Exclusive to

Hamleys

EST. LONDON 1760

The Finest Toy Shop in the World

MANUAL 1

SCIENCE OF LIFE, CHEMISTRY AND SCIENCE OF EARTH

Super Lab Sciences 6 in 1

WARNING

Not suitable for children under 8 years. For use under adult supervision. This product contains small magnets. Swallowed magnets can stick together across intestines causing serious injuries. Seek immediate medical attention if magnets are swallowed. Contains small parts that could be ingested and also sharp edges. Handle with care. 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. This image is for illustrative purposes only, some parts or colours may differ.

AVAILABLE ONLINE: FI DK NO SE CZ

www.hamleys.com/explore-SuperSciencelabkits.irs

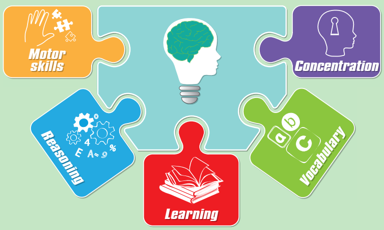
Dear parents and guardians

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 strenghts 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.science4youtoys.co.uk/brain-activator

Science4you
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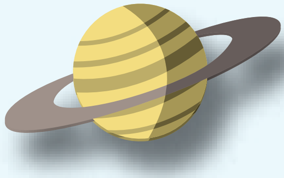
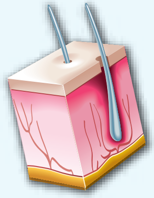
This book was produced in accordance with the proposed science contents within the following key stages:
Science: KS1 and KS2.
Biology: KS3 and KS4.
Chemistry: KS3 and KS4.
Physics: KS3 and KS4.





Super Lab Sciences

6 in 1

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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 and the final crystal(s) out of reach of children under 8 years of age.
- Clean all equipment after use.
- Make sure that all containers and/or non-reclosable packaging are fully closed and properly stored after use.
- Ensure that all empty containers and/or non-reclosable 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, drink or smoke in the experimental area.
- Do not allow chemicals to come into contact with the eyes or mouth.
- Do not apply any substances or solutions to the body.
- Do not grow crystals where food or drink is handled or in bedrooms.
- Take care while handling with hot water and hot solutions.
- Ensure that during growing of the crystal the container with the liquid is out of reach of children under 8 years of age.
- Do not replace foodstuffs in original container. Dispose of immediately.
- This kit contains food colourings. Dyes can stain. Keep away from objects and delicate fabrics.

Warning. This product contains gypsum powder.
- Do not place the material in the mouth.
- Do not inhale dust or powder.
- Do not apply to the body.

Warning. Not suitable for children under 8 years. This product contains small magnets.
Swallowed magnets can stick together across intestines causing serious injuries. Seek immediate medical attention if magnets are swallowed.

GENERAL FIRST AID GENERAL 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 inhalation:** Remove person to fresh air.
- **In case of skin contact and burns:** Wash affected area with plenty of water for at least 10 minutes.
- In case of doubt, seek medical advice without delay. Take the chemical and/or product together with the container with you.
- In case of injury always seek medical advice.

Write on the provided blank space the telephone number of national poison information centre or local hospital. They may provide you with information about measures to take in case of intoxication.

In case of emergency dial

USA 911 | UK 999 | Australia 000 | Europe 112

LIST OF CHEMICALS SUPPLIED

Sodium bicarbonate
$NaHCO_3$
CAS # 144-55-8

Sodium chloride (salt)
NaCl
CAS # 7647-14-5

Calcium sulphate (gypsum)
$CaSO_4 \cdot 2H_2O$
CAS # 7778-18-9

DISPOSAL OF USED CHEMICALS

When you need to dispose of chemical substances, it is necessary to make reference to national and/or local regulations. In any case you sure never throw chemicals into sewers and garbage. For more details please refer to a competent authority. For disposal of packaging make use of the specif collections points.

