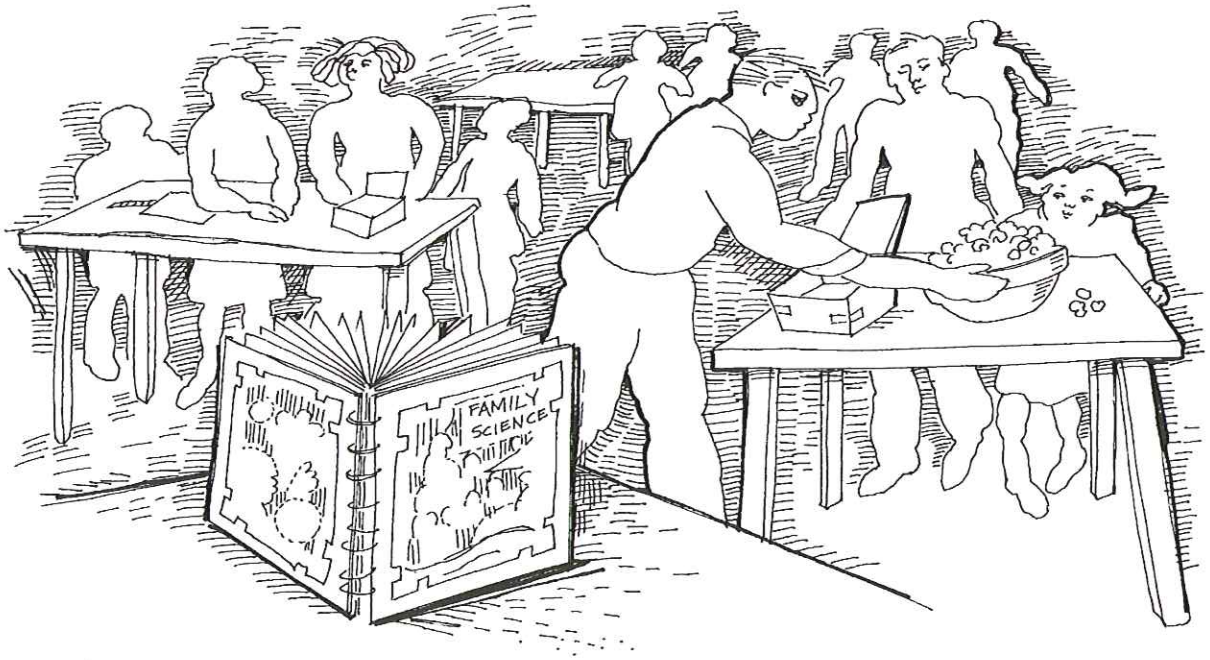
www.familyscience.org



What Is Family Science?

FAMILY SCIENCE is an informal science education program that gives parents and children an opportunity to work and learn together. Hands-on activities that use easy-to-find, inexpensive materials let families explore the ways in which science plays a role in daily life.

Parental involvement in FAMILY SCIENCE is key to the program's success. By showing an interest in science and making time to explore ideas and conduct simple investigations, parents can have a positive influence on children who may otherwise decide that science is too hard, too abstract, or boring. An added benefit of FAMILY SCIENCE activities is that they provide parents with a link to school science curriculum. Doing science at home opens the door to talk with kids about what they're learning in school and can help reinforce the idea that anyone can be a scientist.

Teachers, parents and others interested in promoting FAMILY SCIENCE in their community may want to hold an event based on the concepts and activities presented in this book (see Chapter 8 for more information). The format, location and scheduling of an event should respond to the needs of local communities or neighborhoods. During FAMILY SCIENCE events, parents and children work cooperatively in pairs and small groups to solve problems and "talk science." The hands-on activities provide fun experiences for the entire family that build skills, confidence and excitement about science learning.

What are the specific goals of FAMILY SCIENCE?

To make science more accessible to families by offering:

- a non-threatening, hands-on approach to learning scientific processes, concepts and themes.
- cooperative learning activities which develop problem-solving, questioning and communication skills.
- strategies for encouraging all students to pursue scientific study.
- opportunities for families to participate in group science activities.

