SCIENCE CAN

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32 EXPERIMENTS

SCIENCE CAN

SCIENCE LAB

LABORATOIRE DE SCIENCES

LABO DE CIENCIAS

8-14 years

STEAM
EDUCATIONAL PRODUCT

⚠ WARNING Choking Hazard-small parts. Not for children under 3 years.
Children under eight years can choke or suffcate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons fromchildren. Discard broken balloons at once. Made of natural rubber latex.

Not suitable for children under (8) years.For use under adult supervision. Contains some chemicals which present a hazard to health. Read the instructions before use, follow them and keep them for reference. Do not allow chemicals to come into contact with any part of the body, particularly the mouth and eyes. Keep small children and animals away from experiments. Keep the experimental set out of reach of children under (8) years old. Eye protection for supervising adults is not included.

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SAFETY INSTRUCTIONS

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MATERIALS REQUIRED FOR EXPERIMENT

Nummer	Name	Menge
1	Baking soda(Sodium Hydrogen Carbonate) | CAS NO.144-55-8 EC NO.205-633-8	40g
2	Citric acid | CAS NO.77-92-9 EC NO.201-069-1 P261:Avoid breathing dust/fume P264:Wash hands and other parts of the body (if related) thoroughly after handling P271:Use only outdoors or in a well-ventilated area P280:Wear protective gloves/protective clothing/eye protection/face protection P312:Call a POISON CENTRE/ doctor/ if you feel unwell P304+P340:IFINHALED: Remove person to fresh air and keep comfortable for breathing P337+P313:If eye irritation persists: Get medical advice/attention P305+P351+P338:IFIN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P501:Dispose of contents/container in accordance with local/regional/national/international regulations. H319:Causes serious eye irritation ;H335:May cause respiratory irritation	20g
3	Effervescent tablets | CAS NO.144-55-8 ;77-92-9 EC NO.205-633-8;201-069-1 (Sodium hydrogencarbonate 50%; Citric acid 50%) P261:Avoid breathing dust/fume P264:Wash hands and other parts of the body (if related) thoroughly after handling P271:Use only outdoors or in a well-ventilated area P280:Wear protective gloves/protective clothing/eye protection/face protection P312:Call a POISON CENTRE/ doctor/ if you feel unwell P304+P340:IFINHALED: Remove person to fresh air and keep comfortable for breathing P337+P313:If eye irritation persists: Get medical advice/attention P305+P351+P338:IFIN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P501:Dispose of contents/container in accordance with local/regional/national/international regulations. H319:Causes serious eye irritation H335:May cause respiratory irritation	5.6 g
4	Red plgment | CAS NO.2611-82-7;7647-14-5 EC NO.220-036-2;231-598-3	0.05 g
5	Yellow pigment | CAS NO.1934-21-0;7647-14-5 EC NO.217-699-5;231-598-3	0.05 g
6	Blue pigment | CAS NO.3844-45-9;7647-14-5 EC NO.223-339-8;231-598-3	0.05 g
7	PH tast strips	3 Pcs
8	Victamin c tablets CAS NO.50-81-7;9005-25-8 EC NO.200-066-2 , 232-679-6	1 Pcs
9	Transparent plastic card	2 Pcs
10	Balloon Children under 8 years of age may suffocate on uninflated or burst balloons. Adult supervision is required. Keep uninflated balloons away from children. Remove burst balloons immediately. Use a pump to inflate! This product is made with natural rubber latex, which may cause allergies.	1 Pcs
11	cotton rope	2 Pcs
12	round cardboard	2 Pcs

WHAT TO DO IN CASE OF IRRITATION CAUSED BY CHEMICALS

- IN CASE OF EYE CONTACT WITH CHEMICALS: Rinse thoroughly with clean water. Keep eye open if necessary. Consult a doctor or poison centre immediately.
- IN CASE OF SWALLOWING THE CHEMICALS: Wash out mouth with clean water. Drink fresh water. Do not induce vomiting. Consult a doctor or poison centre immediately.
- IN CASE OF INHALATION OF CHEMICALS: Move to fresh air.
- IN CASE OF SKIN CONTACT WITH THE CHEMICALS: Wash affected area with plenty of clean water for at least 10 minutes.
- If in doubt, seek medical advice immediately. Take the chemical and its container with you.
- Always consult a doctor in case of injury.

