JUNIOR SCIENCE

MY FIRST SCIENCE KIT

21 BONUS EXPERIMENTS

Contents

Incase you need assistance, please e-mail us at care@metis.in

1 GLUE VOLCANO

10 MINS

Equipments

- Measuring Cylinder
- Spatula
- Cups

Materials Needed

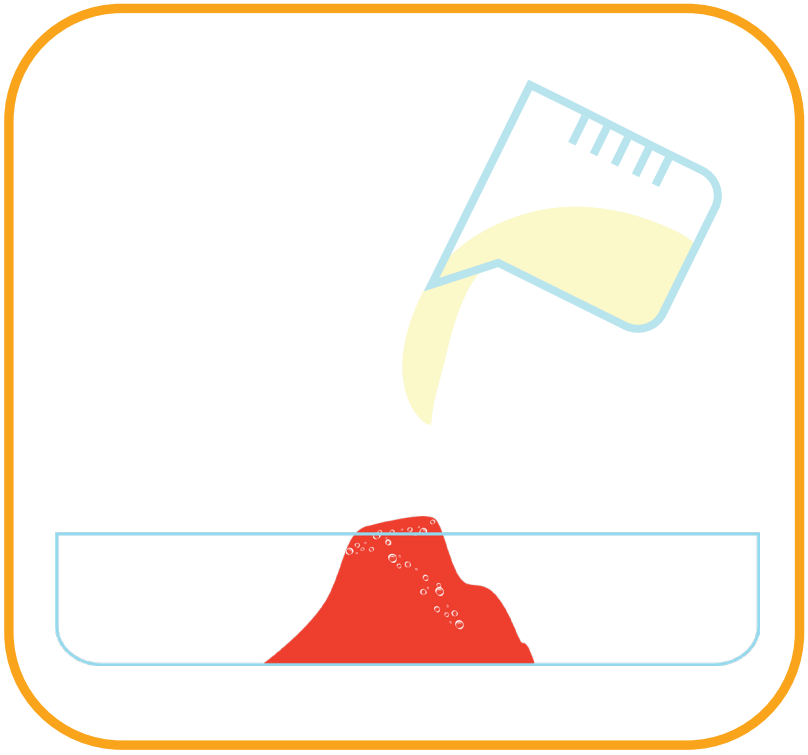
- Vinegar
- White Glue
- Baking Soda
- Colours

INSTRUCTIONS

1. Add 4 scoops of Baking Soda to a cup.
2. Pour 10 ml white glue to the cup with the help of the measuring cylinder. Then, add 3 drops of red, 3 drops of blue colour and 9 drops of yellow colour to the mixture.
3. Knead the mixture till it turns fluffy and thick. Mould the mixture in the the shape of a mound and place it on the tray.
4. Press on the mound to create a depression in the centre that resembles a volcano. The, pour 20 ml vinegar over it and observe.

Science Behind This

The baking soda in the mound reacts with the vinegar to create carbon dioxide gas bubbles. This results in the fizzing of the glue volcano.



What Did You See?

When you poured the vinegar into the volcano, did you see it fizzing and bubbling?

2 LEMON VOLCANO

5 MINS

Equipments

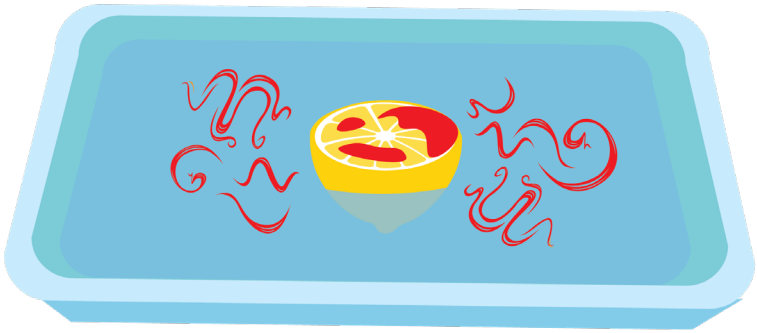
- Spatula
- Tray

Materials Needed

- Baking Soda
- Colours
- Lemon

INSTRUCTIONS

1. Take a lemon. Ensure it is not cold or frozen. Ask an adult to cut it in half. Take one half and place it on the tray.
2. Mash the insides of the lemon using the spatula.
3. Add 2-3 drops of any colour and 1 scoop of baking soda onto the lemon. Then mash the baking soda into the lemon using the spatula.
4. Squeeze the remaining half of the lemon over the mashed one.



Science Behind This

Lime juice is acidic. When it comes in contact with a basic chemical like baking soda, a reaction takes place in which bubbles of carbon dioxide are released.

What Did You See?

Did you see a fizzy reaction occur inside the lemon?