ADVICE FOR SUPERVISING ADULTS

- Read and follow these instructions, the safety rules and the first aid information, and keep them for reference.
- The incorrect use of chemicals can cause injury and damage to health. Only carry out those experiments which are listed in the instructions.
- This experimental set is for use only by children over 8 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. Particular attention should be paid to the safe handling of acids, alkalis and flammable liquids.
- 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.

KIT CONTENTS

Description:	Quantity:
1. Red food colouring	1
2. Blue food colouring	1
3. Yellow food colouring	1
4. Rubber bands	4
5. Petri dish	1
6. Protective gloves	2
7. Protective goggles	1
8. Paper clips	4
9. Plasticine	4
10. Erlenmeyer flask	1
11. Beaker	1
12. Funnel	1
13. Magnetic rings with support	1
14. Test tubes with lid	3
15. Plastic tube	1
16. Plastic flowerpots	2
17. Pulley	1
18. Pasteur pipettes	3
19. Peats	2
20. Pencil	1
21. Plastic spatula	1
22. Ping-pong ball	1
23. Green bean seeds	1
24. Small measuring cups	2
25. Small measuring cup lid	1
26. Syringes	2
27. Test tube rack	1
28. Coloured paper sheets	2
29. Balloons	8
30. Volcano mould	1
31. Card with graphic elements	1
32. Decorative stickers	1
33. Gypsum	1
34. Sodium bicarbonate	1
35. Sea salt	1
36. Straws	8
37. pH test strips	1
38. Modelling metal wires	2
39. Tweezers	1
40. Woollen yarn	1
41. Wooden spatula	2
42. Scientist lab coat	1
43. Cornflour	1
44. Round filter papers	3
45. Wooden sticks	4

1. What is science?

But what is science after all?

The word science comes from Latin and means 'knowledge'. Science helps you understand how and from what the world is made of and how everything works.
Science also helps you understand life, the universe, other nature phenomena… and almost everything that is around you!
With this kit you will be able to know some science areas and perform some scientific and fun experiments!

1.1. How is the work of a scientist? – Experiments and procedures

Scientists study the world around us, trying to understand it and find answers to things or problems that we still don't know so well. But not every scientist studies the same, they get specialized in diverse areas.

To understand how things work, how are they made and get some answers, scientists realize **experiments**.

a) Scientific method

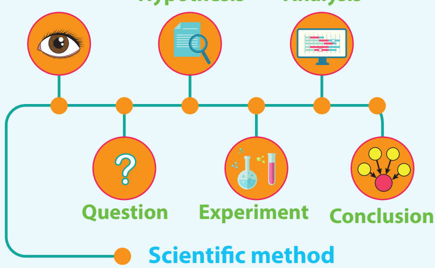
Scientists have ideas about the world around us. To prove that these ideas are right (or at least that they are not wrong) they perform **experiments**!

When an idea is scientifically tested through experiments it's called a hypothesis. A **hypothesis** explains the idea and usually includes the results prediction.

DID YOU KNOW…
That scientists write in journals about their ideas so that other scientists around the world can test the same ideas?
If other scientists agree that there are enough evidences to approve the hypothesis, the idea becomes a **theory**.

But how do experiments work after all?

First scientists explain their theories – **hypothesis** – then, they explain how may the experiment be performed, this is to say, the steps of the experiment – **method**.
After following the method of the experiment, scientists register the **results** and **analyse** them. In this way they can take their **conclusions**.



To get credible results, scientists are very patient and repeat their experiments over and over again!

2. The science laboratory

A science laboratory has a big importance to all sciences! This is the place where scientists perform their experiments.

2.1. The bench of a scientist – materials and their functions

While conducting an experiment scientists use special material. Do you want to know the material of your science kit?

Protective goggles
At the science laboratory, scientists use protective goggles while performing an experiment to protect their eyes.