INSTRUCTIONS FOR SUPERVISORS

* Read,follow,and keep these instructions,safety rules,and firstaid information handy.

- Incorrect use of chemicals can lead to injuries and damage to health. Only carry out experiments that are listed in the instructions.
- This experiment set may only be used by children over the age of 8.
- As children's abilities vary within an age group, supervising adults should use their own judgement to decide which experiments are suitable and safe for children. The instructions allow supervisors to evaluate each experiment and decide whether it is suitable for a child.
- The supervising adult should discuss the warnings and safety information with the child/ children before starting the experiment. Particular attention should be paid to the safe handling of acids, alkalis and flammable liquids.
- The area around the experiment should be flat and tidy and kept away from food storage. It should be well lit and ventilated and close to a water supply. A solid table with a heat-resistant top should be used as a base.

SAFETY RULES

- Keep small children, animals, and people without eye protection away from the experiment area.
- Always wear eye protection.
- Keep the experiment set out of the reach of children under 8 years of age.
- Clean all objects after use.
- Ensure that all containers are completely closed after use and stored properly.
- Ensure that empty containers are disposed of properly.
- Wash hands thoroughly after performing experiments.
- Do not use any equipment or objects for the experiments that were not supplied with the set or recommended in the instructions for use.
- Do not eat or drink in the area of the experiments.
- Avoid contact of chemicals with eyes or mouth.
- Do not replace food in the original container, dispose of immediately.

When disposing of chemicals, the national or local disposal regulations must be observed. Under no circumstances should chemicals be disposed of with waste water or household waste. Further information on correct disposal can be obtained from the responsible authority. For the disposal of packaging materials, use the collection containers at the collection points.

The chemicals contained in the set and the products resulting from the suggested experiments must not be used in any way other than specified in these instructions.

Warning! The products created during the suggested experiments must be used and stored out of the reach of children under 3 years of age, as small parts may be produced which could cause suffocation if swallowed or inhaled.

FIRST AID INFORMATION

- In case of contact with the eye: rinse the eye with plenty of water and keep it open if necessary. Seek medical help immediately.
- In case of ingestion: Rinse mouth with water, drink fresh water.
Do not induce vomiting. Seek medical attention immediately.
- In case of inhalation: Move the person to fresh air.
- In case of contact with skin and burns: Rinse the affected skin area with plenty of water for at least 10 minutes.
- If in doubt, seek medical attention without delay. Take the chemical with you along with the container.
- Always seek medical attention in case of injury.
- In case of accident due to improper use of the products resulting from the proposed experiments (ingestion, inhalation, penetration of the nose or ear canals): Seek medical attention immediately.

NOTE: Information on first aid can also be found separately below for specific experiments. Here you will find the telephone number of the nearest poison control center, which should always be available in an emergency.

