My First Science Kit

⚠ WARNING:

CHOKING HAZARD - Toy contains small parts. Not for children under 3 years.

PLAY MONSTER

Dear Parents and Guardians:

Through play, children develop different cognitive skills. Scientific studies show that when we are having fun or making discoveries during an experiment, a neurotransmitter called Dopamine is released.

Dopamine is known to be responsible for feelings like motivation, reward and learning and that's why experiences are related to positive feelings. So, if learning is a positive experience, it will stimulate the brain to develop various skills.

Therefore, Science4you aims to develop educational toys that combine fun with education by fostering curiosity and experimentation.

Find out below which skills can be developed with the help of this educational toy!

The educational feature is one of the key strengths of our toys. We aim to provide toys which enable children's development of physical, emotional and social skills.

Find out more about the Brain Activator in Science4you toys at:

www.playmonster.com

PLAYMONSTER

We wanna hear how much fun you had! Get in touch at:

Customer Service
1400 E. Inman Pkwy., Beloit, WI 53511
playmonster@playmonster.com | 1-800-524-4263

For more fun, visit playmonster.com

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Science4you

SAFETY RULES

- Read these instructions before use, follow them and keep them for reference.
- Keep young children, animals and those not wearing eye protection away from the experimental area.
- Always wear eye protection.
- Store this experimental set out of reach of children under 4 years of age.
- Clean all equipment after use.
- Make sure that all containers are fully closed and properly stored after use.
- Ensure that all empty containers and/or non-recloasable packaging are disposed of properly.
- Wash hands after carrying out experiments.
- Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.
- Do not eat or drink in the experimental area.
- Do not replace foodstuffs in original container. Dispose of immediately.
- Do not apply any substances or solutions to the body.
- **Warning:** All experiments of this kit should be carried out under the supervision of an adult.

GENERAL FIRST AID INFORMATION

- **In case of eye contact:** wash out eye with plenty of water, holding eye open if necessary. Seek immediate medical advice.
- **If swallowed:** wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.
- In case of doubt, seek medical advice without delay. Take the chemical and its container with you.
- In case of injury always seek medical advice.

ADVICE FOR SUPERVISING ADULTS

- Read and follow these instructions, the safety rules and the first aid information, and keep them for reference.
- This experimental set is for use only by children over 4 years.
- Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which experiments are suitable and safe for them. The instructions should enable supervisors to assess any experiment to establish its suitability for a particular child.
- The supervising adult should discuss the warnings and safety information with the child or children before commencing the experiments.
- The area surrounding the experiment should be kept clear of any obstructions and away from the storage of food. It should be well lit and ventilated and close to a water supply. A solid table with a heat-resistant top should be provided.
- This experimental set contains colorings. Colorings can stain. Keep it away from objects and fabrics.
- This experimental set contains seeds. The seeds must be kept away from eyes, nose and mouth. In case the seeds come in contact with eyes or mouth, wash with running tap water. In case of rash or irritation seek medical advice.

PROTECTIVE GOGGLES INSTRUCTIONS

General Applications (EN 166:2002-04)
PROTECTIVE GOGGLES MODELS JO-101, JO-123, MERKOR 101, MEDOP 101 and WVC.54Y.001: Can protect against basic impacts or low energy, but not against dust or liquid splashes or even against cast metals.

PANORAMICS: Against low or medium energy impacts, dust, liquid drops and cast metals. Not against liquid splashes or electric short-circuit.
FACIAL VISORS: Can protect against low, medium and high energy, liquid splashes, cast metals and hot solids. Not against dust and gases.

1 – IDENTIFICATION
- Manufacturer identification:
JI Justnesa, MEDOP, MERKOR, WEVINCO, or the anagram.
- Optical class, according with EN 166 (Just for neutral lens)

OPTICAL CLASS	SPHERICAL POWER (D1+D2)	STIGMATIC POWER (D1 - D2)	DIFFERENCE IN PRISMATIC REFRACTIVE POWER (Δ, cm/m)		
			Horizontal		Vertical
	(Dioptre)	(D.m)	External Base	Internal Base	
1	±0.06	0.06	0.75	0.25	0.25
2	±0.12	0.12	1.00	0.25	0.25
3	+0.12 -0.25	0.25*	1.00	0.25	0.25

Notes: D1 and D2 are the refractive powers of the two main meridians.
* The main meridian axes of the two lenses will be parallel between ± 10°.

- Symbol of mechanical resistance, with the letters:
Without letter: Minimal robustness.
S: Robustness increased (steel ball from 22mm to 5.1 m/s).
F: Impacts of high speed and low energy (steel ball from 6mm to 45 m/s).
B: Impacts of medium energy (steel ball from 6mm to 120 m/s).
A: High energy impacts (steel ball from 6mm to 190 m/s).
- Marking of the frame:
- Identification of the manufacturer: JI, MEDOP, MERKOR, WEVINCO.
- The number of Standard EN 166, which covers this protector
- A letter indicating the field of use (See table)
- Symbol of resistance to particles of high speed:
  - Low energy impact: F
  - Medium energy impact: B
  - High energy impact: A

Note: If protection against high velocity particles and extreme temperature is required, the eye protector used must be marked with the letter T and immediately after the letter of impact (FT, BT, AT). If the letter of impact is not followed by the letter T, the eyewear should be used against particles at high speed and at room temperature.

2 – USE
It must be ensured that the risk present in the working environment corresponds to the field of use of this protective eyewear, which is deduced from the marks printed on them.
To adapt the protective eyewear to user dimensions, you only need to modify the length on the extension tabs. If the goggles have non-extendable tabs, you must change the curved position of each tab of the tab by hand: this operation is made easier by gently heating the tab first with warm air from a radiator, hot water, etc.
The helmet-adaptive visors are adjusted by inserting the frame at the edge of the helmet and securing it with the rear elastic closure.
All equipment is manufactured with materials that do not produce allergies, irritations, etc. However, they can produce allergic reactions in especially sensitive people.
They are for personal use and therefore should not be used by several users, even after they have been carefully cleaned.
The prescription glasses should be worn under the conditions for which they were prescribed.
Fields of use:

SYMBOL	DENOMINATION	FIELD OF USE DESCRIPTION
Without Symbol	Basic use	Mechanical hazards not specified
3	Liquids	Liquids (Drops and Splashes)
4	Thick dust particles	Powder particles larger than 5 microns
5	Gas and fine dust particles	Gases, vapors, sprays, smoke and dust particles with a size of less than 5 microns.
8	Electric Short Circuit Arc	Electric arc due to short circuit in electrical equipment.
9	Hot melt and solid materials	Splashes of molten metals and penetration of hot solids.

3 – MAINTENANCE
3.1 Care and Cleaning
Full protective goggles should be cleaned at intervals with clean, soapy water. Then dry them carefully with a soft, clean and absorbent cloth. For greater cleaning (disinfection) use a dry cloth impregnated with alcohol. In no case should other types of solvents be used.
3.2 Replacement
With prolonged use, these protective glasses can be scratched and chopped and, in the case of plastic lenses, yellowing. Therefore, it is necessary to do a periodic review of the state of the protective eyewear and replace it if it exhibits these defects, although apparently still allow the vision, and replace the product. In any case, the product must be replaced every 5 years.
3.3 Spare Parts
Spare lenses are available for all face screens. There are also spare lenses for binocular glasses and welder glasses.
3.3 Conservation
Protective goggles should be stored in an airy and cool place, avoiding humidity, dirt and dust. It is recommended to use a protector or a plastic bag to transport the glasses.
Disposal considerations: must be handled in accordance with local regulations.