Protective gloves
Protective gloves are important to protect scientists' skin from chemical and toxic products.

Scientist lab coat
A lab coat protects the skin of a scientist while protecting, at the same time, his clothes. It protects, for instance, against bacteria or splashes of chemical substances. The white colour of the lab coat allows observing where splashes fell.

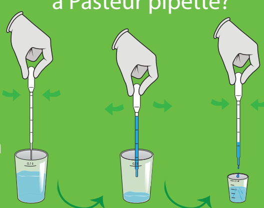
Tweezers
Tweezers are used to handle objects without touching them with the hands.

Funnel and filter papers
A funnel is used to transfer liquids and, with a filter paper, to the separation (filtration) of mixtures.

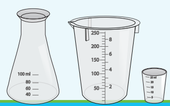
Spatulas and sticks
These are used to handle liquids and solids and to prepare mixtures with this kind of substances.

Pasteur pipette
A Pasteur pipette is used to handle liquids, measuring their volume and also to transfer them from a container to another.

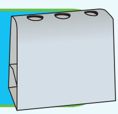
How should you use a Pasteur pipette?



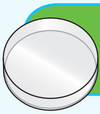
Test tube
As its name indicates, a test tube is used to perform tests, e.g. mixing some reagents.



Erlenmeyer flask, beaker and measuring cup
These are used to measure liquids and to dissolve substances. Erlenmeyer flasks have a thin opening to avoid accidental splashing.

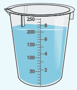


Test tube rack
It is used to hold test tubes while they're being used.



Petri dish
At chemistry laboratories, this material can be used, for example, in crystallisation.

2.2. Measurement units – volume and capacity



The **volume** of an object is the amount of space that it takes up and it's related to the **capacity** of the object. This is to say, the capacity is related with the maximum amount that something can contain. So, the **capacity** may be the **internal volume** of a container.

For example, the amount of liquid that your small measuring cup can transport indicates its capacity.

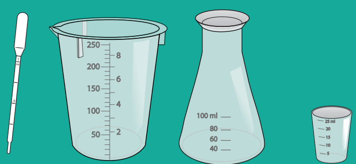
The unit of capacity considered by the **International System of Units** is the litre (l). However, to measure small amounts of liquids scientists use inferior submultiples of the litre like the millilitre (ml). In turn, the unit of volume considered by this system is the cubic metre (m^3).

Even though these two are not exactly the same, they are related:

- 1 cubic metre (m^3) of volume is equivalent to the capacity of 1000 litres (l);
- 1 cubic centimetre (cm^3) is the same as 1 millilitre.

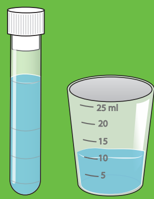
Find out the **capacity** of your laboratory material!

Pasteur pipette | Beaker | Erlenmeyer flask | Measuring cup



1 ml | 250 ml | 100 ml | 25 ml

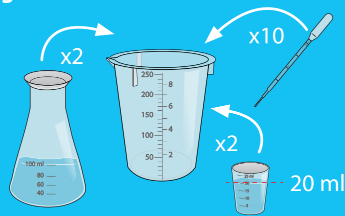
SUPER SCIENTIST:
Scientist, which of these containers has more water?



Answer: the amount of water (capacity) in each container is exactly the same: 10 ml. When we pour water or another liquid into a container, the liquid changes its form, adapting to the container's form.

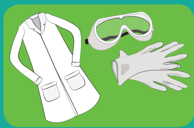
Scientist, how can you fill the beaker using, at least once, each one of these instruments?

Suggestion:



3. Science experiments

Don't forget to put your protective lab coat, gloves and goggles every time they are showned in the material list

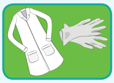


Material included in the kit.

BEFORE YOU START

Scientist, if you ever need glue, here you have a very scientific way to prepare it!