POISON CONTROL CENTER-GB

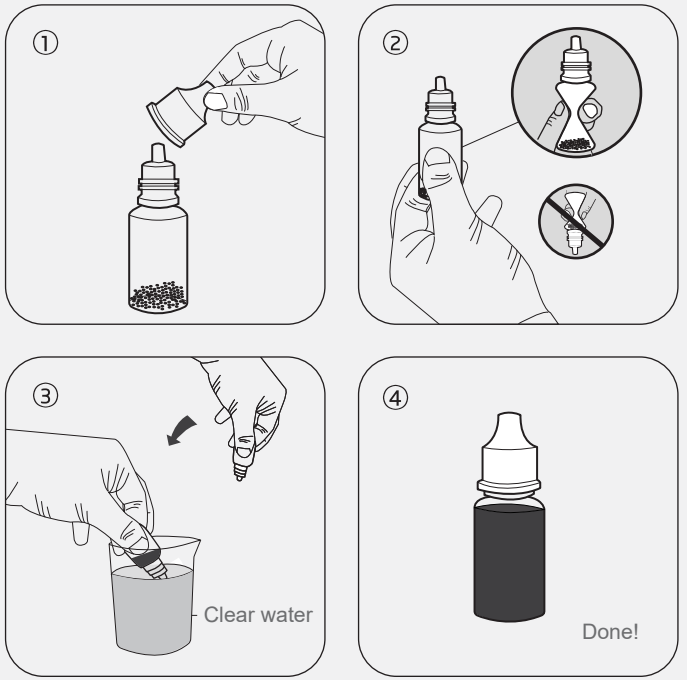
TOXBASE is hosted by NPIS Edinburgh,
Royal Infirmary of Edinburgh,
Edinburgh, EH16 4SA.
To contact TOXBASE
admin: mail@toxbase.org
+441312421383

TIPS FOR LABORATORY EXPERIMENTS

- Choose a suitable, well-lit, and well-ventilated location where water is available.
- Obtain a cloth that you can use to wipe up any spilled substances.
- Do not try out any experiments you have invented yourself.
- Do not place the test tubes containing the substances on the work surface, as they could roll away. Instead, always place them in the test tube rack.

Get inspired by our experiments. Everything you need for your experiments that is not included in the set is written in **bold** in the experiment instructions.

HOW TO USE THE COLOR PIGMENTS:



EXPERIMENT 1: ANGRY RAISINS

After the experiment, dispose of all food used in the experiment.

Materials **5 raisins, carbonated lemonade**

Steps

1. Measure 150 ml of carbonated lemonade using the measuring cup and pour it into the flask.
2. Add the raisins to the flask one by one.
3. Observe the changes in the raisins.

Experiment Principle

The little bubbles in carbonated lemonade are actually carbon dioxide being released. When the raisins sink to the bottom of the bottle, the carbon dioxide from the lemonade sticks to their surface. The little bubbles act like life jackets for the raisins. The combined density of the raisins and bubbles is lower than that of water, causing them to rise to the surface. When the raisins reach the surface, the small carbon dioxide bubbles burst and the raisins sink again. From the outside, it looks as if the raisins are jumping up and down in the lemonade.

EXPERIMENT 2: FIREFIGHTING WITHOUT WATER

Ask an adult to help you light the candle. After the experiment, dispose of all food used in the experiment.

Materials **Baking soda, white vinegar, candle, lighter**

Steps

1. Light the candle and place it in the center of a plate.
2. Measure 20 ml of white vinegar with the measuring cup and add half a spoonful of baking powder to create lots of bubbles.
3. After 5 to 10 seconds, slowly tip the measuring cup over the candle (without pouring out the liquid) and observe the phenomenon.

Experiment Principle

Burning substances require oxygen, and if oxygen supply is cut off, the fire will stop. Baking soda and vinegar produce carbon dioxide, which is denser than air. When the cup is placed above the candle, it cuts off the oxygen supply, and the fire is extinguished. Fire extinguishers work on the same principle, using a chemical reaction to release large amounts of carbon dioxide gas, putting out the fire.

EXPERIMENT 3: A PING PONG BALL IN FLOW

After the experiment, dispose of all food used in the experiment.

Materials **Clean water, Ping pong ball, Bowl**

Steps

1. Place the ping pong ball into the empty basin.
2. Pour water over the ping pong ball and observe that the ball is controlled by the water flow.

Experiment Principle

According to Bernoulli's principle, pressure is lower where water flows faster and higher where water flows slower. When the table tennis ball moves away from the center of the flow, the water below the ball is slower and the pressure is higher. Above the ball, the water is faster and the pressure is lower. This creates a difference in buoyancy pressure that pushes the ball back to the center.