3 WATER BENDING

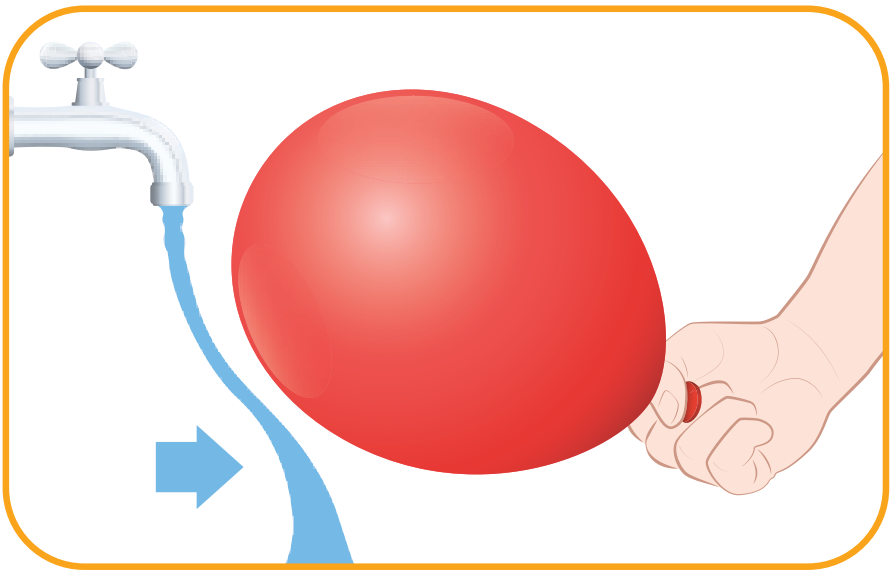
5 MINS

Materials Needed

- Woollen Sweater/ any woollen apparel
- Balloon

INSTRUCTIONS

1. Blow up the balloon and tie a knot to ensure that the air stays inside.
2. Rub the balloon on a woolen cloth like a sweater for 7 minutes. You can also rub the balloon on your hair.
3. Bring the balloon near water flowing from a tap. Ensure that the flow of water is slow.



Science Behind This

When we rub the balloon on wool or hair, it gains static electricity. This type of electricity can attract objects to it, like water.

What Did You See?

Did you see the flow of water bending towards the balloon?

4 JUMPING FIGURES

15 MINS

Materials Needed

- Woolen cloth
- Card paper
- Balloon
- Scissors

INSTRUCTIONS

1. Cut out some paper figures from the card paper. They can be any shape.
2. Place all your paper figures on a flat surface.
3. Blow up the balloon and ask an adult to tie a knot on its neck.
4. Rub the balloon on the woolen cloth and bring it close to the paper figures. What happens next?

Science Behind This

Rubbing the balloon on wool gives it static electricity. Static electricity can both attract and repel objects. This is the reason the paper figures fall back down after getting attached to the balloon first.

What Did You See?

When you placed the balloon near the figures, did they start jumping?

5 SECRET MESSAGE

30 MINS

Equipments

- Cup

Materials Needed

- Lemon juice
- Candle
- Paper sheet
- Earbud

INSTRUCTIONS

1. Take a cup and fill it with lemon juice.
2. Dip an earbud into the lemon juice and write a word on the sheet of paper. Let the sheet dry completely.
3. Ask an adult to light a candle.
4. Hold the sheet over the burning candle to warm it for a minute

Science Behind This

Lemon juice is acidic in nature. The acid remains in the paper even after the lemon juice has dried. The acid undergoes oxidation and turns brown when heat is applied.

What Did You See?

Did you see the message appearing on the paper once it was placed above the candle?

6 MAKE A FOUNTAIN

10 MINS

Equipments

- Funnel

Materials Needed

- Clear plastic bottle with cap
- Colours
- Water
- Board Pin

INSTRUCTIONS

1. Use the funnel to pour water into the bottle.
2. Fill the bottle completely to the brim. Add 3-4 drops of colour and screw the cap tightly.
3. Ask an adult to lie the bottle down horizontally and pierce a hole in its side using a board pin.
4. Pick up the bottle and make it stand vertically. Do you see any water flow out of the hole?
5. Now unscrew the cap and observe.

Science Behind This

The water can't go out of the hole util the cap is unscrewed and new air comes into the bottle. This new air is needed to replace the space created with the water leaving from the hole.

What Did You See?

Did you see the water flowing out of the hole once the bottle cap was unscrewed?