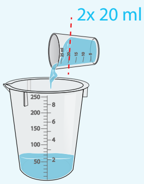
Experiment
How to produce glue?



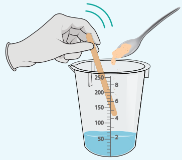
What you will need:
- Wheat flour
- Water
- Small measuring cup
- Beaker
- Wooden spatula
- Tablespoon

Steps:

1. With the small measuring cup measure 40 ml of water and pour it into the beaker.



2. Add to the cup about 40 grams (g) of wheat flour, this is to say, 4 tablespoons. Mix it well with the wooden spatula and your glue is ready!



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

Explanation:
Wheat flour has gluten, a protein that when in contact with water gets the proprieties of a glue.

DID YOU KNOW...
That the word gluten comes from Latin and means 'glue'?

3.1. Science of life – Biology and Human Body

The science of life studies the living beings: how they live and grow, what they eat and how their bodies work. Scientists that study this science, study from microscopic bacteria to plants and animals.

Do you want to know more about this scientific area?

Became a super scientist with the experiments we have for you at the following link:

www.science4you.co.uk/super-lab-sciences-6-in-1

Plants

Plants are very important to our survival because these living beings are responsible for the oxygen production, indispensable to animals. Furthermore, plants are also food for much animals, including humans.

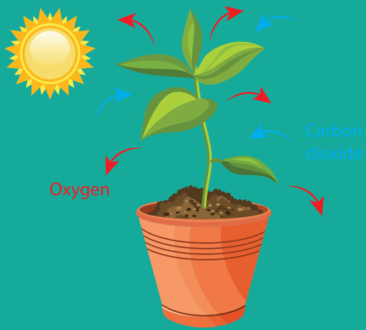
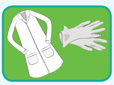


Image 1. Photosynthesis: plants use carbon dioxide and produce oxygen.

Experiment 1
Plants growth

What you will need:

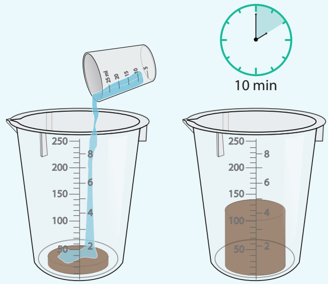


- Plastic flowerpot
- Peat
- Beaker
- Small measuring cup
- Petri dish
- Green bean seeds
- Pasteur pipette
- Cotton
- Water

Steps:

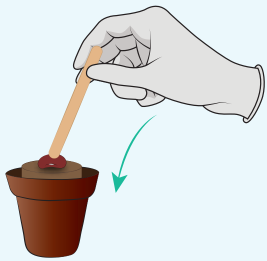
Cultivating in soil:

1. Pour a peat into the beaker and with the small measuring cup add also 25 ml of water into the beaker.



You will see the peat enlarging!

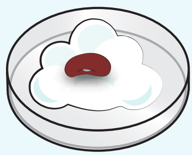
2. Put the peat inside the plastic flowerpot and add to it, with the wooden spatula, a green bean seed. This seed must be covered with about 1 centimetre (cm) of soil.



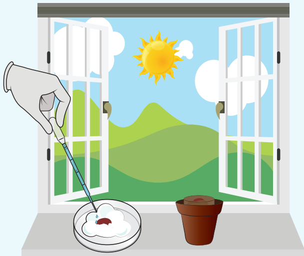
Cultivating in cotton:

1. Add a piece of cotton in the Petri dish. Then use the Pasteur pipette to wet the cotton with water.

2. Put a green bean seed above the cotton.



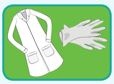
Place the plastic flowerpot and the Petri dish near a window, so they get some sunlight. Keep watering the flowerpot and the cotton, with the help of the Pasteur pipette.



Scientist, were you capable of growing beans in soil and in cotton?