EXPERIMENT 4: DISTORTED TEXT

Materials **Clean water, marker pen, white paper,** Transparent water bottle (with lid)

Steps

1. Fill the bottle with clean water using the measuring cup and screw the cap on tightly.
2. Write a few words on the white paper with the felt-tip pen.
3. Hold the paper behind the bottle and watch how the image on the paper changes.

Experiment Principle

Light travels at different speeds in different materials. When light passes from one medium to another, its direction changes. This process is called refraction. When light passes from air into water, the medium changes, causing the light to refract. When the bottle is filled with water, the cylindrical column of water also acts like a curved lens, so that we see a reversed image of the words within a certain range.

EXPERIMENT 5: DANCING MATCHSTICKS

Ask an adult to help you light the matchsticks. Make sure that there is nothing flammable nearby.

Materials **2 matchsticks, modeling clay, lighter**

Steps

1. Shape the modeling clay into a rectangle and stick the first matchstick into one corner with the head facing up.
2. Place the second matchstick next to the first one so that the heads touch.
3. Light the matchsticks and watch as the second matchstick slowly flies up into the air as if it were dancing.

Experiment Principle

The high heat of the flame causes the iron in the match head to oxidize into iron(III) oxide (Fe_3O_4), the main component of magnets. Due to their magnetic properties, the match heads stick to each other.

EXPERIMENT 6: MILK & LEMONADE

After the experiment, dispose of all food used in the experiment.

Materials **Milk, carbonated lemonade**

Steps

1. Measure 100 ml of lemonade using the measuring cup and pour it into the flask.
2. Clean the measuring cup, then measure 50 ml of milk and pour it into the flask. Stir well with the stirring rod.
3. Observe the change in the milk.

Experiment Principle

When you mix milk and lemoande, something interesting happens: Milk contains proteins that remain liquid at a certain pH level. Carbonated lemonade is slightly acidic. When they come together, the acid in the lemonade causes these proteins to precipitate out of the milk, which we call “protein denaturation.”

EXPERIMENT 7: AIR CANNON

Ask an adult to help you light the candle.

Materials **Candle, Lighter, Scissors**

Steps

1. Cut the opening of the balloon with scissors and stretch the balloon over the wide end of the funnel to form an elastic membrane.
2. Light the candle and place it on a flat surface.
3. Hold the funnel about 15 cm above the candle flame. Pull back the elastic membrane, let it go, and observe the phenomenon.

Experiment Principle

Although air is invisible and intangible, it is still a real substance. 'Wind' is simply the movement of air. When the elastic membrane is pulled back and then released, the air in the funnel is compressed and shot out quickly from the narrow end. This creates a strong air current that blows out the candle. This is an air cannon, in which air acts like a 'projectile'. Large air cannons can be very powerful, almost like normal cannons.

EXPERIMENT 8: CURVED WATER

Materials **Clean water, transparent plastic cup, pin, wool sweater**

Steps

1. Use the needle to pierce a small hole near the edge of the plastic cup (make sure the hole is small).
2. Blow up the balloon, tie a knot in it, and rub it against a wool sweater about 20 times.
3. Fill the cup with water and hold it up—a small stream of water will now flow through the hole.
4. Hold the part of the balloon that has been rubbed against the wool sweater close to the stream of water and you will see how the water bends towards the balloon.

Experiment Principle

When you rub the balloon against the wool sweater, it becomes negatively charged. The small stream of water coming out of the hole is electrically neutral. When the negatively charged balloon comes closer, the neutral water molecules rearrange themselves so that their positively charged side is attracted to the balloon. Because opposite charges attract each other, the stream of water bends toward the balloon.

EXPERIMENT 9: DISAPPEARING FLOWERS

Ask an adult to help you when cutting with scissors.

Materials **Clean water, white paper, scissors, plastic bag, watercolor markers, water basin**

Steps

1. Cut the white paper slightly smaller than the plastic bag and draw beautiful flowers on it.
2. Put the painted paper in the plastic bag.
3. Fill the water basin with water.
4. Dip the bag vertically into the water basin and watch the flowers magically disappear.