In case of emergency dial:
9-1-1 or Poison Control: 1-800-222-1222

In case of poisoning by any of the components used in the experiments of this toy, contact your local poison control center or the nearest hospital. Please consult the following link for more information: https://www.poison.org/

LIST OF SUBSTANCES SUPPLIED

Blue Coloring

INGREDIENTS: CI 42090, SODIUM BENZOATE, POTASSIUM SORBATE

Precautionary Statements:
P202 Do not handle until all safety precautions have been read and understood.
P233 Keep container tightly closed.
P234 Keep only in original container.

Red Coloring

INGREDIENTS: CI 16255, SODIUM BENZOATE, POTASSIUM SORBATE

Precautionary Statements:
P202 Do not handle until all safety precautions have been read and understood.
P233 Keep container tightly closed.
P234 Keep only in original container.

Yellow Coloring

INGREDIENTS: CI 19140, SODIUM BENZOATE, POTASSIUM SORBATE

Precautionary Statements:
P202 Do not handle until all safety precautions have been read and understood.
P233 Keep container tightly closed.
P234 Keep only in original container.

Chamomile Seeds

Recommendations for substances and mixtures: Do not ingest. Avoid contact with the eyes and mouth. Use only according to the instructions. Store in tightly closed containers. Keep in a cool, dry place. Protect from moisture, direct sunlight and heat sources.

DISPOSAL OF USED SUBSTANCES

Do not dispose of substances and / or mixtures together with household or other waste. Please recycle packaging materials where local recycling programs exist.

My First Science Kit

Get to know your kit!


Protective goggles


Large test tubes with lids


Measuring cup


Yellow coloring


Pipette dropper


Blue coloring


Red coloring


Chamomile seeds


Magnifying glass


Tweezers


Small test tubes with lids


Flower pots


Bubble wand


Test tube rack


Cotton balls


Card with graphic elements

Note: every time you finish an experiment wash all material and put it away!

Hello, Scientist!
Get ready to explore the world of science! These fun experiments will teach you so many fun and interesting things with your **First Science Kit!**

What is science?

Science means **Knowledge!**

How does science work?

A Scientist has questions!

What?
Where?
When?
Who?
Why?

The Scientist makes experiments!

The Scientist finds answers!

And much more...

What does science study?

Different living beings.

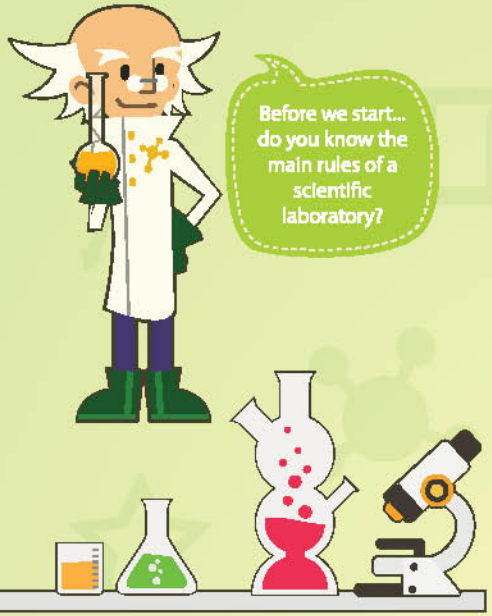
Different musical instruments made of different materials make different sounds!

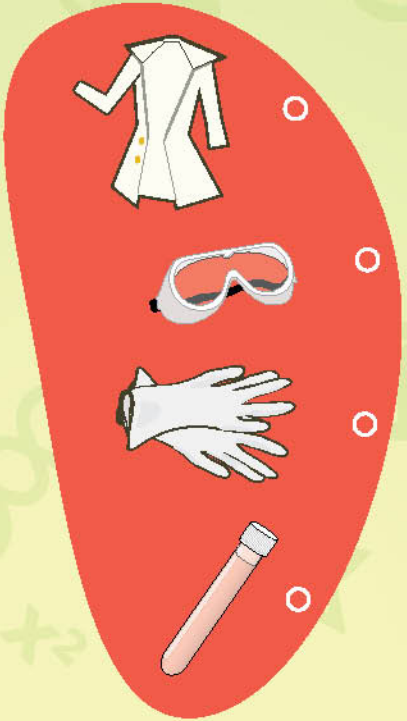
Planet Earth

Safety in the laboratory

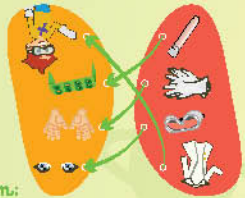
Game 1.

Connect the images on the left to the ones on the right. They will give you some helpful knowledge to always stay safe in the laboratory!



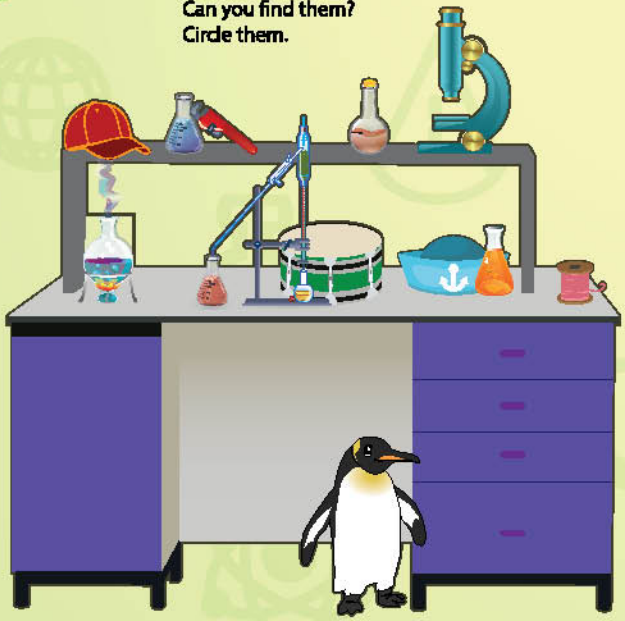


Solution:

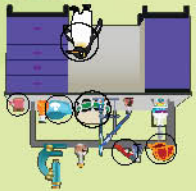


Game 2.

There are 6 things in the image which do not belong to the laboratory!
Can you find them?
Circle them.



Solution:



5 senses, 5 rules!

It is very important to use protective goggles for your eyes every time we instruct you to, that way, your **sight** will always be protected!

It is necessary to listen to all advice from adults. Pay attention to strange or unfamiliar sounds. That is what **hearing** is for!

Never smell any experiment unless we instruct you to do so. That is the only way to protect your sense of **smell**!

If you want to protect your **taste**, don't taste any experiment unless instructed. Never eat or drink anything while you are performing an experiment!

When necessary, use the gloves. At the end of each experiment, wash your hands thoroughly. Your hands help you recognize the world, through **touch**.

Note: Scientist, remember that after each experiment you should always clean up your "laboratory" and all the materials should be washed.

The pipette dropper!

Scientist, it is very important that you learn how to properly use the pipette dropper! Are you ready?

What will you need

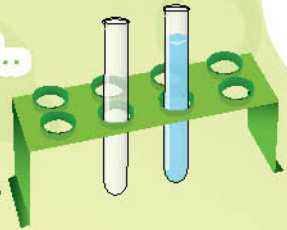
Extra materials:

- Water

How to do it...

1. Put the 2 test tubes in the test tube rack.

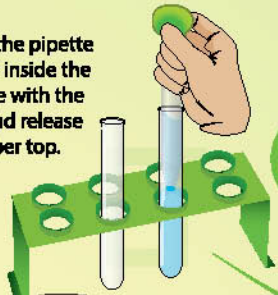
2. Fill 1 of the test tubes with water.



3. Now, hold the pipette dropper, just like you see in the image.

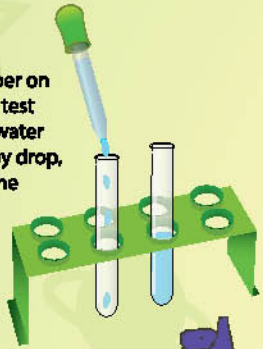
4. Press the upper part of the dropper (rubber top part).