Explanation:
Seeds have all the nutrients that a plant requires to grow, so they can easily grow in cotton. However, water and sunlight are also essential to its growth (germination).

Experiment 2
How do plants feed themselves? – Coloured flowers



What you will need:
- Erlenmeyer flask
- Food colouring (of your choice)
- Pasteur pipette
- White petals flower (e.g. daisies, clove flower or hyacinths)

Steps:

1. Fill the Erlenmeyer flask with water.

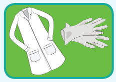
2. Add 10 drops of a food colouring, using the Pasteur pipette.

3. Pour the flower inside the flask and wait 24 to 48 hours.

Scientist, what happens to your flower? Can you change its colour?

Explanation:
In this experiment you are able to see that the petals of your flower get the colour of your chosen food colouring. This happens because plants have tubes in their stem that carry food from the roots to all the parts of the plant (xylem). It is due to the xylem that plants stay healthy and can obtain water and mineral salts.

Experiment 3
Up and down

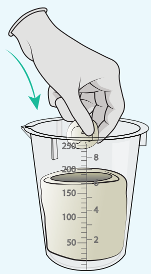


What you will need:
- Green bean seeds
- Pasteur pipette
- Beaker
- Small measuring cup
- Petri dish
- Wooden spatula
- Absorbent paper (e.g. napkin)
- Water

Steps:

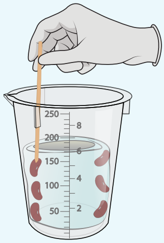
1. Fill the small measuring cup with water and then add some green been seeds in the water.

2. Make a roll and a ball with absorbent paper. Pour the roll inside the beaker and then add the ball to its interior.

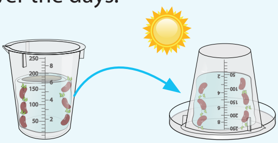


3. With a Pasteur pipette add some droplets of water until the absorbent paper gets all wet.

4. With the help of the wooden spatula add the wet green bean seeds between the beaker and the wet absorbent paper roll. Put the beaker in a place with sunlight.



5. After 4 to 5 days of germination it will be possible to observe roots and stems. Turn the beaker upside down over the Petri dish and observe what happens to the roots and stems over the days.



Note: keep the paper wet with the help of the Pasteur pipette.

Explanation:

Gravity affects the behaviour of humans, animals and plants, among others. Green bean roots always grow in the same direction that gravity acts, this is to say, to the direction of Earth's interior. Stems on the other hand, grow in the opposite direction. When we turn the beaker upside down we can verify that the direction of the roots' growth changes too. This fact is explained by the plant's adaptation to the new 'gravity conditions'.

Forensic sciences include science and technologic areas like medicine, genetics and others that collaborate in crime investigations.

In forensic sciences, a magnifying glass is very important, for example, to find fingerprints! Build your own magnifying glass and use it also to observe plants' details!

Experiment 4
Build a magnifying glass

ATTENTION: ask an adult for help.

What you will need:

- Empty and clean plastic bottle
- Marker
- Scissors
- Water

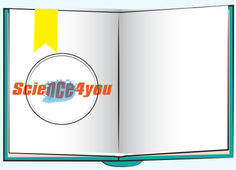
Steps:

1. With the marker, draw a circle in the upper part of the bottle.

2. Carefully and with the help of an adult, cut the circle with the scissors.

3. Put some droplets of water in the centre of the plastic circle that you just have cut.

4. Now you just need to use your magnifying glass. Try, for example, to magnify some letters of a book, placing it over the words! You may also use it in the next experiment.



Scientist, if you want to observe in detail little objects, surfaces, animals or plants, a magnifying glass is the ideal instrument!

Explanation:

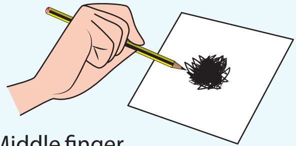
The cutted circle has a convex form. When you add water to it, the light passes through it and is refracted. In this way it is possible to create the lens effect, enlarging what you observe with the magnifying glass.