7 EARTHQUAKE ZONES

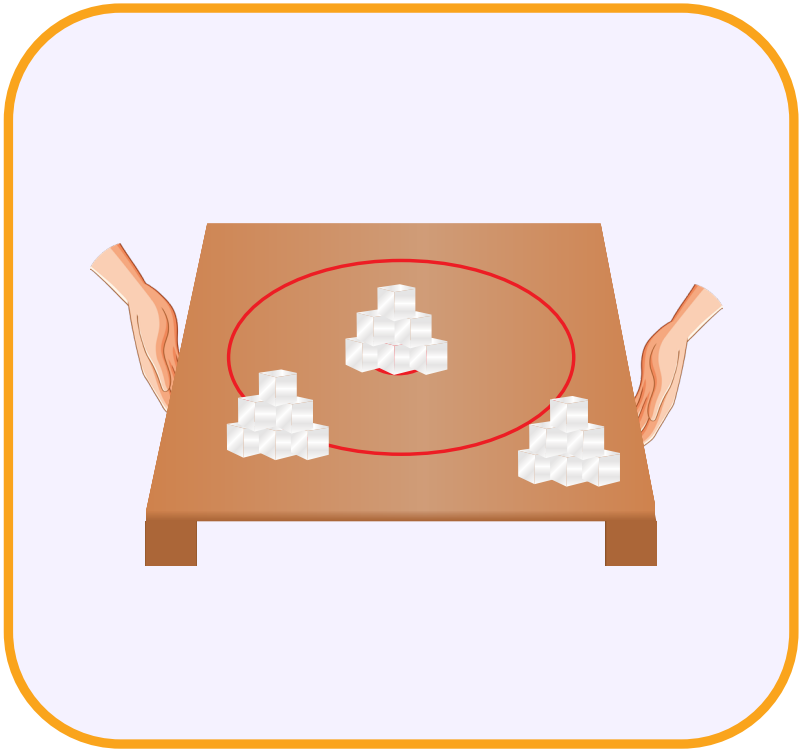
5 MINS

Materials Needed

- A piece of 10” x 10” cardboard
- Pen
- Sugar cubes
- 2 blocks of wood

INSTRUCTIONS

1. Mark the middle point of the cardboard with a pen and draw a large ring around it. Then place the cardboard on top of the blocks.
2. Make 3 small sugar cube buildings with 3 cubes at the bottom, 2 cubes in the middle and 1 cube on the top.
3. Place the first building on the mid-point, the second on the ring, and the third at the edge of the cardboard.
4. Start tapping the cardboard from the bottom of the middle point and observe.



Science Behind This

The sugar cube buildings fall apart one after another as the tapping continues from the bottom. However, the building at the centre falls first, while the other buildings follow subsequently because the impact of the tapping is the strongest at the centre similar to how an earthquake’s impact is the greatest near the epicentre.

What Did You See?

Did you see how the buildings were differently affected by the tapping of cardboard?

8 BALLOON JET

15 MINS

Equipments

- Stirring stick

Materials Needed

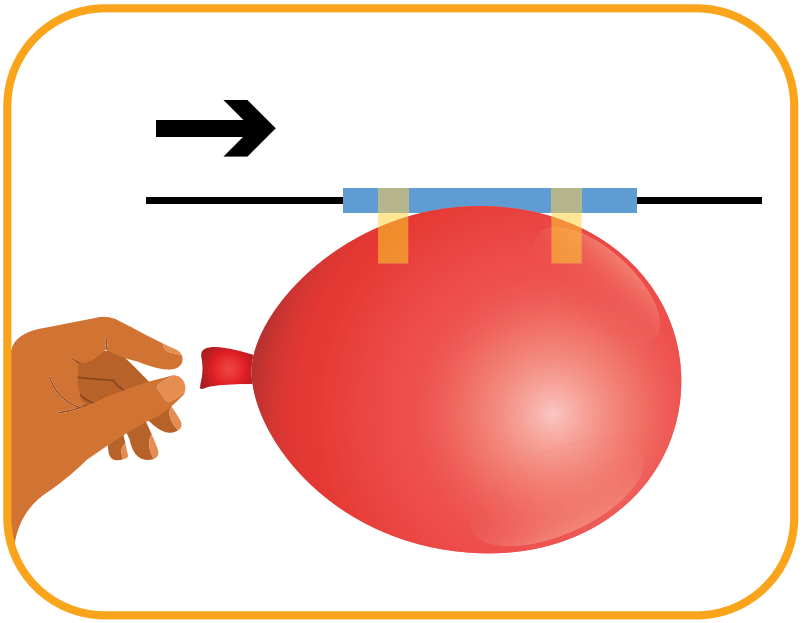
- Long thread
- Adhesive tape

INSTRUCTIONS

1. Pass the thread through the stirring stick. Attach both ends of the thread across the length of a room.
2. Attach pieces of adhesive tape to the top and bottom of the stirring stick.
3. Blow up the balloon. While still holding the neck, attach the balloon to the stirring stick using the free ends of the adhesive tape stuck on it.
4. Bring the balloon and stirring stick to one end of the thread and let go of your hand. What happens next?

Science Behind This

The buildup of air is released from the back of the balloon. This pushes the balloon ahead. Since it is attached to the stirring stick, it can only go straight.



What Did You See?

When the balloon was released, did you see it zoom at high speeds along the thread?