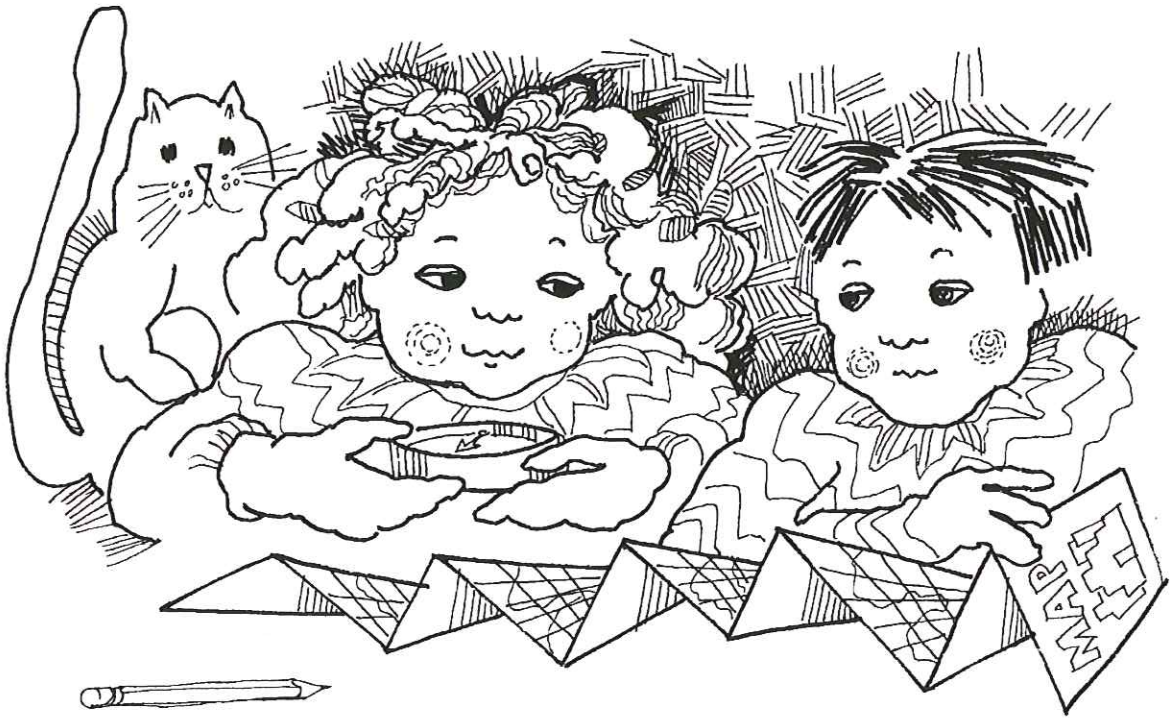
To demonstrate the relationship between science education and future career choices by providing:

- activities that highlight the relevancy of science to daily life.
- a forum for guest presenters to share information with families about various jobs and how they relate to science.

- a historical perspective on science discoveries that highlight various contributions of people from different cultures.

To get parents more involved in their children's science education by encouraging:

- participation in informal learning activities which supplement children's formal school science experiences.
- parental interest and involvement with school science curriculum.
- families to do science activities at home using inexpensive and readily available materials.
- adults and children to be partners in learning.



Move It

Age:
5-13

Participants:
Group, Family, Pair

Supplies

- *marble*
- *large bowl*
- *paper*
- *pencil*
- *ruler*
- *8 nickels*
- *small, empty plastic soft drink bottle with cap*
- *water*
- *mug*
- *playing card*
- *safety glasses recommended*

Rim Roll

- Put a marble in a bowl.
- Without touching the marble or lifting the bowl, can you make the marble roll around the side of the bowl?

It takes some kind of force to start an object moving. Move the bowl in circles on the table until the marble is rolling around the side of the bowl. Objects at rest tend to stay at rest and objects in motion tend to stay in motion unless acted on by an outside force. This property is called inertia. The inertia of the moving marble keeps it on the side of the bowl. People in a moving car also have inertia. When the car stops suddenly, they will keep moving forward unless they are wearing seat belts. This is why seat belts are so important. Seat belts help stop the forward movement.