Experiment Principle

Light travels in straight lines. However, when it passes from air into water, it changes direction and is refracted. This can confuse our eyes. Depending on the angle of view, objects in the water can disappear, creating the illusion that they are invisible.

EXPERIMENT 10: THE COIN THAT HOLDS WATER

Materials **1 coin, clean water**

Steps

1. Pour 20 ml of water into the measuring cup.
2. Carefully add drops of water to the surface of the coin using the pipette.
3. Observe how the water droplet on the coin gets bigger and bigger.
4. Keep adding water until the droplet finally overflows.

Experiment Principle

The reason the coin can hold so much water is due to surface tension. Water molecules at the surface experience an inward force due to the difference in molecular density inside and outside the droplet. This force holds the water together, allowing it to form a dome-like shape on the coin without immediately spilling over.

EXPERIMENT 11: THE COTTON SWAB CANOE

Materials **Dish soap, clean water, plate, cotton swab**

Steps

1. Fill a plate with clean water so that the cotton swab can float.
2. Use the pipette to add a little dish soap to the Petri dish.
3. Dip one end of the cotton swab into the dish soap.
4. Break the cotton swab in half and place it in the water—watch how it moves forward on its own!

Experiment Principle

The movement of the cotton swab is caused by dish soap, which contains surfactants. These substances break down fat and reduce surface tension in water. As soon as the cotton swab soaked in dish soap is dipped into the water, it pulls the water forward behind it due to the lower surface tension.

EXPERIMENT 12: SEPARATING WATER AND OIL

Ask an adult to help you when cutting with scissors.

Materials **Blue color pigment, cooking oil, clean water**

Steps

1. Pour 5 ml of clean water into the test tube and add one drop of blue pigment.
2. Pour cooking oil into the Petri dish. Use the pipette to take 3 ml of oil and add it to the test tube.
3. Stir the mixture with the stirring rod, place the test tube back in the test tube holder and leave it to stand.
4. Observe the changes in the test tube.

Experiment Principle

Under normal conditions, oil and water do not mix because they have different molecular sizes, densities, and viscosities. Since water is denser than oil, the oil floats on top of the water.

EXPERIMENT 13: MIXING WATER AND OIL

Materials **Blue color pigment, cooking oil, clean water, dish soap**

Steps

1. Pour 5 ml of clean water into the test tube and add a drop of blue pigment. Add a small amount of dish soap using the pipette.
2. Pour cooking oil into the Petri dish. Use the pipette to collect 3 ml of oil and add it to the test tube.
3. Stir the mixture with the stirring rod, place the test tube back in the test tube rack, and leave it to stand.
4. Observe the changes in the test tube.

Experiment Principle

Dishwashing liquid acts as an emulsifier, breaking the oil down into tiny droplets and preventing them from recombining. This distributes the oil evenly throughout the water, making it look as if the two liquids have mixed.

EXPERIMENT 14: HOMEMADE PLAYDOUGH

After the experiment, dispose of all food used in the experiment.

Materials Blue color pigment, **cooking oil, flour, table salt, clean water, Plate**

Steps

1. Put two drops of blue pigment and 10 ml of clean water into a test tube.
2. Measure 5 ml of cooking oil in another test tube.
3. Measure 50 ml of flour with a measuring cup and put it on a plate.
4. Add a small amount of salt to the Petri dish. Use the sample spoon to add a spoonful of salt to the flour.
5. Pour the liquids from both test tubes into the flour and knead the mixture until it forms a dough. (If necessary, add small amounts of water to adjust the consistency.)

Experiment Principle

Cooking oil is added to the dough to prevent it from sticking and to make it easier to shape. Salt helps slow down the evaporation of water, keeping the dough soft and pliable for longer.

EXPERIMENT 15: THE MYSTERIOUS BOTTLE

Ask an adult to help you when cutting with scissors.