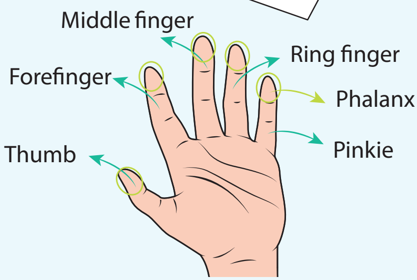
Experiment 5
Fingerprints

What you will need:
- Pencil
- Magnifying glass (experiment 4)
- Paper sheet
- Sticky tape

Steps:

1. With your pencil, scratch the paper sheet until you have a spot at least of the size of the phalanx of one of your fingers. To do this, paint, scratching several times in the same spot.





2. Choose a finger, rub it against your forehead and nose and then press it against the painted zone. Press firmly.

By rubbing your finger against your forehead and nose, it gets easier to collect your fingerprints because these zones have great amounts of natural fat.

3. After this you may put some sticky tape over the place you pressed your finger. Press the sticky tape a little, remove it from the paper and then stuck it in a blank paper sheet.

4. Now it's time to observe your fingerprint! Compare it with the fingerprints of your family and friends.

Use the magnifying glass that you built in the previous experiment and observe closer your fingerprints!

Explanation:
When we touch something we left behind some natural fat, sweat, amino acids and proteins. These body wastes are responsible for fingerprints, this is to say, it's due to these that we are able to collect fingerprints. Furthermore, we also 'leave' our fingerprints when touching in mouldable materials or if we have our hands dirty with paint or blood. In this experiment, the charcoal of the pencil gets stuck in the natural fat of your fingers and, in this way, it's possible to observe your fingerprints!

Biologists look to the interior of the living beings to understand how they are and live. They even study the small chemical molecules that turn each living being unique – the DNA! DNA (deoxyribonucleic acid) is the molecule where the genetic information of each individual is and that is transmitted from parents to children.

Experiment 6
Strawberry DNA extraction

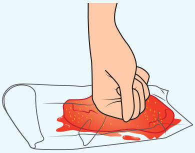
ATTENTION: ask an adult for help.

What you will need:
- 3 Fresh strawberries
- Test tube
- Wooden stick
- Round filter papers
- Small measuring cup
- Test tube rack
- Beaker
- Table salt
- Washing-up liquid
- Cold ethanol (96%)
- Funnel
- Teaspoon
- Tablespoon
- Plastic bag
- Water
- Large container

Steps:

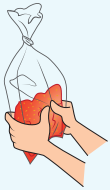
1. Start by washing your strawberries with water and removing the leaves.

2. Put the strawberries into a bag and smash them with your hands during 2 minutes.



3. Put in the beaker 150 ml of water with the help of the small measuring cup, a tablespoon of washing-up liquid and a teaspoon of table salt.

4. Add to the bag that contains the mushed strawberries 50 ml of the solution you prepared in the anterior step. Use the small measuring cup to help you.



5. Mix well, squeezing the bag with your hands for a minute.

6. Prepare the funnel with the round filter paper, as illustrated, and pour it into the test tube. You may also add some water droplets with the Pasteur pipette, to help the filter to get stuck to the funnel. After assembling the test tube rack, hold there the test tube with the funnel.

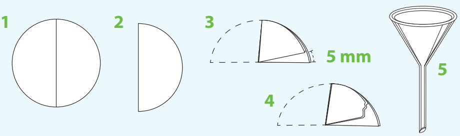
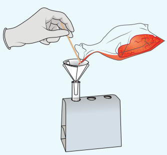


Image 2. Round filter paper preparation.

7. Let the solution to rest inside the bag for 30 minutes. Then, pass some of its content by the funnel. Pour the liquid into the tube until the first measure of its capacity. Guide the liquid with the help of the wooden stick.