Making Change

- Draw a line 8 inches (20 centimeters) long.
- Place 8 nickels on the line touching each other.
- Staying on the line, slide the first nickel in the row away from the other nickels.
- The challenge is to make space between the last nickel and the rest of the line. However, you can only touch the first nickel and you must stay on the line.
- What would you do if you wanted to move the last 2 or 3 nickels?

In this activity, you provide the energy when you hit the first nickel against the others. The energy from the hit is transferred through each coin until it reaches the last nickel. Since there are no nickels next to the last nickel to transfer the energy to, the energy moves the last nickel away from the line of coins.

Vibrations

Age:
5-13

Participants:
Group, Family, Pair

Supplies

- *6 film cans, black*
- *variety of objects to put in film cans (beans, popcorn, paper clips, confetti, etc.)*
- *rubber bands, variety of sizes*
- *small cup or mug*
- *tuning fork*
- *bowl*
- *water*

Sound Match

- One person fills 3 black film cans with a number of small objects so that each can makes a different sound when shaken.
- The other person tries to match the sounds by filling the other 3 film cans.

It Feels Right

- Rest your fingers gently on your throat.
- Say the word "vibration."
- Move your fingers along your throat until you find the spot where you feel the most vibration.
- Gently place your fingers on your partner's throat while he/she rests his/her fingers on yours. Talk about what you've discovered while you feel the vibrations on each other's throats.

A vibration is when something moves back and forth very fast. You will be able to feel the vibration and hear the sound at the same time. Different vibrating objects make different sounds. Can you feel the difference between the voice vibrations of an adult and a child?

Strumming

- Stretch a rubber band vertically around a mug, crossing the opening of the mug.
- Holding the bottom of the mug against your ear, pluck the rubber band.
- Add different sizes of rubber bands, and then pluck the rubber bands one at a time. Try strumming across all of the bands.
- Describe the sounds you hear to your partner.
- What would you do to the rubber bands if you wanted to change their sounds?

Sounds are produced when objects vibrate. You can produce different sounds by varying the tightness of the rubber bands. When stretched the same amount, a thin rubber band produces a higher pitch than a thick rubber band.

Age:
8-13

Participants:
Group, Family, Pair

Evidence, Please

Supplies

- *paper, a variety of types*
- *paper clips*
- *clear plastic cups*
- *small flashlight*
- *small portable mirror*
- *plastic soda straw*
- *sheet of aluminum foil*
- *tape*
- *balloons*
- *spoons*
- *rubber bands*
- *pencil*
- *string*
- *ruler*
- *resealable sandwich bags*

Why

To test ideas and offer explanations for findings.

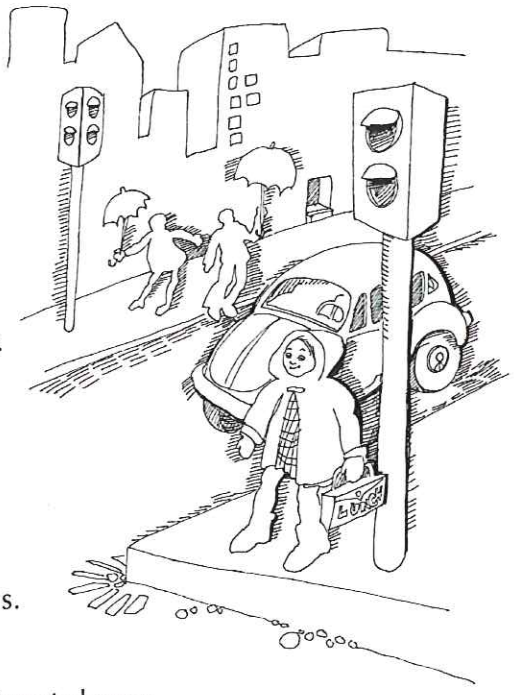
What

Scientists ask questions about the world around them and search for evidence to confirm their ideas. Evidence can support some things, but it may require ongoing investigation before a conclusion is reached. The challenge of this activity is to find evidence that demonstrates a science idea or concept for others using household items.