Materials Blue color pigment, **clean water, plastic bottle, Nadel**

Steps

1. Fill a plastic bottle completely with water and add three drops of blue coloring so you can see it better.
2. Screw the cap on tightly so nothing can leak out.
3. Use a needle to poke several small holes in the bottle—the water won't leak out!
4. Unscrew the cap, and the water will squirt out of the holes.

Experiment Principle

The surface tension of the water forms a thin film over the small holes, preventing it from escaping. When the bottle is closed, the internal pressure is lower than the external air pressure, which keeps the water inside. When the cap is removed, air flows in, equalizing the pressure and breaking the surface tension, allowing the water to escape.

EXPERIMENT 16: VISCOUS LIQUIDS

Materials Yellow color pigment, **clean water, starch**

Steps

1. Add 3 drops of yellow food coloring to 20 ml of water and stir well.
2. Add about 8 spoonfuls of starch to the Petri dish.
3. Slowly pour the colored water into the starch while stirring constantly. If the mixture becomes too runny, add more starch and continue stirring until it has a thick, ice-like consistency. Your non-Newtonian fluid is ready!

Experiment Principle

A non-Newtonian fluid behaves differently from normal fluids. Its thickness, i.e. how easily or heavily it flows, changes depending on how you move or press it. If you move it slowly, it can be thicker, and if you move it quickly, it becomes thinner. Normal fluids always remain the same thickness, no matter how you move them. Non-Newtonian fluids can also be found in nature, for example in blood, cells, and mucus.

EXPERIMENT 17: FIREPROOF PAPER CUP

Ask an adult to help you light the candle.

Materials **Clean water, paper cup, candle, Plate**

Steps

1. Pour about 100 ml of water into a plate and place a lit candle in the middle.
2. Pour about 150 ml of water into a paper cup and hold the cup over the candle flame.
3. Observe that the paper cup does not catch fire.

Experiment Principle

The ability of a paper cup to hold boiling water without burning is due to heat transfer. At standard atmospheric pressure, water boils at 100°C, while paper ignites at a temperature higher than 100°C. As the water absorbs heat from the flame, its temperature remains constant at 100°Ceven after reaching the boiling point. This prevents the paper from reaching its ignition temperature, allowing the cup to remain intact.

EXPERIMENT 18: THE BOTTLE THAT "SWALLOWS" A BALLOON

Ask an adult to help you when experimenting with hot water.

Materials Balloon, **hot water, cold water, paper cup, bottle (with a lid)**

Steps

1. Pour hot water into the bottle (make sure the temperature is below 75 °Cto prevent deformation).
2. Close the bottle cap and wait 3 minutes for the bottle to heat up.
3. Quickly pour out the hot water, place the balloon over the bottle opening, and place the bottom of the bottle in a paper cup filled with cold water.
4. Watch as the balloon is sucked into the bottle.

Experiment Principle

When the air in the bottle is heated, it expands. As soon as the balloon is placed over the opening of the bottle, the total amount of gas remains unchanged. When the air cools, its volume decreases, causing the pressure in the bottle to drop. Since the external air pressure is now higher, it pushes the balloon into the bottle.

EXPERIMENT 19: SIMPLE DART EXPERIMENT

Ask an adult to help you when cutting with scissors.

Materials **Double-sided tape, small paper strip, cotton swab, clay, scissors**

Steps

1. Remove the cotton wool from both ends of the cotton swab.
2. Cut a strip of paper (8 cm long and 1.5 cm wide) and stick double-sided tape to one end.
3. Attach the paper strip to one end of the cotton swab, roll it up slightly, and cut the free end into a fish fin shape. Throw the cotton swab horizontally and note the direction it flies.
4. Attach a small piece of clay to the other end of the cotton swab and throw it again, noting any differences.

Experiment Principle

The center of gravity is the point at which the entire weight of an object is concentrated. If you add modeling clay to the front of the dart, the center of gravity shifts forward. This ensures that the dart always flies so that the tip lands first when you throw it.

EXPERIMENT 20: PAINTING ON EGGSHELLS

After the experiment, dispose of all food used in the experiment.