5. Put the pipette dropper inside the test tube with the water and release the rubber top.



Did the water enter the dropper, Scientist?

6. Put the dropper on top of the empty test tube and let the water fall slowly, drop by drop, while you press the rubber top.



Practice until you are able to drop just small drops! That way you will be an extraordinary Scientist!

Could you do it, Scientist?

It is extremely important that you wash the pipette dropper every time you use it and every time you change reagents (colorings)! To wash it, take out the rubber part and rinse the plastic part several times with water.

Theme: Colors

Experiment 1
Color mixtures

It is from the mixture of these three colors that others are obtained, just like the colors of the rainbow.

In nature, there are 3 **primary colors.**

What will you need

Goal

To know the primary and secondary colors and learn how to obtain the secondary colors, using just the primary colors.

Extra materials:

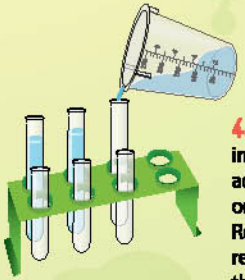
- Water
- Gloves

How to do it...

1. Put on the gloves.

2. Put the test tubes in the the rack, as the image shows.

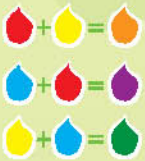
3. Using the measuring cup, fill the 3 large test tubes with water.



4. Let's add color to the water in each test tube! With the dropper, add 5 drops of a coloring to one of the large test tubes. Repeat the steps for the remaining test tubes, with the rest of the colors.

5. Next, carefully put one of each color into the small test tubes. Then, use the color sheet in the image to the right to choose a color combination. Put the second color in the small test tubes and mix them together. Finally, put the lids on the small test tubes to save the colors for later.

What do you observe?
Which colors can you create?



Are you ready to make new colors?

Did you know...
That if we add secondary colors to a primary color, we obtain a tertiary color? Brown is an example of a tertiary color because it is the mixture of green with red!

Conclusion!

In this experiment, it was possible to observe that, when we mix two colors (primary), we get a new color (secondary).

Experiment 2
A garden of flowers

Theme: Living things - plants

Plants are living things that use the Sun's energy and carbon dioxide for food. They are extremely important because they produce the oxygen that we breathe!

Did you know...
That there are several types of plants?


Tree


Plant with flower


Non-flowering plant

Goal

Learning how plants grow and develop.


Chamomile

What will you need


Flower pot


Pipette dropper


Cotton balls


Flower tags (card with graphic elements)


Chamomile seeds

Extra materials:

- Cup
- Water
- Scissors
- Gloves

Always ask an adult for help!

How to do it...

1. Put on the gloves and put 3 cotton balls in the flower pot.

2. Put between 4 to 10 chamomile seeds in the flower pot.

3. Put a bit of water in a cup and then water the flower pot using the dropper.

Adult supervision required

4. Ask an adult to help you use the scissors to cut out the flower tags on the card with graphic elements. Write the name of the plant on the tag and put it in the flower pot to identify it.

5. Keep watering your flower pot with the dropper! Don't forget that plants also need sunlight to grow.

You can also use soil for plants instead of cotton balls to perform this experiment.

Conclusion!

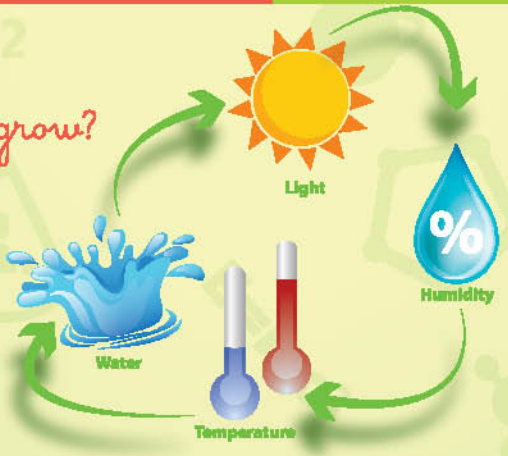
Plants germinate (develop) from seeds! To grow, they need nutrients, water, and sunlight. But not in excess or they can become sick and die.

	Chamomile
Ideal period to plant seeds:	Spring
Blooming season:	During spring and summer

Experiment 3

What do plants need to grow?

A plant's life is influenced mainly by four factors:



Goal

To know and observe the factors which influence a plant's growth and survival.

What will you need?

Extra materials:

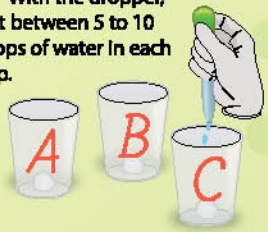
- 3 Cups
- Marker
- Water
- Grass seeds
- Gloves

How to do it...

1. Put on the gloves and use a marker to identify the 3 cups with A, B and C.

2. Put a cotton ball in each cup.

3. With the dropper, put between 5 to 10 drops of water in each cup.



4. Put some grass seeds in each cup.

5. Place the cups as follows:

Cup A
Near a window and keep moistening it.

Cup B
In a dark place and keep moistening it.

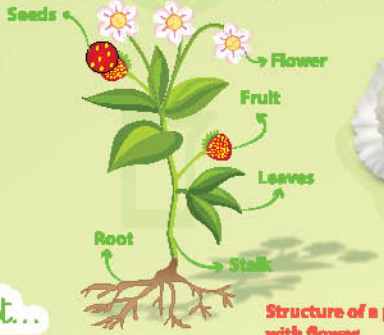
Cup C
Near a window, without adding more water on this cup.

Conclusion!

Grass should only have grown in cup A. We can learn that plants can't grow without light or water!

Experiment 4
Flowers that change color

You already know that there are several types of plants. A plant's structure is interesting. Have a look at the example!



Structure of a plant with flower.


White carnation

What will you need?


Pipette dropper


Measuring cup


Colorings

Goal

To understand how plants get food.

Extra materials:

- Plant with a white flower (e.g. carnation)
- Pitcher
- Scissors
- Spoon
- Water
- Gloves

Always ask an adult for help!

How to do it...

1. Put on the gloves and put 200 milliliters (ml) of water inside the measuring cup.

2. With the dropper, add 15 drops of your favorite color to the water. Stir with the spoon.

3. Ask an adult to cut the tip of the white flower stalk at an angle.

4. Put the colored water in a pitcher.

The measuring cup has a scale (ruler) which helps you measure the quantity (volume) of the liquids you put inside.

5. Put the flower in the pitcher.

Wait a few days and see what happens. Keep adding water to the pitcher so the flower is never without water.

SUPER SCIENTIST:
Use the colorings you like the most and get flowers of many different colors. Perform experiment 1 and then use the new colors that you created.

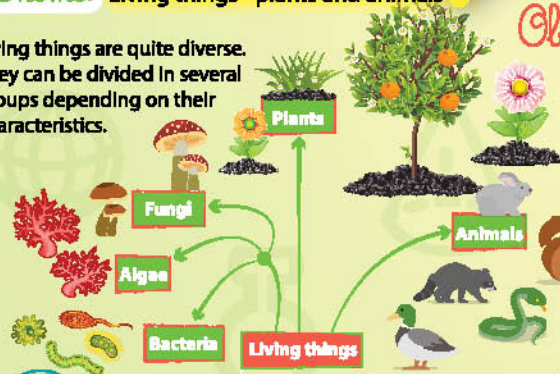
Conclusion!

The colored water goes up the stalk until it reaches the leaves and flower, which turn the color that you added to the water. Plants feed through their roots. In the absence of roots, the stalk transports the water directly to the plants.

Theme: Living things - plants and animals

Experiment 5
Observing living things

Living things are quite diverse. They can be divided in several groups depending on their characteristics.