How

- Divide into teams. Collect one large set of supplies for the whole group. You may want to add other household materials to your supply list.
- Each team selects one of the topics on the *Evidence, Please List* to investigate using their collection of household materials (see page 90). For a challenge, one team can choose a topic for another team to investigate and demonstrate.
- Decide how much time you will have to investigate the selected topic, and prepare a demonstration of your evidence.
- Use the *Evidence, Please List* for ideas on what evidence to demonstrate. Practice your demonstration to be sure it shows the evidence you want.
- Each team presents their evidence on the selected topic.
- During the presentations, record other science ideas you discovered on the *Evidence, Please List.*
- Add answered and unanswered questions to a Question Quilt (see page 86 for a full description of this activity).

Evidence, Please List



Topic	Properties to demonstrate as evidence
Air	Air has weight and takes up space. Air can move objects. Air pressure is reduced by moving air.
Friction	Friction produces heat. Friction causes objects to resist movement. Friction can produce static electricity. Wheels reduce friction.
Water	Water can be absorbed. Some substances dissolve in water. Stirring shortens the dissolving time. Water pressure is not the same at all depths.
Shadows	A shadow is cast when light is blocked. One object can cast shadows of many different shapes. The distance between the object and the light source affects the size of the shadow.
Sound	Vibrating objects produce sound. Objects can be identified using sound. Sound can move through solid objects.
Human Beings	The senses help people identify objects, substances and events. Thumbs give humans a manual dexterity advantage. People adjust their center of gravity to remain balanced.
Reflection	Reflection is one way light changes direction. A reflection of a reflection can be viewed. Images reflected in a flat mirror are reversed. The location of an image in a mirror depends on the distance of the object from the mirror.
Light	Light travels in a straight line. Light can be reflected.
Structures	A hollow structure can be light and strong. The stronger the structure the more weight it can support. The shape of a structure affects the rigidity and strength of the structure.

Age:
5-13

Participants:
Group, Family, Pair

293

Supplies

- *popcorn kernels*
- *hot air popcorn popper*
- *pot holder*
- *heatproof bowl*
- *pencil*
- *tape*
- *construction paper*
- *scissors*
- *paper towels*
- *felt pen*

Why

To compare and classify materials.
To estimate volumes.

Who

In 1948, scientists exploring the Bat Cave in New Mexico discovered that American Indians had lived there for more than three thousand years. Research revealed that American Indians were the first people to cultivate corn, and popcorn was one of their earliest foods. Popcorn kernels discovered at Bat Cave were carbon dated to 2000 BC. Researchers uncovered 766 corn cobs, 293 popcorn kernels, and 6 popped kernels.

What

Take a close look at a handful of popcorn kernels. They can be classified into two primary types: rice and pearl. Rice kernels are long, flat, and pointed with dented sides. Pearl kernels are short with smooth, rounded crowns. The shiny outside covering of a popcorn kernel is called the pericarp. This hard covering splits when the kernel is heated. For the best popping results, the moisture inside the kernel should be between 13.5% and 15.5%. When it pops, the starchy, white substance inside the kernel called the endosperm expands. After popping, popcorn can be sorted into groups based on appearance. The smaller, compact popcorn with the pericarp still clustered together is the mushroom type. The butterfly type popcorn is larger and more open, with smaller, broken pieces of pericarp.

How

In this activity, your family or group will sort and classify popcorn types, and you'll design a container to hold 293 popped kernels.

- Select a few kernels to observe and compare. Use the description of rice and pearl kernels to find 1 of each type.
- Pop a small batch of popcorn. Sort the popped popcorn into groups based on shape and size. Try to identify both the mushroom and butterfly types of popped corn.

- Make a chart to record unpopped kernel and popped popcorn observations.
- Next, discuss methods for counting a 293 kernel sample.
- Before popping the corn, discuss how much space each person predicts the 293 popcorn kernels will fill after popping.
- Have each individual use tape and paper to design and build his/her own container to hold the popped corn. The finished container should have room for all of the popcorn without any empty space or any popcorn overflowing the container.
- Pour 293 kernels into a preheated popper. Use a heatproof container to catch the popped corn.
- Once cooled, pour the popped corn into each paper container. Who's container was closest to the right size?

Design Brief: Design a container to hold 293 popped kernels of corn.

Next

- Hot air poppers typically have a 1/2 cup dispenser which holds approximately 700-800 kernels. How many cups of popped popcorn will a hot air popper with a full dispenser produce? Build a container that will hold the 1/2 cup of kernels after they've popped. Measure the container and calculate its volume (length x width x depth).