Materials **White vinegar, cotton swab, egg**

Steps

1. Pour an appropriate amount of white vinegar into the measuring cup and dip a cotton swab into it.
2. Draw patterns on the eggshell with the vinegar-soaked cotton swab (for best results, apply the vinegar several times to ensure a sufficient reaction).

Experiment Principle

White vinegar reacts with the calcium carbonate in the eggshell, causing it to dissolve and the shell to become thinner in the painted areas.

EXPERIMENT 21: SHAPE DETERMINES BUOYANCY

Materials **Clean water, modeling clay, Water basin**

Steps

1. Take a small piece of modeling clay and shape it into a ball.
2. Shape the same amount of modeling clay into a small boat.
3. Place both shapes in the water basin and compare how they float.

Why does the boat float while the ball sinks?

Experiment Principle

Whether an object floats or sinks depends on how heavy it is and how much water it displaces. The more water an object displaces, the stronger the upward force exerted by the water. If this buoyancy is greater than the weight of the object, it remains afloat and floats. However, if the weight is greater than the buoyancy, the object sinks.

EXPERIMENT 22: THE SINGING RUBBER BAND

Materials **Paper cup, cotton swab, rubber band**

Steps

1. Break the cotton swab in half and poke a small hole in the center of the bottom of the paper cup.
2. Tie one end of the rubber band to the center of another intact cotton swab and thread the other end through the hole in the cup so that the cotton swab is attached to the bottom of the cup.
3. Pull on the unattached end of the rubber band and stretch it to different lengths. Pluck the rubber band to produce different sounds from the cup.

Experiment Principle

Sound is produced by vibrations. The pitch depends on the frequency of the vibrations: the tighter the rubber band is stretched, the higher the frequency and the higher the pitch. The looser the band, the lower the frequency and the deeper the pitch.

EXPERIMENT 23: THE MAGIC WATER BAG

Materials **Clean water, plastic bag, pencil**

Steps

1. Fill the plastic bag with a little clean water (not too much, as the plastic bag is thin).
2. Sharpen the pencil and carefully turn it in the plastic bag. Observe the result.

Experiment Principle

The pencil has a smooth, even surface, and the plastic bag is elastic. When the pencil pierces the bag, the bag wraps tightly around the pencil and seals it. This keeps the plastic bag closed and prevents water from escaping.

EXPERIMENT 24: WATER DISPLACEMENT VOLUME MEASUREMENT

Materials **Blue color pigment, clean water, stones, Plate**

Steps

1. Fill the bottle with water and add 3 drops of blue food coloring. Stir well and place on a plate.
2. Drop the stones into the bottle so that the water overflows from the bottle.
3. Pour the water from the plate into the measuring cup to measure the volume of the stones.

Experiment Principle

When an object is submerged in water, the water flows over it. The volume of the displaced water corresponds to the volume of the submerged object.

EXPERIMENT 25: DIY SPINNING TOP

Ask an adult to help you when cutting with scissors.

Materials **Scissors, colored markers, cardboard, cotton swabs, pencil, double-sided tape, modeling clay**

Steps

1. Mark the center of the cardboard and align it with the center of the bottom of the bottle. Draw a circle around the bottom of the bottle.
2. Cut out the circle and draw a spiral pattern on it with colorful markers.
3. Poke a small hole in the center of the cardboard, remove the cotton wool from the cotton swab, and stick double-sided tape to the center of the cotton swab.
4. Stick the cotton swab into the hole in the cardboard and stick some modeling clay to the underside of the spinner.
5. Your homemade spinner is now ready.

Experiment Principle

When you spin the top, the forces acting on its various parts remain in dynamic equilibrium for a short time, allowing the top to continue spinning. When you look at the spiral design on the top, your eyes experience an optical illusion. All objects have inertia, which is the natural tendency to resist changes in motion.

EXPERIMENT 26: ESCAPE OF PEPPER POWDER

During the experiment, make sure that you do not inhale the pepper powder and that it does not get into your eyes.