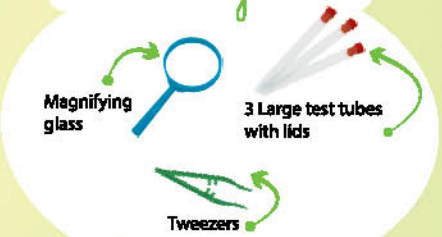


Division of living things in five groups.

Goal

To observe some of the characteristics of living beings.

What will you need



Extra materials:

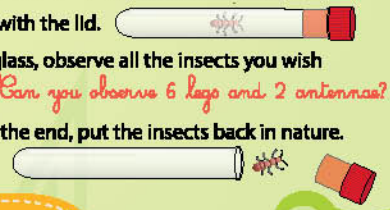
- Flower from experiment 2 or 4
- Plants
- Insects
- Notebook
- Pencil

How to do it... Observing plants

1. Choose the plants you want to observe.
   Look for them in a garden or in your house!
2. Thoroughly observe the details of the plants. Use the magnifying glass to help you.
3. With the tweezers, remove some leaves and/or petals and observe them.
4. Observe also the flower of experiment 4.
5. Draw what you observe in your notebook.

How to do it... Observing insects

1. Take your material outside on a sunny day.
2. Look for insects on your plants.
3. When you find an insect try to hold it with the tweezers and put it in the test tube.
4. Cover the test tube with the lid.
5. With the magnifying glass, observe all the insects you wish and draw what you see. *Can you observe 6 legs and 2 antennas?*
6. In the end, put the insects back in nature.



Don't keep insects for longer than 2 minutes inside the closed test tube!

Conclusion!

This is an excellent technique to observe living things in their own environment.
That way, it is possible to see how they behave and the great diversity of living things that exists!

Experiment 6
Finger paint

Theme: Art with science

By using certain materials' properties, it is possible to create mixtures which become new materials.

Paints are the result of mixing several components.

There are so many types of colorful paints!

What will you need?

Goal

To make paint that can be used with the fingers, using only simple materials!

Extra materials:

- Flour
- Water
- Tablespoon
- Bowl
- Sheets of paper

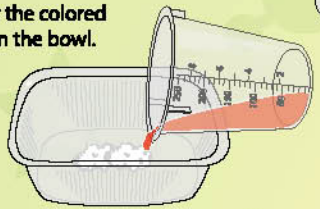
How to do it...

1. Start by putting 2 spoons of flour in a bowl.

2. Measure 20 ml of water with the measuring cup.

3. Use the dropper to add some drops of your favorite coloring to the water.

4. Put the colored water in the bowl.



5. Mix well with your fingers.

6. Repeat these steps using different colors, or mix the ones you already made.

ATTENTION: when you finish the experiment, throw away all used food.

Now have fun and make fantastic works of art on sheets of paper!

Scientist, use these paints in the following experiment!

Do you remember experiment 1? What do you observe, Scientist?

Conclusion!

In this experiment you made fantastic paints using just ingredients from your everyday life.
This is only possible due to the properties of the materials you used!

Theme: Living things - fingerprints

Experiment 7
Art with fingerprints

Fingerprints are the drawings which you can see on the tip of your fingers.

These are different for every person!

Did you know...
That not even twins have the same fingerprints?
That is why they are used to identify people!

What will you need

Goal

To observe fingerprints, and to understand that there aren't two identical in the world.

Extra materials:

- Sheets of paper

How to do it...

Observe fingerprints!

1. Prepare the sheets of paper.

2. Choose a paint and put your index finger in it. Then press your finger against the sheet of paper.

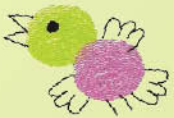
3. Use the magnifying glass to see the details of the drawing that remained on the paper.

What do you observe? This is your fingerprint!

4. Repeat the experiment but now ask other people to press their fingertips to the paper.

Are their prints the same as yours?

Create art with your fingerprints!



Try to create drawings, using just the tip of your fingers (your fingerprints)! **Use your imagination!**

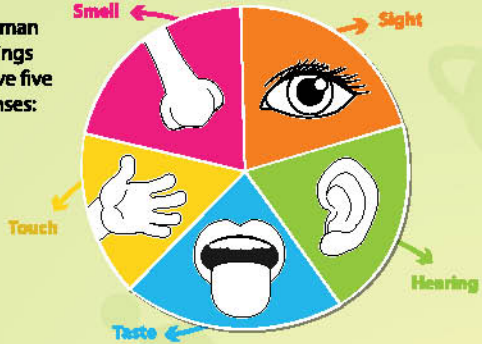
Conclusion!

Fingerprints are very important. Everyone has a different pattern that helps to identify them!

Experiment 8
What is that smell?

Theme: Living things - The five senses

Human beings have five senses:

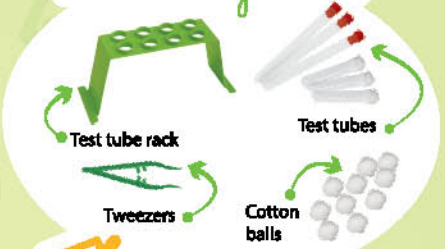


To recognize the smell of your lunch or of a perfume, we use the **sense of smell**!

Goal

To recognize different fragrances using the five senses of the human body.

What will you need?



Extra materials:

- Blindfold
- Different spices and perfumes
- Fruit juices
- Other things you want to test

Always ask an adult for help!

How to do it...

1. Put the test tubes in the rack.
2. Ask an adult to put a spice (cinnamon, curry, coffee chocolate, vanilla, etc.) in each tube without letting you see it.
3. Put on the blindfold and then smell each one of the tubes.
4. Wash the test tubes thoroughly with water and soap.
5. Repeat the experiment but now ask an adult to put some drops of liquid fragrances (such as different perfumes or different fruit juices) on the cotton balls.

ATTENTION: when you finish the experiment, throw away all used food.

Cinnamon

Curry

Vanilla

Conclusion!

The nose is the organ responsible for the sense of smell. Even with the eyes blindfolded, it is possible to distinguish different smells and identify them! That happens because the human body has what we call an olfactory memory.

Experiment 9
The flavor game

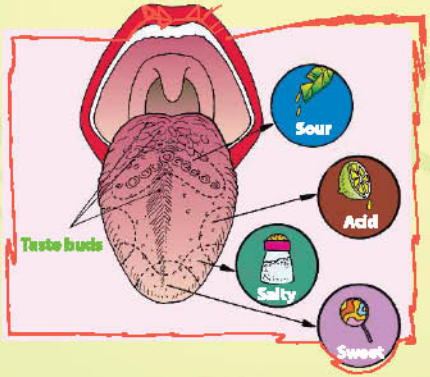
What will you need?

Extra materials:

- Opaque cups
- Water
- Lemon juice
- Chocolate powder
- Coffee powder
- Table salt

Always ask an adult for help!

The sense of **taste** can recognize 4 different main types of flavors.



Goal

To recognize the 4 main flavors detected by the human tongue.

How to do it...

1. Fill 4 opaque cups half full with water.

You can also ask an adult to give you other flavors for you to guess.

2. Ask an adult to put a teaspoon of each of the following ingredients in each cup, without you looking.

3. The adult should then make you taste each cup, one at a time.

ATTENTION: when you finish the experiment, throw away all used food.

4. Can you guess the flavors of each cup?

Repeat the experiment but cover your nose. Do you experience all the flavors in the same way?

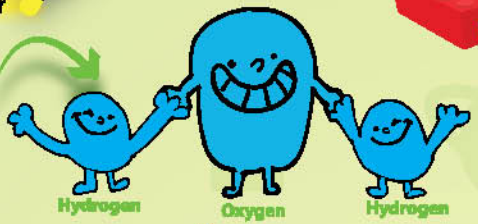
Conclusion!

The human tongue detects 4 different types of flavors! Furthermore, taste and smell act simultaneously, helping us experience all the flavors.

