

LETTER TO FAMILY

Cut here and glue letter onto school letterhead before making copies.

Science News

Dear Family,

Our class is beginning a new science unit, the **Mixtures, Force, and Energy Module**. Over the next several weeks we will be studying basic concepts in physical science. First, we'll assume the roles of chemists, investigating materials and how they interact by mixing simple ingredients—such as gravel, salt, and water—and then separating the mixtures and solutions.

The U.S. Consumer Product Safety Commission (CPSC) requires the following label to be on student sheets associated with the use of the following chemicals in these FOSS investigations: citric acid, diatomaceous earth, Epsom salts, and kosher salt. It is a reminder to students to exercise particular safety precautions when working with materials in the classroom.

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Next, we'll investigate different forms of energy, build electric circuits powered by D-cells (flashlight batteries), and explore light. Finally, in our force and motion investigations, we'll try to figure out what causes things to move, stop moving, change speed, or change direction. We will also focus on planning and conducting controlled experiments, an important scientific investigation and reasoning skill. Throughout the module, your young scientist will make observations and measurements using appropriate tools, as well as keep a science notebook for collecting, recording, organizing, and analyzing data.

You can increase your child's understanding and interest in physical science by asking him or her to talk about the investigations we are doing at school. Also, watch for the home/school connection sheets I will send home from time to time with your student. These suggest ways for the whole family to investigate interesting aspects of matter, energy, and force and motion. In this way, you can extend the classroom experiences into your home.

You can get more information on this module by going to www.FOSSweb.com. If you have any questions or comments, or have expertise you would like to share with the students, please contact me or come in and visit our class.

Sincerely,

HOME/SCHOOL CONNECTION

Investigation 1: Separating Mixtures

Make a mixture known as oobleck.

Materials

- 1 Mixing bowl
- 1 Spoon
- 1 Measuring cup
- Cornstarch
- Water

Directions

1. Put about 1 cup of cornstarch in a mixing bowl.
2. Slowly add water to make a mixture, stirring as you go.
3. When the cornstarch is all wet, it will turn into oobleck.

Things to find out

Explore the properties of oobleck.

- Is it a solid or a liquid?
- What happens when you place solids, such as coins or spoons, on the surface?
- What happens when you try to push your hand gently into the oobleck? When you try to push your hand hard and fast into the oobleck?
- Pick up a handful of oobleck. Can you hold it?
- Can you cut a ribbon of oobleck with scissors?
- What happens to the properties of oobleck when you change the amounts of the two ingredients in the mixture? More water? More cornstarch?

NOTE: If you want to keep oobleck so that you can work with it another day, store it in a covered container in the refrigerator.

HOME/SCHOOL CONNECTION

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Investigation 2: Concentration

You can make your own play putty right at home. Here's what you will need.

Materials

20 mL White household glue (Colored glue won't work.)

15 mL Borax

- Water
- 1 Measuring cup
- 1 Plastic bag
- 1 Set of measuring spoons
- 1 Spoon
- Food coloring
- 2 Plastic cups or small jars (Baby-food jars work great.)

Directions

1. Mix 15 mL (1 tablespoon) of borax in a cup or jar with enough water to dissolve it (about 40–50 mL). This will make a very concentrated solution.
2. In a separate plastic cup, mix 20 mL (4 teaspoons) of white glue with 5 mL (1 teaspoon) of water and a few drops of food coloring.
3. Add 5 mL of the concentrated borax solution to the cup of glue.
4. Mix the mixture for a few minutes, and watch what happens.
5. Now test your play putty for stretching, bouncing, newsprint transfers, and so on. How long will it stretch? How high will it bounce? Record your observations, and bring them to class.
6. Store the putty in a plastic zip bag.

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HOME/SCHOOL CONNECTION

Investigation 3: Reaching Saturation

You can grow crystals in your home laboratory. Choose one of the approaches described below. Use safe laboratory procedures when working with chemicals.