9 COLOURFUL RAIN

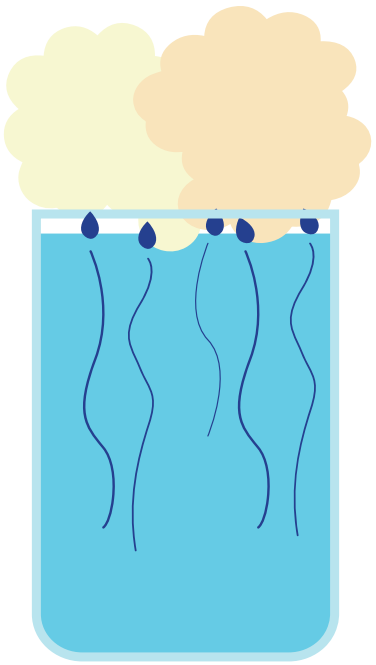
20 MINS

Materials Needed

- Glass tumbler
- Shaving foam
- Colours
- Water

INSTRUCTIONS

1. Fill the glass tumbler with water.
2. Spray some shaving foam over the top layer on the water.
3. Put several drops of different colours over the foam.
4. Observe for 10 minutes.



Science Behind This

The paint droplets go through the foam and fall down. This is similar to water droplets in the clouds falling down due to the force of gravity.

What Did You See?

Did you see the colour drops go through the foam and fall into the water?

10 CREATE A RAINBOW

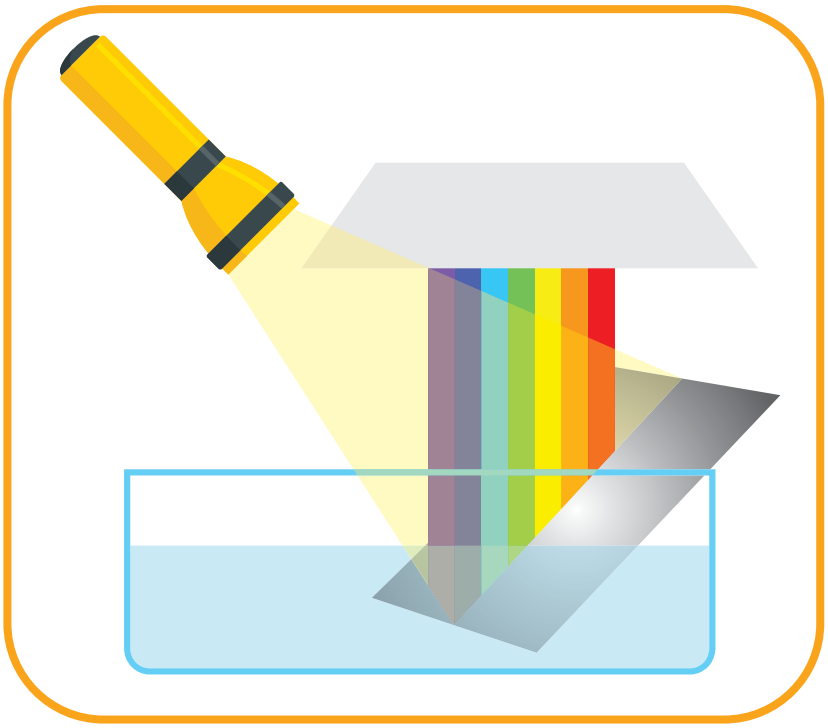
10 MINS

Materials Needed

- Torch
- Clay/Adhesive tape
- Shallow big bowl
- White card
- Mirror
- Water

INSTRUCTIONS

1. Fill the shallow bowl halfway with water.
2. Place the mirror in the bowl. Fix it in a sloping position at one end of the bowl using adhesive tape or clay.
3. Shine light using a torch to the submerged portion of the mirror.
4. Hold the white card above the bowl. What do you see?



Science Behind This

White light consists of 7 colours namely VIBGYOR (Violet, Indigo, Blue, Green, Yellow, Orange and Red). When this light is viewed through water, it splits into individual bands of colour making a rainbow.

What Did You See?

Did you see a rainbow appear on the white card?