Experiment 10
Giant soap bubbles

Theme: Water

Water is essential to our everyday life. Do you know the water **molecule**? It is made of 3 atoms!



Molecules are like building bricks which join together to create all the things you see around you!

What will you need?

Extra materials:

- Dish soap
- Water
- Gloves
- Liquid glycerine
- Shallow dish or plate

Always ask an adult for help!

Goal

To learn how to make giant soap bubbles!

How to do it...

1. Put on the gloves and goggles.

2. Add 100 ml of water to the measuring cup.

3. Add 50 ml of dish soap to the measuring cup.

The liquid should now be where it says 150 ml.

4. Add 50 ml of liquid glycerine to the measuring cup.

The liquid will be on the 200 ml mark.

Don't forget to check the measuring cup scale!

You just created a solution for soap bubbles!

5. Stir the **solution** and then pour it carefully onto the plate.

6. Now, you only need to use the soap bubble hoop to make your giant soap bubbles!

Conclusion!

Dish soap and liquid glycerine increase the power between the water molecules, giving them more elasticity. That is why we are able to make giant soap bubbles.

Theme: **Water & Art with Science**

Experiment 11
Painting with soap bubbles

Water has 3 properties:

It has no smell | It has no color | It has no flavor

When we mix something with water we are making a **solution!**

Goal

To use science to create fantastic works of art with soap bubbles.

What will you need

Extra materials:

- Bowls
- Straw
- Paper sheets
- Gloves

How to do it...

1. Put on the gloves and goggles and put a bit of soap bubble solution in a bowl.

2. Choose a color and, with the dropper, add 5 or 6 drops to the bubble solution.

3. Stir with a spoon. You just created a colored solution!

Repeat these steps and make solutions of the colors you wish. **Do not forget to wash the dropper every time you change colors.**

4. Prepare a sheet of paper to make your paintings.

5. Use the straw and dip one of the tips in the colored solution.

6. Blow through the other tip of the straw. Can you make soap bubbles?

7. Blow onto the sheet of paper and see what happens!

8. You can also use more than one straw at the same time.

9. If you want, you can still use the soap bubble hoop.

Conclusion!

The colors of the colored solutions stay marked on the sheets of paper!

You can save these solutions in the test tubes, covering them with the lids, or in other jars with lid.

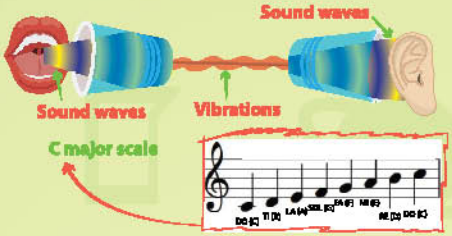
ATTENTION: always blow through the same side of the straw(s) and when you finish the experiment throw them away.

Experiment 12
Water xylophone

Theme: Sound

Sound is the result of a **vibration**: the vibration of particles present in the medium.

These vibrations are captured by the **sense of hearing**, that is, by our ears.



Goal

To simulate music notes with a xylophone made with water.

What will you need


Pipette dropper


Colorings

Extra materials:

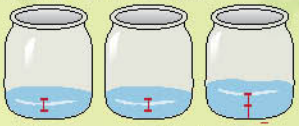
- 8 Glass jars of the same size
- Metal spoon
- Water
- Gloves

How to do it...

1. Fill two glass jars with the same amount of water. One of them will be our control jar and the other the musical note Ti (B).

Attention, you must always use the measure of the control jar to fill all the eight glass jars.

2. Fill a third jar with 2x the amount of water of your control jar.

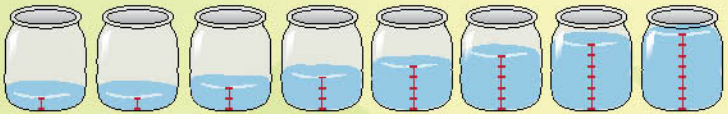


3. Fill a fourth jar with 3x the amount of water of your control jar.

4. Fill a fifth jar with 4x the amount of water of your control jar.

5. Fill a sixth jar with 5x the amount of water of your control jar.

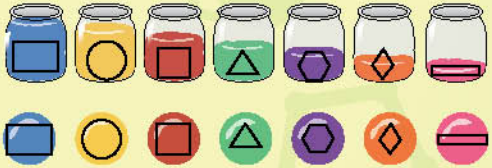
6. Fill a seventh jar with 6x the amount of water of your control jar and an eighth jar with 7x the amount of water of your control jar.



8. Use the metal spoon handle and gently clink the jars with it. Have fun playing and making new sounds!

7. As mentioned in step 1, the jar containing only 1 x the amount of water of your control jar is the musical note Ti and the one containing 7x that measure is the Do (C).

Remember experiment 1? With the pipette dropper, use the colorings and add different colors to each music note (each jar).

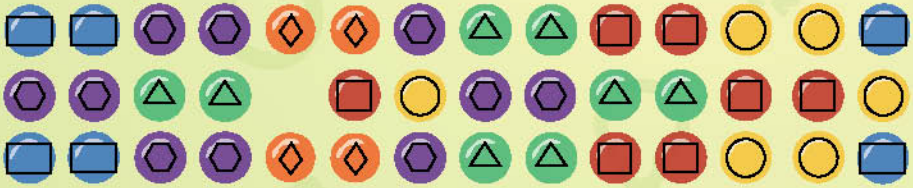


Conclusion!

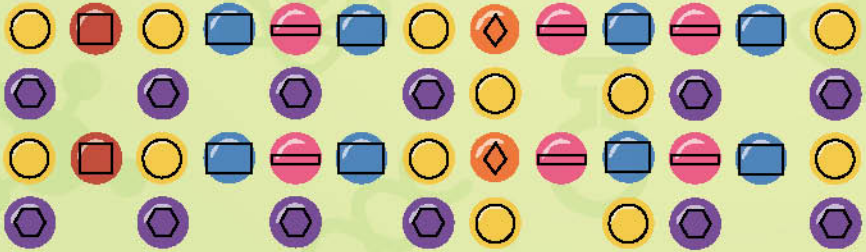
Different quantities of water create different sounds due to the vibration of molecules.

Play fun songs!

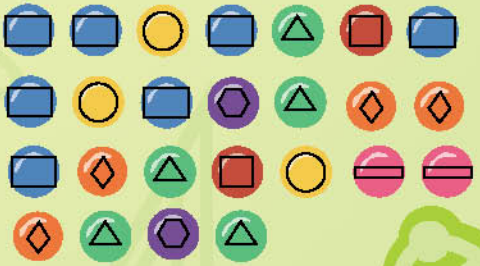
Twinkle, twinkle little star



London bridge is falling down



Happy birthday song

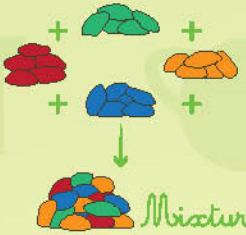


Experiment 13
(Im)possible mixtures

Theme: Mixtures

When we put together two substances, we say we are making a *mixture*.

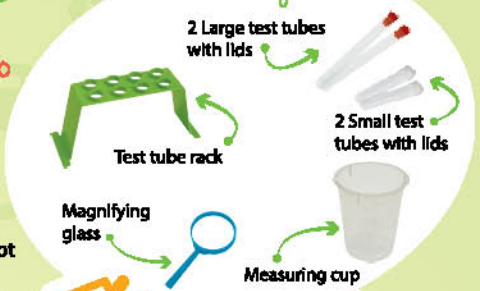
Chemistry is the science that tells us of what things are made and how they interact together.



Goal

To understand that not all substances can be mixed together and to observe different types of mixtures.

What will you need?



