K12

K12's

Interactive Learning Activity Book

Learning Beyond the Classroom

Hands-on learning activities are vital to a well-balanced education. They're also just plain fun.

When students learn outside of a traditional classroom, their surroundings become a science lab full of experiments, observations and memorable moments waiting to be explored!

Embrace the natural scientist, explorer, and adventurer in your child (and maybe learn something yourself) when you try these hands-on activities together.

Table of Contents

GRADES K—5

Play With Invisible Ink

WHAT YOU NEED

- ☐ Sheet of paper
- ☐ One lemon
- ☐ Lamp
- ☐ Small bowl or glass
- ☐ Cotton swab, brush, or other writing instrument

What to Do

Squeeze the lemon juice into a bowl or glass. Have your child use a cotton swab, brush, or their finger to write a message with the juice on a sheet of paper. Wait until the juice is dry, then hold the paper up to a warm light bulb and reveal the secret message!

How It Works

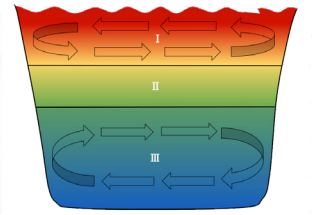
The carbon compounds in lemon juice are colorless at room temperature, but exposure to heat causes the carbon to break down and oxidize, making the "ink" visible.

GRADES K—5

Test Water Stratification With Skittles

WHAT YOU NEED

- ☐ **Skittles**
- ☐ **Warm water**
- ☐ **Light-colored plate with a rim**



What to Do

Let your student arrange the Skittles—in any order they'd like—around the edge of the plate. Gently pour in warm water until the plate is full, but the Skittles are not fully submerged. After a few moments, you'll see the color from the Skittles begin to slide toward the center of the plate, creating a unique pattern.

Ask your little scientist what they observe. Which colors dissolve first? Which spread fastest? Repeat the experiment as many times as you'd like to create different patterns.

How It Works

Each Skittles color is composed of slightly different ingredients which have different densities. When warm water dissolves these ingredients, water stratification—the separation of layers in the water—occurs, creating fun patterns of color

GRADES K—5

Build Toy Parachutes

WHAT YOU NEED

- ☐ Plastic bag
- ☐ Paper cup
- ☐ Yarn
- ☐ Scissors

What to Do

Start by removing the handles on your plastic bag. Next, use your scissors to poke four holes in the bag, one in each corner. Poke four holes in the top of your paper cup. Now, cut four equal pieces of yarn about 12” long.

Thread a piece of yarn through each hole in your cup and knot off the end. Thread the other end of each yarn piece through a hole in your plastic bag and knot off the end. Have your child decorate the bag and cup however they like.

Your parachute is ready for launch! Let it go over a porch, staircase, or any other elevated area and ask your student to observe how it falls.

How It Works

Making a parachute is a fun, simple way for kids to learn about gravity and air resistance. You can try placing toys or small objects in the paper cup to see how the weight changes the descent, or make parachutes of different sizes and materials and race them!

GRADES K—5

Experiment With Yeast

WHAT YOU NEED

- ☐ **Bread mix**
- ☐ **Bowls (as many as you'd like)**

What to Do

Start by helping your child prepare the bread mix in different bowls—we recommend at least two, but you can mix up as many as you'd like! Once the mix is prepared, ask your student to place the bowls in a variety of locations like a dark room, outside, or near a window. You can also experiment with covered and uncovered bowls.

Wait several hours, then ask your student to check on each bowl of bread mix. Observe which mix rose the most and identify which conditions yeast thrives in!

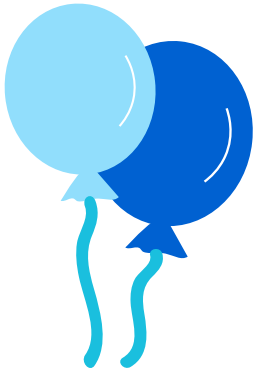
How It Works

Yeast, which makes bread rise, is most active in moist and warm conditions. By placing the bread mix in different locations, your child can observe how factors like temperature and air flow affect the yeast.

GRADES K—5

Inflate a Balloon With Pop Rocks and Soda

WHAT YOU NEED



- ☐ **Bottled soda**
- ☐ **Packages of Pop Rocks**
- ☐ **Latex balloons**
- ☐ **Funnel**

What to Do

Give your balloon a good stretch, especially at the neck. Next, insert your funnel into the opening of the balloon and pour in a package of Pop Rocks. Make sure to tap on the funnel to get the Pop Rocks towards the bottom of the balloon.

Next, open your bottle of soda. Place the opening of the balloon securely over the top of the bottle. Now gently shake Pop Rocks into the bottle by holding the balloon above the opening and watch as the balloon starts to inflate!

How It Works

When Pop Rocks dissolve, they release a little carbon dioxide, which is why they feel so funny in your mouth and make a crackling noise. With a little help from the carbon dioxide gas in the soda, the gas escapes from the liquid and up toward the opening of the bottle, inflating the balloon.

GRADES 6—8

Make Your Own Microscope

WHAT YOU NEED

- ☐ Plastic cup
- ☐ Rubber band
- ☐ Plastic wrap
- ☐ Scissors
- ☐ Water

What to Do

Start by cutting a hole in the bottom of your plastic cup—this is where you'll slide the specimens you're observing in and out of the microscope. Next, place some plastic wrap around the top of the cup and secure it with a rubber band.

Slide your specimen into your plastic cup, then pour a few droplets of water on top of the cling wrap. Let the droplets collect, then look through the water to see your specimen up close!