Alum or Epsom Salts Crystals

1. Evaporate an alum (or Epsom salts) solution and save the crystals.
2. With an adult, make a supersaturated alum solution by dissolving alum in very hot water (close to boiling) until nothing more will dissolve. Cool the solution. Pour it into a jar.
3. Tie one alum crystal to the end of a thread. This is the seed crystal.
4. Hang the seed crystal in the jar of supersaturated alum solution, and wait several days for the crystal to grow.
5. Remove the crystal, make another supersaturated alum solution, cool it, pour it into the jar, and put the crystal back into the solution. Repeat this process for bigger and bigger crystals.

Bluing Crystals

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|--------------------------------|----------------------|
| 1/4 cup Water | 1 Plastic cup or jar |
| 2 Tbsp. Liquid bluing | 4 Pipe cleaners |
| 2 Tbsp. Salt | 1 Small lump of clay |
| 2 Tbsp. Ammonia (no detergent) | • Food coloring |

1. With an adult, make a solution with the water, liquid bluing, salt, and ammonia.
2. Place a lump of clay on the bottom of a clear plastic cup or jar. Push four pipe cleaners into the clay. Put food coloring on the tips of the pipe cleaners.
3. Pour the solution into the cup so that it covers the clay and all but 1 cm of the pipe cleaners.
4. Set the cup where it will not be bumped or disturbed. Crystals will start to form in a few hours.

NOTE: The solution may be poured over broken charcoal, sponges, or sections of cardboard tubes instead of clay and pipe cleaners. Whichever material you use, part of it must extend above the surface of the liquid.

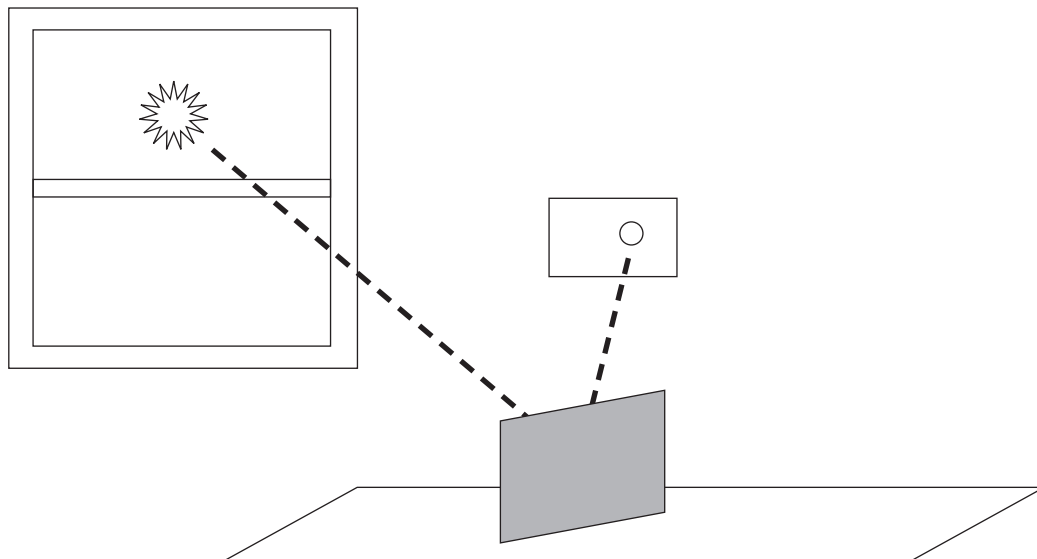
HOME/SCHOOL CONNECTION

Investigation 4: Light and Energy

Safety Note: Never look directly at the Sun or reflect sunlight in a person's eyes. Both can damage eyes.

The Sun seems to move across the sky because Earth is turning on its axis. You can use a mirror to observe the movement. Here's how.

Find a window where light from the Sun shines in. Position a mirror to reflect sunlight onto a wall. Tape a piece of paper there. Mark the center of the reflection of the Sun. Wait 10 minutes and mark the center of the reflection again. Did the reflection move? Why?