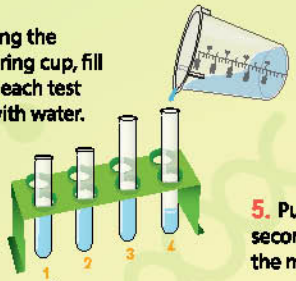
Extra materials:

- Water
- Olive oil
- Sand
- Lemon juice
- Powdered chocolate
- Teaspoon
- Gloves

How to do it...

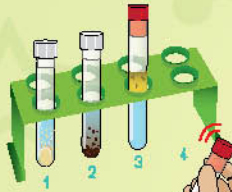
1. Put the test tubes in the test tube rack.

2. Using the measuring cup, fill half of each test tube with water.



3. Put on the gloves and add the *solid* components to the small test tubes and the *liquids* to the large test tubes.

4. Cover the test tubes with its lids and stir them, one by one.



5. Put the test tubes back in the rack. Wait a few seconds and observe the results. Scientist, use the magnifying glass for a better observation!

ATTENTION: when you finish the experiment, throw away all used food.

Do all the substances mix with water?

In the test tubes 1 and 3, the substances **do not mix**. In the test tubes 2 and 4, the substances **mix**.

Conclusion!

Not all substances mix with water. We can say that there are two types of mixtures in nature: **homogeneous** mixtures — when substances mix — and **heterogeneous** mixtures — when substances do not mix.

Experiment 14
Colored Icebergs

Theme: Density

Substances' properties make them behave in a special way.

Density is like the "weight" of substances. The ones that float are less dense than the ones that are on the bottom!

Iceberg

Do you know what an iceberg is?
An iceberg is a great mass of ice which floats in water. How is that possible?

It is possible thanks to its *density!*

What will you need?

Colorings

Measuring cup

Pipette dropper

Extra materials:

- Ice tray
- Water
- Cooking oil
- Spoon
- Tall transparent cup
- Gloves

Always ask an adult for help!

Goal

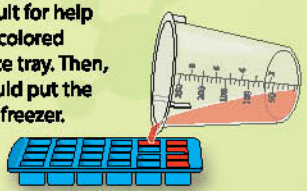
To observe the density of the substances and how it influences their behavior.

How to do it...

1. Put on the gloves and fill the measuring cup with water.

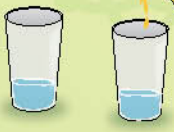
2. Choose the coloring that you want to use and, with a dropper, add between 3 and 4 drops to the water. Stir well with a spoon.

3. Ask an adult for help and pour the colored water in the ice tray. Then, the adult should put the ice tray in the freezer.



4. Wait at least 1 hour until the ice cubes form.

5. After this time, fill ½ of the tall transparent cup with water.



6. Next, add the cooking oil to the cup.

7. Put a colored ice cube in the cup.

Ice
Oil
Water

Higher Density

Water in the liquid state is denser than in the solid state (ice).

Conclusion!

In this experiment it is possible to observe that water and oil don't mix, and that the ice cube floats in oil. As the ice cube begins to melt, the colored water drops start descending to the bottom of the cup. That is due to different densities.

Experiment 15
Does it sink or float?

Different objects have different weights. Depending on the weight and the force they exert on the water, they can float or sink.

That always depends, as you already know, on density!

Extra materials:

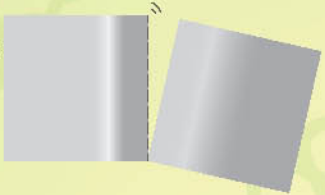
- Aluminium foil
- Large bowl
- Water
- Marble
- Cork
- Coins
- Gloves
- Other materials you would like to test

Goal

To understand that some objects are able to float.

How to do it...

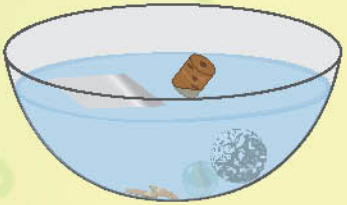
1. Tear the aluminium foil to make two square pieces of the same size. Ask an adult to help you.



2. Make a small ball with one of the squares.

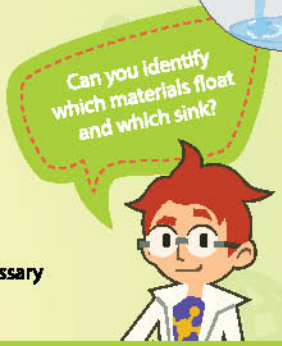
3. Fill the large bowl with water.

4. Put all of your test materials in the bowl to see what hapens!



Conclusion!

Denser objects sink. That happens because water can't make the necessary force to keep the objects floating.



Theme: **Solutions and densities**

Experiment 16
Sugar rainbow

Density is the result between a body's mass and volume!

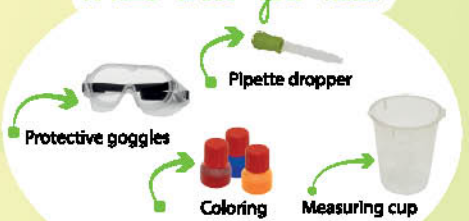
A full soccer ball (higher volume) floats in water but a deflated soccer ball (lower volume) sinks.

Why?

That happens because, as its mass is equal, its density increases when the volume is lower.

Did you know...
That the substances dissolved (mixed) in liquids are called **solutes?**

What will you need?



Goal

To observe that the same quantity of water can have different densities if the quantity of the solute (mass) is different.

Extra materials:

• Sugar • 4 Cups • Teaspoon • Gloves

Always ask an adult for help!

How to do it...

1. Put on the gloves and goggles.

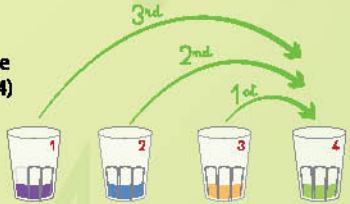
2. Use the teaspoon and put sugar in the cups, just like you see in the image:

3. Ask an adult to heat water, and with the measuring cup, add 50 ml of water to each cup.

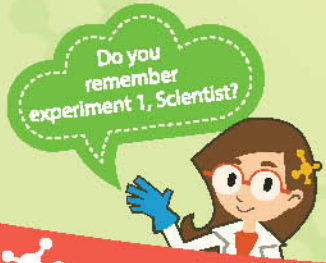
4. Mix well with the spoon to dissolve the sugar (solute).

5. With the dropper add a few drops of one color to each cup.

6. Ask an adult to help you pour in the cup which has 8 spoons of sugar (cup 4) the rest of the solutions, following the order you see in the image.

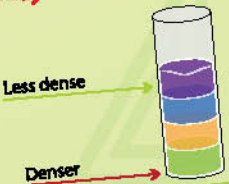


ATTENTION: when you finish the experiment, throw away all used food.



Conclusion!

The more the sugar there is in the same quantity of water, the higher the density of the solution (as more mass exists in the same volume).



Experiment 17
The dance of colors

Theme: Surface tension

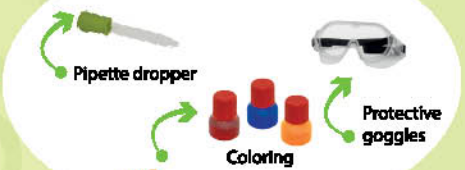
Molecules, as you know, bind to each other, creating forces.

These forces are responsible for allowing the materials to present their characteristics.

On the **surface** of liquids, molecules create a force called surface tension!

Did you know...
That it is due to surface tension that water scorpions and other insects are able to walk on water?

What will you need?



Extra materials:

- Toothpick
- Milk
- Deep plate
- Dish soap
- Gloves

Always ask an adult for help!

Goal

To observe the force exerted in the surface of liquids.

How to do it...

1. Put on the gloves and goggles and add a bit of milk to the deep plate.

2. With the dropper, add some drops of coloring to the milk.

3. Dip the toothpick in a bit of dish soap.

4. "Prick" the drops of coloring with the toothpick. Do it to one drop at a time. Try not to move the milk!