Materials **Pepper powder, water, dish soap, Plate**

Steps

1. Fill the plate with water and sprinkle the pepper powder evenly over the surface.
2. Dip the stirring stick in dish soap and place it in the middle of the water.
3. Observe the movement of the pepper powder.

Experiment Principle

The pepper powder moves away because water has a special property called surface tension. This surface tension causes the powder to float on the surface of the water. However, when dish soap is added to the water, it breaks the surface tension and the powder quickly moves from the center of the water to the edges.

EXPERIMENT 27: BOTTLE RACE

Materials **Sand, clean water, 2 plastic bottle of the same size**

Steps

1. Fill two bottles with the same weight of water and sand.
2. Place the bottles on a sloping surface and let them roll down.
3. Observe which bottle moves faster.

Experiment Principle

Sand creates more friction with the bottle than water. Since the grains of sand also rub against each other, the movement slows down. Water has less friction, so it moves faster than sand.

EXPERIMENT 28: LEMON FIRE BREATH

Ask an adult to help you light the candle. Get an adult to help you cut the lemon. After the experiment, dispose of all food used in the experiment.

Materials **Lemon (or other citrus fruits), candle, lighter**

Steps

1. Cut off a piece of lemon peel or peel an orange.
2. Light the candle and squeeze the lemon peel to spray the juice toward the candle flame.
3. Watch the candle flame.

Experiment Principle

Citrus peels contain natural oils and other flammable substances. If you squeeze the peel near a candle flame, the oils will ignite and produce bright, flickering flames accompanied by crackling noises.

EXPERIMENT 29: BALLOON AND PAPER SCRAPS

Materials **Balloon, wool sweater, paper scraps**

Steps

1. Blow up the balloon and tie it tightly.
2. Rub the balloon on clothing or other fibers, then hold it close to the paper scraps and observe the result.

Experiment Principle

The friction between the balloon and the fabric generates static electricity. This electricity causes the balloon to attract the paper scraps, almost like a magnet.

EXPERIMENT 30: OXIDIZING APPLE

After the experiment, dispose of all food used in the experiment. Get an adult to help you cut the fruits.

Materials **1 apple, 1 lemon, clean water, fruit knife, plastic wrap, Basin**

Steps

1. Fill the bowl with water and cut the lemon in half.
2. Cut the apple into four pieces.
3. Dip one piece of apple completely into the water, wrap another piece in plastic wrap, brush another piece with lemon juice, and leave the last piece untreated.
4. Wait about half an hour and observe the changes in the apple pieces.

Experiment Principle

The color change in apples happens because they react with the air, which is called oxidation. Water and plastic wrap block the air and slow down this reaction. Lemon juice helps by slowing down a substance in apples that is responsible for the color change, keeping the apples fresh and colorful for longer.

EXPERIMENT 31: SHARP STRAW

After the experiment, dispose of all food used in the experiment.

Materials **Raw potato, Straw**

Steps

1. Take a straw, hold it firmly and try to stick it into the potato. The straw will bend but will not penetrate the potato.
2. Hold one end of the straw with your thumb and push the other end into the potato with force.
3. Observe how the straw easily penetrates the raw potato.

Experiment Principle

If you hold one end of the straw closed with your thumb and stick it into the potato, the air inside the straw is compressed. The deeper you stick the straw into the potato, the more pressure builds up inside the straw, making it stiffer and less likely to bend. This allows the straw to pierce the potato.

EXPERIMENT 32: PAPER FLOATING ON WATER

Materials **Clean water, paper**

Steps

1. Fill the flask with water so that the water level is slightly above the rim.
2. Place the white paper over the opening of the flask and make sure that it is completely soaked with water so that there are no gaps between the paper and the flask.
3. Carefully press the paper down with one hand while turning the flask upside down with the other hand. Observe the paper.

Experiment Principle

Due to the air pressure, the pressure in the piston is lower when it is filled with water, while the air pressure on the paper is stronger than that in the piston. This means that the downward force of the water is balanced by the upward force of the air pressure, preventing the water from falling down.