HOME/SCHOOL CONNECTION

Investigation 5: Motion and Variables

There was a time when pendulums played an important role in everyday life as time regulators. The predictable swinging of the pendulum, when linked to the hands of a clock, kept the world on time. Now, for the most part, pendulum clocks are historical curiosities. Some clock collectors still have a cuckoo clock or grandfather clock as an interesting reminder of a time past.

Make a pendulum second timer

You can make a second timer at home with a mass, like a fishing weight or a big washer, and some string or thread. Strive to get it as accurate as possible. Fine-tune it until you can call 15 seconds at the same time another family member sees the second hand on a clock reach 15 seconds.

Make a minute timer

This might be a little more demanding, as pendulums tend to lose energy (because of friction at the pivot and air resistance) as they swing. What variables can you change to improve your chances of making the pendulum swing for a minute?

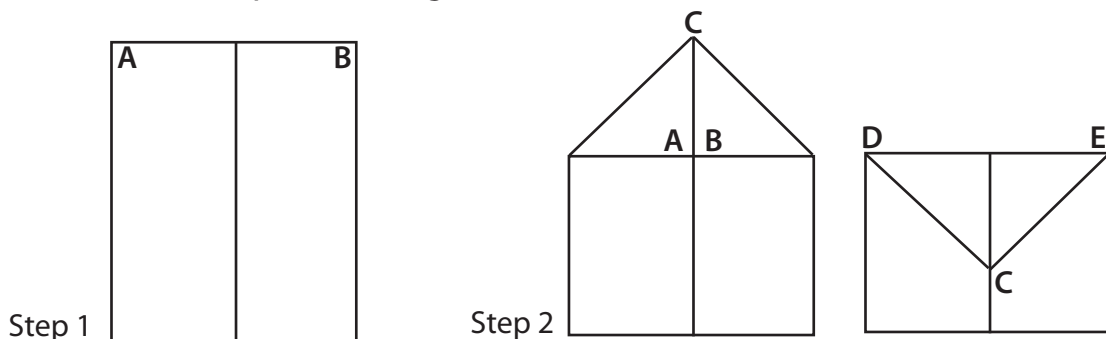
Ride a pendulum

A playground swing is a big pendulum you can ride. Can you guess how many cycles (complete swings back and forth) a swing will make in 30 seconds? Will longer swings complete more or fewer cycles in 30 seconds? Take a ride and find out.

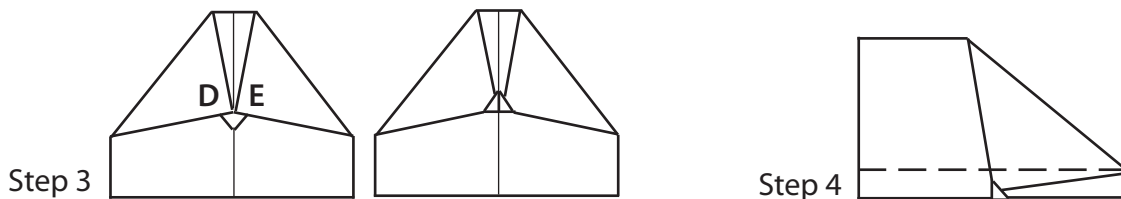
HOME/SCHOOL CONNECTION

Investigation 6: Flippers

What makes a paper airplane fly straight? Do loops? Fly in a circle and come back to you? A number of variables affect the flight of a paper airplane. Here's a model that lends itself to experimenting with the variables.



1. Fold a standard sheet of paper down the middle to create a midline.
2. Fold corners A and B to the midline, then point C down to the midline.



3. Fold points D and E to the midline, and then fold the little point up to hold points D and E down.
4. Fold the plane in half on the midline. Fold the wings down on the dashed line.
5. Turn the last 1 centimeter of the wing up at an angle to create stabilizers, and cut a couple of flaps on the trailing edges of the wings.

Now describe, plan, and implement some experiments. Adjust one variable at a time. See how you can adjust the variables to get the plane to do a number of tricks. After you master the variables, try some new ones. What happens to the plane if you make it half scale? Make it out of thinner paper, like magazine paper or newspaper?