11 FLOATING OR SINKING

10 MINS

Equipments

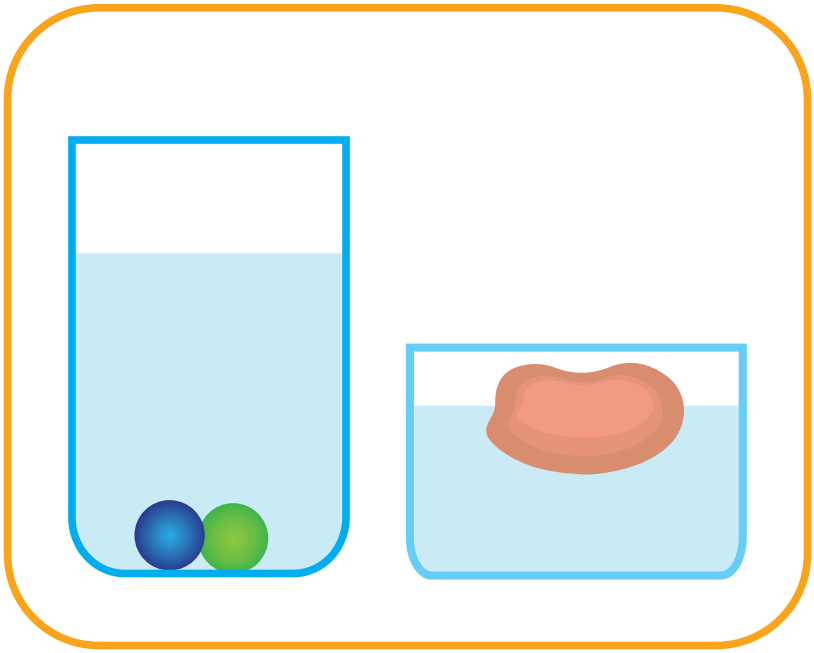
- Glass tumbler
- Cup

Materials Needed

- Marbles
- Water
- Cups
- Clay

INSTRUCTIONS

1. Take a glass tumbler and fill it with water. Then take a cup and fill it with water.
2. Take 2 marbles and drop them into the
3. Take a small piece of clay. Mould it into a boat.
4. Place the clay boat in the cup.



Science Behind This

The clay boat floats because it displaces more water than the marble balls. The more water is displaced, more force gets applied by the water against the object, allowing it to float. Try dropping various objects into water to see if they float or sink.

What Did You See?

Did you see the marbles sinking to the bottom? Did you see the paper boating floating instead of sinking?

12 FLOATING IN DIFFERENT LIQUIDS

10 MINS

Equipments

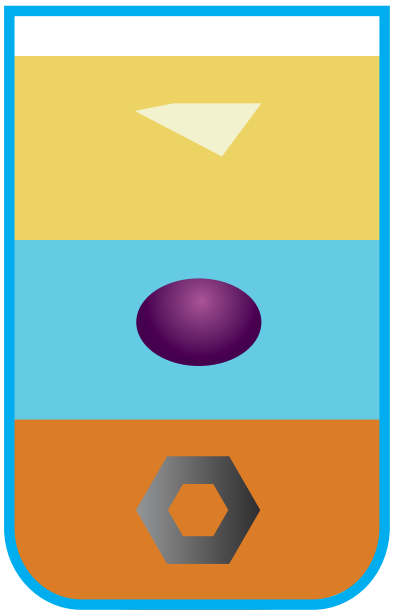
-Measuring cyinder
- Stirring Stick
- Cup

Materials Needed

- Heavy Iron nut
- Glass tumbler
- Cooking Oil
- Colours
- Honey
- Water
- Grape
- Paper

INSTRUCTIONS

1. Mix 75 ml of water with any colour in a cup. Then pour it into a glass tumbler.
2. Pour 75 ml honey and 75 ml cooking oil into the glass tumbler as well.
3. Drop the iron nut into the glass tumbler, followed by the grape.
4. Lastly add a small piece of paper into the test tube. Observe.



Science Behind This

Different liquids have different weights for the same volume. This is called density. Honey is more dense than water and so sinks to the bottom of the glass tumbler. Oil is least dense and hence rises to the top. Objects can float or sink in liquids depending on that liquid's density.

What Did You See?

Did you see the different objects floating at different levels in the glass tumbler?

13 DIFFERENT SIZES

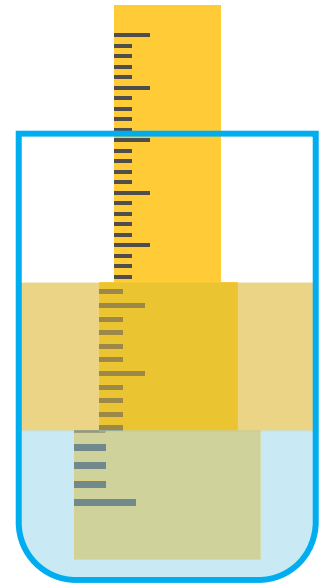
10 MINS

Materials Needed

- Glass tumbler
- Water
- Oil
- Ruler

INSTRUCTIONS

1. Fill 1/3rd of the tumbler with water.
2. Pour oil into the tumbler till the glass is 2/3rd full.
3. Wait for 1 minute until you see the oil and water as separate layers with water at the bottom and oil on top.
4. Insert the ruler into the tumbler. Observe the breadth of the ruler from the side of the glass. What do you see?



Science Behind This

The ruler appears wider because light bends when it enters a different medium other than air. This property of light is called refraction.

What Did You See?

Did you see the breadth of the ruler appear wider in each layer?