How It Works

The collected water droplets on the surface of the plastic wrap act as a magnifier, allowing you to see the specimens up close.

GRADES 6—8

Make Homemade Ice Cream in a Bag

WHAT YOU NEED

- ☐ 2 resealable bags
- ☐ 1 cup half-and-half
- ☐ 2 tbsp. granulated sugar
- ☐ 1/2 tsp. pure vanilla extract
- ☐ 1/3 cup kosher salt
- ☐ 3 cups ice

What to Do

In one resealable bag, mix the half-and-half, sugar, and vanilla, then push as much excess air out of the bag as possible before resealing. In the other bag, mix the ice and salt together. Place the sealed half-and-half mixture bag into the bag of ice and make sure both bags are tightly sealed.

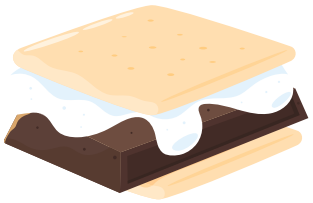
Now the fun part! Vigorously shake the bag for 5 to 10 minutes. After shaking, the half-and-half mixture should harden and resemble the consistency of ice cream.

How It Works

While pure water freezes at 32 degrees Fahrenheit, adding salt to the mix allows it to freeze at lower temperatures and creates a cold enough environment to turn liquids into a more solid form—in this case, ice cream!

GRADES 6—8

Try Solar Oven S'Mores



WHAT YOU NEED

- ☐ Empty pizza box
- ☐ Tin foil
- ☐ Plastic wrap
- ☐ Tape
- ☐ Scissors
- ☐ Ruler
- ☐ Wooden skewer
- ☐ Graham crackers, marshmallows, and chocolate
- ☐ Black construction paper

What to Do

Measure one inch from the front and sides of your pizza box and cut the three sides to create a flap; make sure you don't cut along the back hinge. Fold the flap you created upward so you can see the inside of the box.

Next, cover the inside of the flap you created with tin foil, folding the edges of the foil over the flap to hold them in place. Cover the opening you created in the box with plastic wrap and secure with tape.

Line the inside bottom of the box with tin foil and tape it down. Line the inside top of the box the same way. Tape a piece of black construction paper to the inside bottom of the box, then use the wooden skewer to prop up the flap you created.

Now it's time to cook! Place an assembled s'more inside the pizza box, on top of the black cardboard paper, and place your new solar oven in direct sunlight for at least 30 minutes.

How It Works

A solar oven is a great example of thermal energy at work. The tinfoil flap reflects the sun's rays into the pizza box, heating up the black cardboard paper. The plastic wrap window works like a greenhouse and traps the heat in, cooking the s'mores to perfection!

GRADES 9—12

Learn About Osmosis With Potatoes

WHAT YOU NEED

- ☐ Three to four potatoes
- ☐ Knife
- ☐ Measuring cup
- ☐ Three bowls
- ☐ Salt
- ☐ Sugar
- ☐ Water

What to Do

Cut each potato into slices, then place an equal amount in each of the three bowls. Next, add enough water to each bowl to fully submerge the potatoes. Add salt to one bowl, sugar to another, and leave the third bowl with just water.

Let the potatoes soak for about an hour, then remove them from the water and observe! The potatoes from each mixture should vary in texture and appearance. Observe, feel, and document the differences, and consider how osmosis impacted each group.

How It Works

Osmosis is the process by which water molecules pass from areas of lower concentration to areas of higher concentration. By adding salt or sugar to water, you're creating an environment where the concentration of water inside the potatoes is higher than outside, causing the potato slices to lose water and change appearance.

GRADES 9—12

Create a Classic Volcano

WHAT YOU NEED

- ☐ Playdough
- ☐ Baking soda
- ☐ White vinegar
- ☐ Dish soap
- ☐ Red food coloring
- ☐ Funnel
- ☐ Small container

What to Do

Start by molding a volcano shape using playdough and placing it into a small container. If you don't have playdough, you can also use an empty bottle. Next, add 1/4 cup baking soda, a small squeeze of dish soap, and a few drops of red food coloring into the top of the volcano.

For the big moment, pour vinegar into the volcano using a funnel and watch the eruption!

How It Works

Homemade volcanoes are a hands-on learning classic! In this experiment, the chemical reaction between vinegar and baking soda creates a gas called carbon dioxide. In a similar reaction to the Pop Rocks and soda experiment, there isn't enough room inside the volcano for the gas to escape, so it erupts out of the top!

GRADES 9—12

Measure the Speed of Light With Chocolate

WHAT YOU NEED

- ☐ Microwave
- ☐ Chocolate bar
- ☐ Microwavable plate
- ☐ Calculator
- ☐ Ruler
- ☐ Sheet of Paper

What to Do

Start by unwrapping the chocolate bar and placing it on the plate. Microwave for ten seconds. Take out the plate and observe the spots where the chocolate has melted.

Measure the distance between each melted spot, then use the following equation to calculate the speed of light!

Speed of light = distance between melted spots / microwave time (in seconds)

How It Works

Microwaves use a form of electromagnetic waves, just like light, to produce heat. The peaks of these waves heat faster, melting the chocolate in the microwave. By measuring the distance between melted spots, you can calculate how fast an electromagnetic wave travels!

More Resources

For even more at-home science experiments and hands-on activities, check out:

Science for Kids and At-Home Activities from Mommy Poppins

Fun experiments from Little Bins for Little Hands

Learning activities from Childhood 101

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