Back to Learning!

Science Activities

Ages 7 - 9

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Use this packet of activities to help children practice their Science skills.
Day 1
Convection Currents

MATERIALS:
- Clear cup, large
- Coloured ice cube (food coloring)
- Straight stick, wooden spoon, etc.
- Paper, 1 sheet
- Scissors
- Thread or string
- Working table lamp
- Optional: crayons or markers

INSTRUCTIONS:

Step 1. Make a coloured ice cube by mixing a few drops of food colouring with water.

Step 2. Fill a large clear plastic cup \( \frac{3}{4} \) full of cool water.

Step 3. Gently place your coloured ice cube in the water.
   - What do you observe? Why?

Step 4. Draw a spiral on a sheet of paper and cut along the line.

Step 5. Remove the big bulky corners of the paper so you have a nice spiral. Stretch it out but be careful not to break it.

Step 6. Using the pencil point, carefully poke a small hole in the tip of the spiral. Cut a 2-foot piece of thread off the spool. Pass 1 end of the thread through the hole and tie it. Tie the opposite end onto the handle of a wooden spoon or a straight stick.
INSTRUCTIONS (Continued):

Step 6. Hold your paper spiral over a lamp.
   • What do you observe? Can you explain it?

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Step 7. Feel free to decorate your spiral and hang it in the corner of a room.

THE SCIENCE BEHIND IT:
Convection currents are produced as a result of heat transfer between particles. When heat is added to water, the water molecules move faster and spread apart. As the molecules spread apart, they take up more space. Therefore, in a body of water, like a lake or an ocean, warm water moves up toward the surface and the colder denser water moves downward. The movement of warm and cold water creates currents in the water. These are called convection currents. The next time you go swimming in a pool that has a deep end, take note when you first get in: is the water warmer at the bottom or at the surface?

The mantle under the Earth’s crust moves as a result of convection currents. As the core heats up, the molten rock rises toward the crust. As it rises, it cools and begins to sink. Then it gets heated by the core again and starts to rise. It repeats this over and over again, creating currents under the surface.

The same principle is true for air. The warmer the air, the faster the air particles are moving. The faster the particles are moving, the further apart they spread. This lowers the density of the warm air and causes it to rise over the cooler air.

Many people put a ceiling fan in a high vaulted area in their home to help push the warm air down in the cold winter months. Hot air balloons rise in the sky because the heater warms the air inside the balloon. The warm, less-dense air inside the balloon is lighter than the cooler air around it which causes it to rise.
INSTRUCTIONS:

Step 1. Cut a 3cm circle out of the paper towel. Place your circle and a coin next to each other on a table and blow on them.

• Which item moved the furthest? Why do you think that happened?

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Step 2. Cut a 3cm wide strip of paper towel (or napkin) that is about 10cm longer than your cup.

Step 3. Draw a line across the width of the strip with the black marker about 3cm from an end.

Step 4. Add 1/2 inch of water to the cup. Hold the strip vertically with the side with the black line closest to the ground. Set the strip into the water. Make sure the black line DOES NOT touch the water. Let the other end of the strip drape over the edge of the cup.
INSTRUCTIONS (Continued):

Step 5. Let the strip and water sit for 10–20 minutes. Then, remove the strip from the water and place it on a paper plate.

• What colours of ink was your black marker made of?

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• Why did some colours move further than others?

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Step 6. Try it with different papers and/or different-coloured markers. Try making a design out of dots or using a round coffee filter with a circle in the middle instead of a line. When you’re done, you can use the strips of paper and coffee filters to make a piece of art!

THE SCIENCE BEHIND IT:

Chromatography is the science of separating mixtures. When you placed the strip into the water, the strip absorbed the water and the water started climbing up the paper. When it reached the black line, the colour pigments dissolved in the water and started traveling up the strip with the water. When you blew on a small piece of tissue and a coin, the tissue went further than the coin because it is lighter and less dense. The same thing happened with the ink in the markers. The lighter, less-dense pigments moved further up the paper towel than the heavier ones.
INSTRUCTIONS:

**Step 1.** Using a pencil, colour a 2-inch square on a piece of paper.

**Step 2.** Rub a finger on the square and then touch it to the sticky side of a piece of tape. With it stuck to your finger, press down on the smooth side.

**Step 3.** Remove the tape from your finger and carefully place the tape, sticky side down, onto a piece of white paper. Wash your hands with soap and water.

**MATERIALS:**
- Clear tape
- Magnifying glass or bifocals
- #2 pencil
- Soap and water
- White paper (2) or index cards

When looked at closely, you will notice that the ridges of a fingerprint form 1 of 3 main patterns called loops, whorls, or arches.

**Loop:** This is the most common pattern. If you follow the ridges, they start along one side of the finger, go up toward the fingertip and loop down along the opposite side of the finger.

**Whorl:** The ridges form circles or spiral patterns.

**Arch:** This pattern is the least common. The ridges go slightly upward and then down again like a gently sloping hill.

**Fingerprint Identification**

Loop  Whorl  Arch
INSTRUCTIONS (Continued):

**Step 4.** Use a magnifying glass or a pair of bifocals to identify your fingerprint as a loop, whorl, or arch.

**Step 5.** See if all your fingers have the same style. Check other family members and make a bar graph showing how many members of the family have each style.

**Step 6.** Try using a similar technique by sprinkling some type of white powder (baby powder, flour, etc.) onto door handles or other surfaces around the house to see if you can collect fingerprints with clear tape. Note: in order to see white powder, you will need to tape the fingerprints onto dark paper.