14 DEAD SEA

5 MINS

Equipments

- Measuring Cylinder
- Spatula

Materials Needed

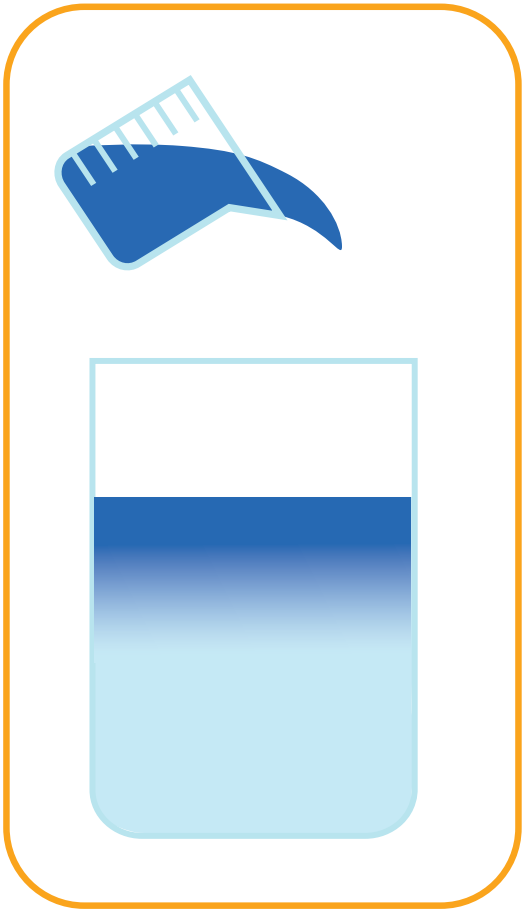
- Glass tumbler
- Blue Colour
- Water
- Salt

INSTRUCTIONS

1. Take a glass tumbler and fill it up to 3/4th with cold water.
2. Add 6 scoops of salt in the glass tumbler and mix the contents well.
3. Measure 10ml of water in the measuring cylinder. Then add 2 drops of blue colour and mix well.
4. Gently pour the blue water into the glass tumbler from the measuring cylinder.

Science Behind This

Salt water has a higher density than freshwater. This is the reason the freshwater stays on top. The dead sea near Israel is a lake with such a high salt content that it is impossible to drown in it. This is due to its high density preventing anyone from sinking below.



What Did You See?

Did you see the blue colour water stay at the top when you view the glass tumbler from the side?

15 VORTEX TUBE

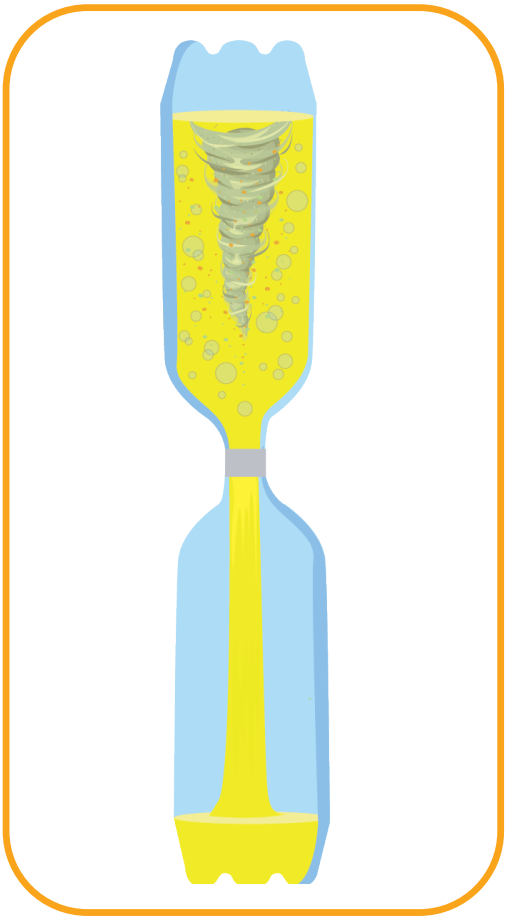
10 MINS

Materials Needed

- 2 Similar, clear plastic bottles
- Colours
- Water
- Glue
- Tape

INSTRUCTIONS

1. Fill one bottle with water. Add 3 drops of colour.
2. Place the empty bottle upside down on the first bottle.
3. Fix both the mouths of the bottles with glue and secure the mouths with tape to create the tube.
4. Flip the tube and shake it in a circular motion.



Science Behind This

This experiment emulates a cyclone. Similar to the Vortex in a Bottle experiment from the Instruction Manual, the centripetal force causes the vortex to form inside the bottle at the top as it is being emptied.

What Did You See?

Did you see a spinning whirlpool being formed inside the top bottle as it is being emptied?

16 CHECK FOR VISCOSITY

10 MINS

Equipments

- Measuring Cylinder

Materials Needed

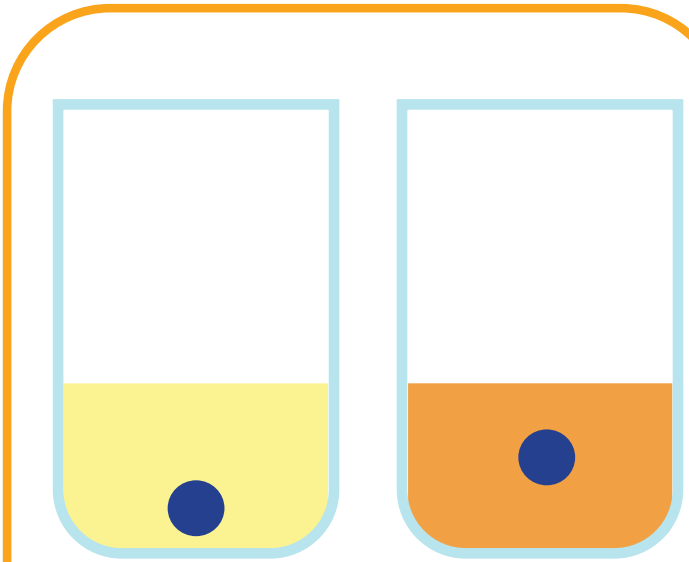
- 2 transparent glass tumblers
- Marble balls/ pebble
- Cooking oil
- Any Syrup
- Vinegar
- Water