Scientist, can you make the colors dance?

Conclusion!

Milk is, just like the rest of the materials that exist, made of **molecules.** These molecules bind in all directions. However, on the surface of the milk (liquid) these forces form a kind of barrier.
Dish soap breaks this barrier, creating the dance of colors you observe!

ATTENTION: when you finish the experiment, throw away all used food.

Theme: Chemical reactions

Copper

Experiment 18

Shiny coins

Have you noticed how some coins are shiny and others are dark?

That happens because, with time, chemical reactions occur, which **oxidize** coins (that is, the material from which these are made — copper).

What will you need?

Protective goggles

Magnifying glass

Tweezers

Goal

To learn how to use chemistry to polish coins.

Extra materials:

- Paintbrush
- Vinegar
- Ketchup
- 2 Plates
- Rusty copper coins
- Gloves

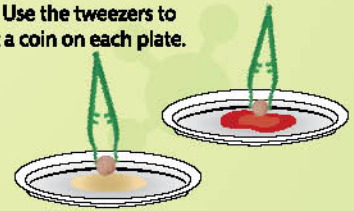
How to do it...

1. Put on the gloves and goggles.

2. Use the magnifying glass to thoroughly observe your rusty copper coins.

3. On a plate, put a bit of vinegar and in another a bit of ketchup.

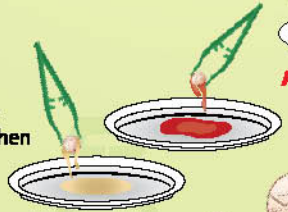
4. Use the tweezers to put a coin on each plate.



ATTENTION: when you finish the experiment, throw away all used food.

5. With a paint brush, rub some of the ketchup and vinegar on the coins.

6. Take the coins off the plates with the tweezers and then observe them!



What do you think, Scientist? Are your coins shinier?

Conclusion!

Vinegar and ketchup have acid compounds in their composition. These compounds react with oxidized copper, cleaning the coins.

If you try to clean your coins with water, for example, you will not get the same result because water is not acid!

Experiment 19
Hidden colors

Theme: Mixture separation

As you know, colors can be the result of a mixture between other colors. Would it be possible to separate the colors again?

In laboratories, scientists use many techniques to separate mixtures. One of them is **chromatography!**

Goal

To use the chromatography technique to separate secondary colors from the primary colors that created them in the first place.

What will you need?

Extra materials:

- Paper filter (coffee filter)
- Water
- Colored markers
- Napkin

How to do it...

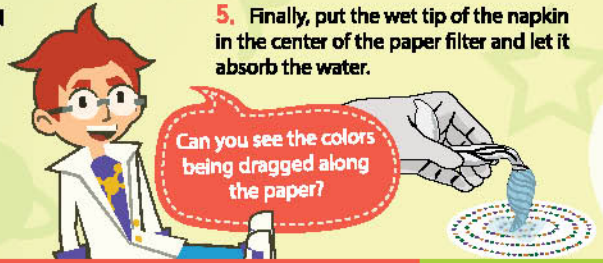
1. Make several dotted circles on the paper filter with the colored markers.

2. Make a circle of dots using mainly secondary or tertiary colors.

3. When the paper filter is colorful, it is time to separate the colors.

4. Twist the tip of the napkin and dip it in the cup of water.

5. Finally, put the wet tip of the napkin in the center of the paper filter and let it absorb the water.



Conclusion!

Chromatography separates the colors along the paper filter because it is porous. That way, colors are separated depending on the weight of the molecules.

Theme: Crystals

Experiment 20
Crystalline messages

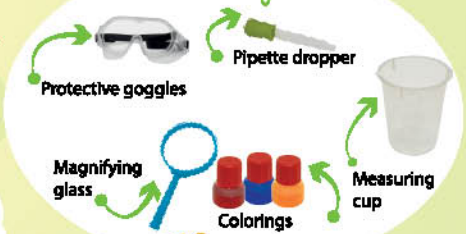
There are 2 types of solids in nature: **crystalline** and **amorphous**.

The difference between them is the way their molecules organize themselves.

Diamond: crystalline solid

Coal: amorphous solid

What will you need?



Goal

To learn how to create a saturated solution which, with time, creates crystals.

Extra materials:

- Sea salt
- Spoon
- Hot water
- Gloves
- Cup
- Black cardboard
- Paintbrush

Always ask an adult for help!

How to do it...

1. Put on your protective goggles and gloves. Measure 50 ml of sea salt with the measuring cup and put it in the other cup.

2. Use the measuring cup again to measure 100 ml of hot water.

3. Use the dropper and add 3 drops of a coloring to the water.

4. Finally, add the salt and mix with a spoon.

You just created a saturated solution of salt!

5. Use the paintbrush and draw whatever you want on the black cardboard. You can write words or make drawings.

Note: It is important that you keep mixing the solution and that you wet the paintbrush many times!

Now you only need to wait until the water evaporates and beautiful crystals of salt are formed on the paper. The color of your crystals will be determined by the coloring you choose. You can make solutions with many different colors, Scientist!

Conclusion!

Initially, the salt dissolved in the water. As the water evaporates, the molecules of the dissolved salt join again in an organized structure, creating beautiful salt crystals!

Experiment 21
Home-made modeling clay

Theme: Moldable materials

In nature, not all materials behave the same way. That will depend on the way their molecules bind.

Clay or dough is a moldable material.

Glass is a hard material.

Stronger bonds create harder materials and vice versa.

What will you need

Dropper pipette

Measuring cup

Colorings

Goal

To create home-made modeling clay, using everyday ingredients.

Extra materials:

- Flour
- Cooking oil
- Water
- Spoon
- Bowls

How to do it...

1. Start by putting 10 full spoons of flour in a bowl.

2. In a measuring cup put 100 ml of water. Then, with the dropper, add some drops of a coloring of your choice.

3. Add the colored water to the flour.

4. Finally, add 20 ml of cooking oil to the previous mixture (use the measuring cup).

5. Mix all thoroughly until you get a homogeneous mixture. The home-made modeling clay is now ready!

ATTENTION: when you finish the experiment, throw away all used food.

Repeat the experiment using other colorings and make modeling clay of any color!

Wheat

Conclusion!

When the flour properties mix with water, they create this fantastic modeling clay! That happens because wheat forms a dough called gluten!

Theme: **Viscosity - Non-Newtonian fluids**

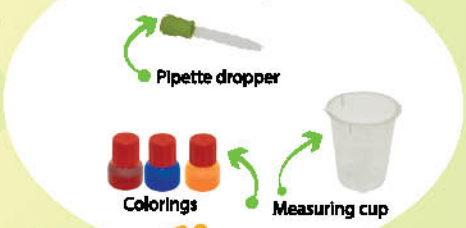
Experiment 22
Crazy dough

Viscosity is a property of fluids (liquids and gases). The more the viscosity, the more it is difficult for the fluid to move.

Some fluids, however, behave in an opposite way. These are called **non-Newtonian fluids.**

Ketchup is a non-Newtonian viscous fluid.

What will you need?



Goal

To observe how corn starch behaves when it is mixed with water.

Extra materials:

- Corn starch
- Bowl
- Gloves
- Tablespoon
- Water

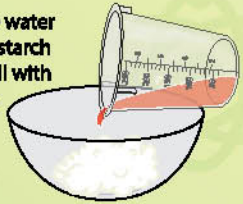
How to do it...

1. Put on the gloves and add 5 full tablespoons of corn starch to the bowl.

2. In the measuring cup put 50 ml of water.

3. Choose a color, and with the dropper, add some drops to the water.

4. Add the water to the corn starch and mix well with your hands.



ATTENTION: when you finish the experiment, throw away all used food.

Your crazy dough is ready. Test it!