THE SCIENCE BEHIND IT:

Your fingerprints are your very own—like nobody else’s in the world. Not even identical twins have the same fingerprints! The tips of your fingers have tiny patterns of lines, called **ridges** and **valleys**. The **ridges** are the raised lines. They contain sweat glands so when you touch something, like a door handle, you leave behind oil in the same pattern as the ridges on your fingertips. You can’t really see the fingerprints, unless you highlight them using a powder and collect them to view with some type of magnifier.

When looked at closely, you will notice that the ridges of the print form 3 main patterns called **loops**, **whorls**, or **arches**.

A **forensic scientist** studies fingerprint patterns to help the police solve crimes. In the United States, the FBI began collecting fingerprints in the 1920s. The forensic scientist collects fingerprints at a crime scene and then analyzes them. The scientist will also compare the fingerprints to other fingerprints found at past crime scenes to see if there is a match. Fingerprint scans aren’t just for solving crimes. They are also used to allow access into buildings and computers. Season ticket holders at Walt Disney World and some Six Flags amusement parks now include fingerprint scans on their passes.
Day 4
Making a Thermometer

MATERIALS:
• Clay
• Food colouring
• Large bowl or pan
• Paper plate or aluminum pan
• Glass bottle with a narrow opening, (such as ketchup, soda, or juice bottle)
• Clear Straw
• Water, lukewarm, ice cold, and tap hot

INSTRUCTIONS:
Step 1. Stand an empty water bottle in the middle of a paper plate or aluminum pan. This will act as a work surface to collect any spilled water.

Step 2. Add a few drops of food colouring into the empty bottle and use the measuring cup to fill $\frac{1}{4}$ of the bottle with lukewarm water.

Step 3. Roll the clay into a tube. Place the straw into the bottle so that it is suspended just above the bottom of the bottle. Secure it in place by wrapping the clay around the straw and the bottle opening. Make sure the straw is open to the air on top and there’s a tight seal.

Step 4. Wait a few minutes and let your thermometer adjust.
INSTRUCTIONS (Continued):

**Step 5.** Place your thermometer in a bowl of hot tap water (not boiling).

- What happens to the liquid in the thermometer? Why?

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**Step 6.** Place your thermometer in a bowl of ice-cold water.

- What happens to the liquid in the thermometer? Why?

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**Step 7.** Move your thermometer around to different locations, inside and outside. Try direct sunlight or the refrigerator too.

THE SCIENCE BEHIND IT:

When heated, the molecules in the liquid move faster causing them to move further apart, which in turn, causes the liquid to expand and take up more space. There’s nowhere for the expanded liquid to go except up the straw. The higher the liquid rises, the warmer the temperature.

When you put your thermometer in a cold area, the liquid molecules slow down. When they slow down, they get closer together which causes the liquid to contract. The contracted water molecules don’t need as much space and the liquid moves down the straw back into the bottle.

Your thermometer won’t measure exact temperatures, but depending on where the liquid is in the straw you will be able to determine which areas around your home are warmer or cooler than others.
Day 5
The Scientific method

MATERIALS:
- 2 pennies (same year)
- Cup of water, small
- Napkin or paper towel
- Paper plate
- Pencil
- Optional: salt, sugar, warm & cold water, soap

SCENARIO:
You decided to go out for a walk on a warm sunny morning after a very heavy rain the night before. While on your walk, you looked down and noticed a penny on the pavement with a HUGE drop of water on it! This really makes you curious!

You start thinking about that...I wonder how many raindrops could land on this penny before the water spills over the edge?

• Based on the above table, which step of the Scientific Method is this?

You decide that you are going to investigate this, so you suggest a possible answer to your question. This possible answer, or educated guess, is called a hypothesis. Form a hypothesis. (hint: start with “I think” and then add how many drops of water you think the penny will hold.)

• Hypothesis:
TEST:

Step 1. Place a penny on your paper plate.

Step 2. Fill your small cup with water and place it to the right of the plate.

Step 3. Dip your pointer finger in the water and let 1 drop at a time fall onto the penny. If you use your thumb to put pressure on your finger, you will find that it makes the drop fall.

Step 4. Record the number of drops it took for the water to spill over in the Data Table below.
   - Complete 3 trials.
   - Which step of the Scientific Method did you just complete?

CONCLUDE:

Look at your data. If the data agrees with your hypothesis (educated guess), then you accept it and if the data disagrees with your hypothesis, then you should reject it. (circle one):

I accept my hypothesis.     I reject my hypothesis.

• Explain why you accepted or rejected your hypothesis
REPORT:
Share your results with a friend or family member.
Will the penny hold the same number of drops if it’s cold outside? What if the water has something in it? What if it’s a different liquid?

TEST AGAIN:
Come up with a new hypothesis and test it. Change 1 variable.
Tip: You used plain water for the control (Penny A) and will change something about the water (type, temperature...etc.) for your variable (Penny B). Fill in your plan in the chart below.

<table>
<thead>
<tr>
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<tr>
<td></td>
<td>Penny A (Control–plain water)</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
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THE SCIENCE BEHIND IT:
The scientific method is a set of guided steps that all scientists around the world use to do research. This process helps scientists solve problems, gather evidence, and discover new information. The steps of the experiments can be repeated by other people. This allows other scientists to check and test each other’s work to make sure the results are accurate and reliable. More specific questions are then developed for testing based on all this previous knowledge. This is how things like fuel efficiency and technology become more advanced.