INSTRUCTIONS

1. Take a glass tumbler and pour 100 ml of any one liquid (water, vinegar, oil or syrup) into it.
2. Repeat the above step for the second glass with a different liquid.
3. Take 2 marble balls, and drop one in each glass at the same time. Observe the marbles as they are sinking to the bottom.
4. Repeat the above 3 steps with different pairs of liquids.

Science Behind This

Some liquids flow slower than others. This is called viscosity. The slower a liquid's flow, the higher is its viscosity. Syrup flows slower than water, and thus has higher viscosity



What Did You See?

Did you see the marbles sink to the bottom of the tumblers at different speeds?

17 ROCK WEATHERING

5 MINS

Equipments

- Cups

Materials Needed

- Small container
- Coloured chalk
- Salt
- Pen

INSTRUCTIONS

1. Take the container and fill half of it with salt.
2. Put some pieces of coloured chalk into the container.
3. Close the lid and give the jar a hard shake for 30 seconds.
4. Pour the contents into the cup and observe.

Science Behind This

When the container is shaken, the salt comes in contact with the chalk, breaking it down. Similarly, rocks also break down over time when they come in contact with natural elements such as air and water. This process is called weathering.

What Did You See?

When you poured the contents into the cup, did you see the salt change colour?

18 CHANGING ARROWS

15 MINS

Materials Needed

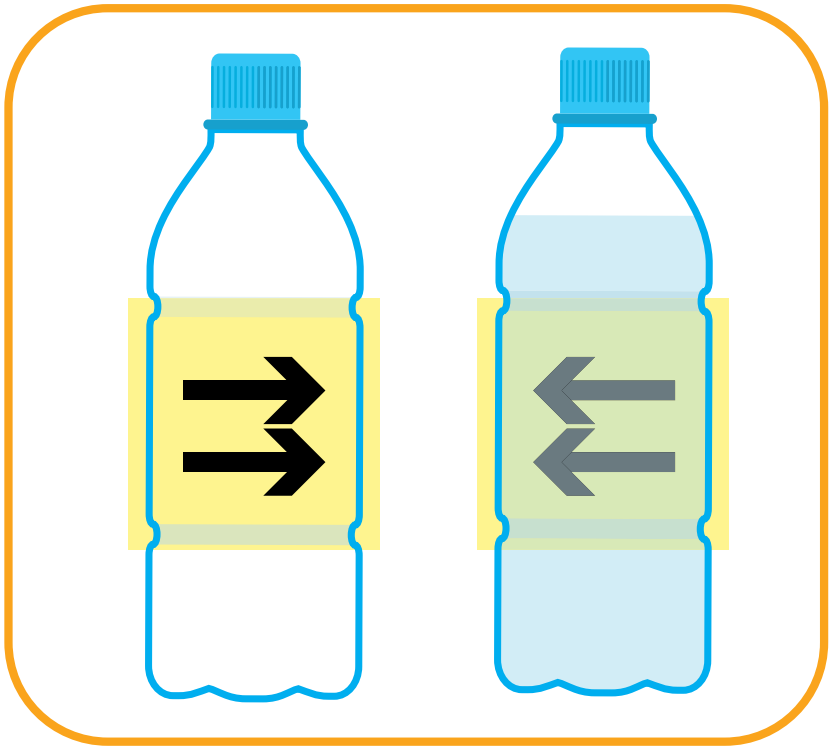
- Transparent Bottle
- Sticky Note
- Marker
- Water

INSTRUCTIONS

1. Take a sticky note and draw a pair of arrows pointing in opposite directions.
2. Stick the note on a wall near the table or any flat surface.
3. Take a transparent bottle and fill it with water.
4. Place the bottle between you and the note and try to see the arrows through the bottle. What do you see?

Science Behind This

Light bends when it passes through water. This is the reason the arrows appear to change direction when viewed through water.



What Did You See?

Did you see the arrows changing directions?

19 SCENTED PLAY DOUGH

10 MINS

Equipments

- Measuring Cylinder
- Spatula
- Cups

Materials Needed

- Cooking Oil/Hair Oil
- Baking Soda
- Cornstarch
- Colour
- Water
- Scent

INSTRUCTIONS

1. Take a cup and add 2 scoops of baking soda and 1 scoop of corn starch.
2. Add 4-5 drops of colour, 5ml of water and a few drops of oil into the cup. Mix them well.
3. Ask an adult to heat the cup in the microwave for 20 seconds. Then let it cool for 5 minutes.
4. Add 5-6 drops of a scent of your choice to the cup. Then take out the mixture and knead it into a dough.