Try to make a small ball. Can you do it? What happens when you release it?

Shake the dough slowly and observe that it behaves as if it were a liquid.

Poke the surface of the dough and see how it appears to be solid!

Notes:
- If it gets too dry, add more water
- If it gets too liquid, add more corn starch

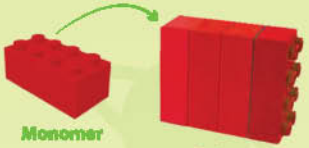
Conclusion!

This crazy dough is a non-Newtonian fluid. That means it has the opposite behavior of normal fluids: the more force is applied to it, the harder it gets.

Experiment 23
Home-made sticky monster

Theme: Polymers

When many molecules bind in a very long chain, we say we have a **polymer.**



Plastic materials, for example, are made of **polymers.**

What will you need?

Extra materials:

- Corn starch
- Dish soap
- Gloves
- Cooking oil
- Tablespoon

Always ask an adult for help!

Goal

To create a fun and sticky dough, using everyday materials.

How to do it...

1. Put on the gloves and then add 2 tablespoons of corn starch to the measuring cup.
2. Add 2 tablespoons of cooking oil.
3. Stir well until the mixture becomes homogeneous.

ATTENTION: when you finish the experiment, throw away all used food.

4. Add a tablespoon of dish soap to the mixture.

Conclusion!

The dish soap made this dough sticky, allowing you to stick it to the wall.

Theme: Light

Experiment 24
The colors of the rainbow

A rainbow results from the separation of the sunlight (white light).

A rainbow is made of **7 colors:**

Red Orange Yellow
Green Blue Indigo Violet

Goal

Observe what happens when the 7 colors of the rainbow are mixed.

What will you need?

Newton disc (card with graphic elements)

Extra materials:

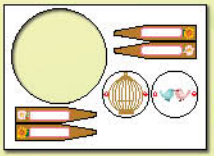
· Scissors · Pencil · Adhesive tape

Always ask an adult for help!

How to do it...

Adult supervision required

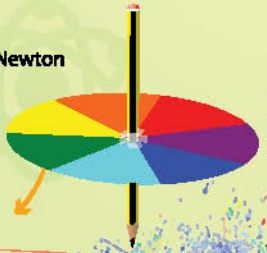
1. Ask an adult to help cut out the Newton disc from the card with graphic elements.



2. Ask an adult to make a hole in the center of the disc using a pencil.

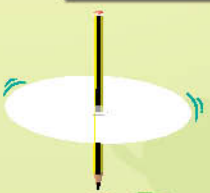
3. Now pass the pencil through the hole.

4. Attach the pencil to the Newton disc with a bit of sticky tape.



Your Newton disc is ready!

5. Now you need to make the disc spin as if it were a spinning top.



Did you know...
That rainbows only appear when sunlight is decomposed by the presence of water drops in the air?

When the disc spins too fast, the eyes and the brain, as they work together, can't distinguish each color separately. That makes it seem that the disc is white.

Conclusion!

When the Newton's disc is spinning like a top, we observe the white color because that is the result of the sum of the colors of the rainbow.

Experiment 25
Cartoons

Theme: Optical illusions

It is because of light that our eyes can capture the images that we see.

The sense of sight works when light gets inside our eyes, stimulates the nerves and sends signals to the brain, which deciphers the "message."

What will you need?

Circles — birds and birdcage (card with graphic elements)

Goal

To observe how both images can look like a single one through an optical illusion.

Extra materials:

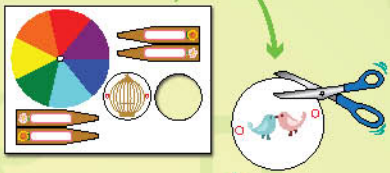
- Scissors
- Sharp pencil
- Yarn or string
- Glue stick

Always ask an adult for help!

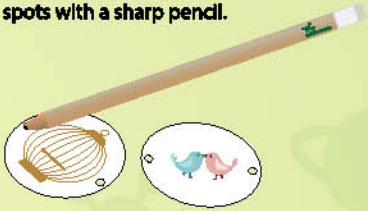
How to do it...

Adult supervision required

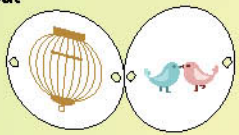
1. Ask an adult to help cut out the birds and birdcage circles from the card with graphic elements.



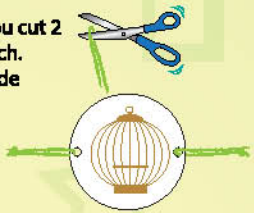
2. Ask an adult to make two holes in each circle in the indicated spots with a sharp pencil.



3. Use the glue stick and glue both circles. Make sure you glue the circles so the pictures are both facing out, and that the pictures are flipped away from each other like the picture here.



4. Ask an adult to help you cut 2 strings about 16 inches each. Then tie 1 string to each side of the card circles.



5. Twist the card circles to wind the strings.

6. Stretch the strings swiftly and see what happens!

Did you know...
That this "technique" is used in cartoons?

Conclusion!

When you stretch the strings, the card circles start spinning really fast and it looks like the birds enter the birdcage — an optical illusion occurs.

Theme: **Planet Earth**

Sand results from rock erosion through the action of wind, water and living things.

Cliffs suffer erosion and create sand.

Experiment 26
Sand painting

Goal

To use science to create fantastic works of art!

What will you need?

Colorings

Pipette dropper

Extra materials:

- Beach sand
- Bowls
- Gloves
- Cardboard
- Markers
- Cotton swabs
- Liquid glue
- Spoon

How to do it...

1st part - Prepare the sand

1. Put on the gloves and put a bit of sand in a bowl.

2. Choose a coloring and with a dropper, add 3 to 4 drops to the sand.

3. Mix well with a spoon.

Do you like the color? Then wait a bit until the sand dries. If you want, add more coloring (so the color gets stronger) or more sand (so the color gets lighter).

4. Repeat this procedure to create sand of many different colors.

2nd part - Create works of art

1. With the markers, make a drawing on a piece of cardboard (any format).

2. Use a cotton swab to rub the liquid glue over your drawing.

3. Without letting the glue dry, sprinkle the colored sand you prepared over the drawing.

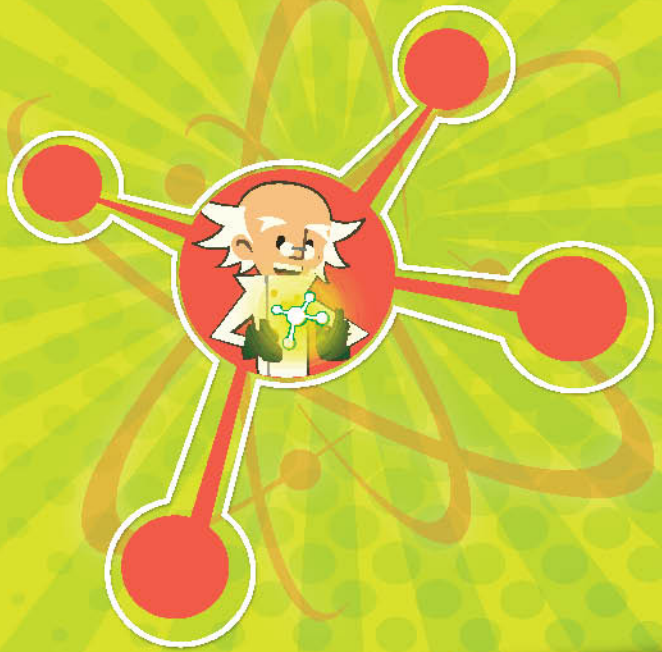
4. Let it dry well and then shake off any extra sand.

How were your sand paintings, Scientist?

Conclusion!

Nature gives us many materials which we can use to create fantastic works of art. You only have to use your imagination!

Science4you



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