Science Behind This

When baking soda and cornstarch are heated together, they combine to form a clay like substance that resembles play dough. The dough has a fragrance since scent has been added to the mixture once it has cooled down.

What Did You See?

Did the mixture have a fragrance after it was kneaded into a dough?

20 SILLY PUTTY

12 MINS

Equipments

- 2 Cups

Materials Needed

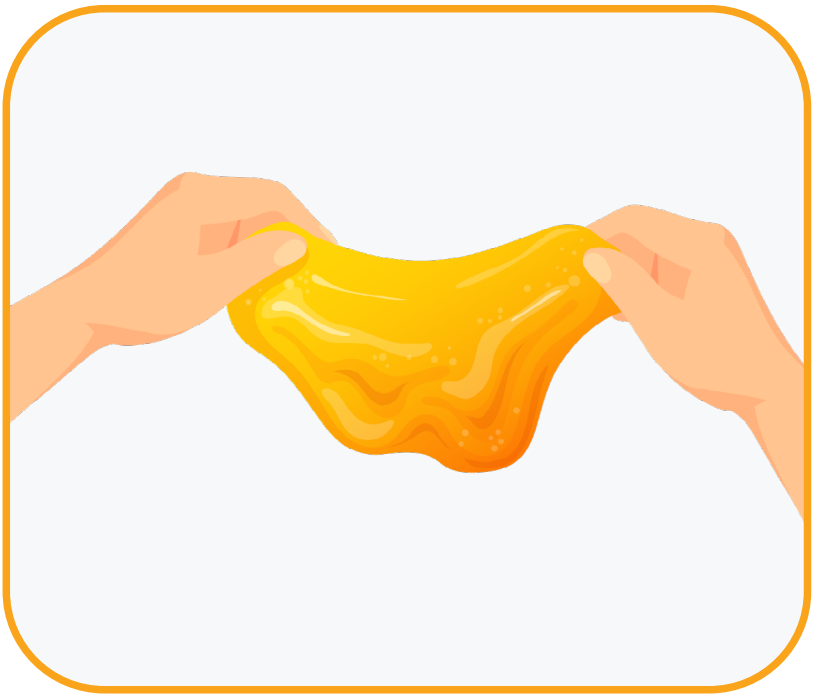
- Air Tight Container
- Large Bowl
- Liquid Starch
- White Glue
- Colour

INSTRUCTIONS

1. Take a large bowl and add 1/2 cup of liquid starch and 1 cup of white glue into it. Then add 5-6 drops of colour.
2. Mix the contents of the bowl until it becomes a dough.
3. Ensure that the liquid starch has been absorbed and the colour is even throughout the dough.
4. Take the dough out of the bowl and place it inside an air-tight container.

Science Behind This

When glue is mixed with liquid starch, it turns into a mixture that resembles a slime. This slime is very rubbery and highly strechable.



What Did You See?

When you started using the putty, was it stretchable and bouncy?

21 RAINBOW STEW

15 MINS

Equipments

- Spatula
- Cups

Materials Needed

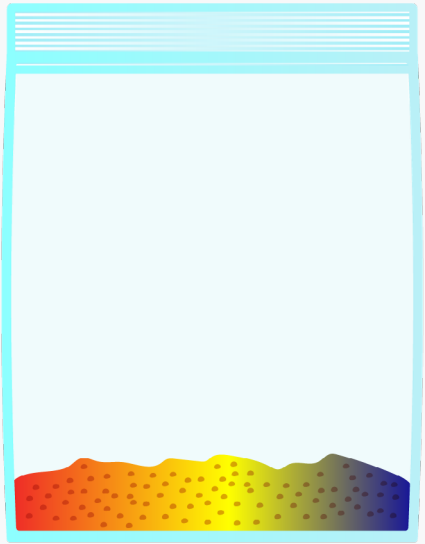
- Wooden spatula
- 3 Bowls
- Plastic tape
- Saucepan
- Ziplock Bags
- Colours
- Cornstarch
- Water
- Sugar

INSTRUCTIONS

1. Add 4 cups of water, 1 cup of cornstarch, and 1/3 cups of sugar to a saucepan.
2. Ask an adult to cook the mixture over medium heat. Stir the mixture with the wooden spatula until it transforms into jelly.
3. Divide the mixture equally into three separate bowls.
4. Add red colour to the first, blue to the second and yellow to the third bowl respectively.
5. Take a ziplock bag and add 2 scoops of each colour into the bag. Zip the bag, and seal it with plastic tape.

Science Behind This

The red, bue and yellow colours are called primary colours. Mixing these colours will result in making of secondary and tertiary colours and so on.



What Did You See?

New colours are formed where the three colours are mixed together. What colours did you see?