8. Now add the cold ethanol (96%), which must be cold, to the test tube until reaching its total capacity.

9. Wait for 3 minutes and you should start seeing the DNA precipitation! Dip the wooden stick in the test tube.

Look closely and see what happens!

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

Explanation:

With the naked eye it's impossible to observe DNA, however, with this experiment it's possible to observe a pellet of DNA.

But how did we do it?

When mushing the strawberries, the cellular wall of the strawberries' cells is destroyed. In this way it is possible to 'reach' the cell's interior and, as so, the DNA. This technique is called **maceration**.

The **washing-up liquid** is responsible for destroying the cell membrane and the **alcohol**, together with the table salt, helps the DNA precipitation.

Experiment 7
Lungs and breathing

ATTENTION: ask an adult for help.

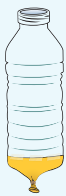
What you will need:

- Scissors
- 2 Balloons
- Small plastic bottle
- Rubber band
- Straw
- Plasticine
- Sticky tape

Steps:

1. Ask an adult for help to cut the base of the small plastic bottle.

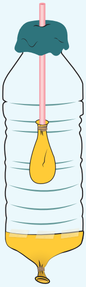
2. Fill one of the balloons with air and then let the air escape.



Carefully, with the scissors cut the balloon so that you may use it to cover the lower part of the bottle. As you can see in the image, make a knot in the other side of the balloon.

3. Attach the other balloon to a straw, using a rubber band.

4. Add the straw with the balloon to the bottle. The balloon must stay in its interior and the straw must have a tip outside the bottle.



5. With the plasticine seal the neck of the bottle, so that the straw remains stuck.

6. Your respiratory system is ready. The balloon that is inside the bottle represents a lung and the other one represents the diaphragm.

7. Test your respiratory system with the breathing movements: inhaling and exhaling.

- Inhaling - Pull the lower balloon. When you do this, the pressure inside the bottle gets lower and the air enters the lungs, so these gain volume.

Explanation:
In the human body, when the diaphragm is contracted, the air flows through the trachea into the lungs.

- Exhaling - Release the balloon. The pressure inside the bottle gets higher and the balloon (representing the lung) expels the air that is in its interior.

Explanation:
In the human body, when the diaphragm relaxes, the air flows out of the lungs.

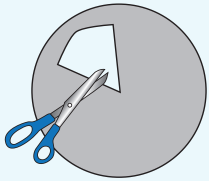
Experiment 8
Butterflies' life cycle

ATTENTION: ask an adult for help.

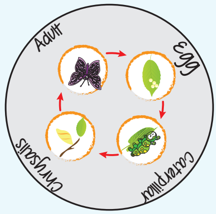
What you will need:
- Scissors
- 2 Circles made of cardboard (1 bigger than the other)
- Pencil
- Tack

Steps:

1. Start by cutting with a scissors a little window with a triangle shape, as shown in the illustration.

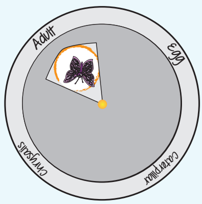


2. In the bigger cardboard circle draw a scheme with the butterfly's life cycle. Don't forget to write the name of each stage.



Attention: the illustration of each stage must be the same size of the 'windows' that you have cut. Only this way you will be able to see the draws while spinning the circle.

3. Use the tack to join the two circles. Join them by its middle point and your butterfly life cycle is ready!



Explanation:
Life cycles are the changes that happen between being born and dying. To the set of transformations that occur during the butterfly's life cycle we call **metamorphosis**.

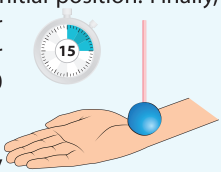
Experiment 9
Measure your pulse with a straw

What you will need:
- Straw
- Plasticine
- Watch or timer

Steps:
1. Mould the plasticine so it gets a ball form. Then, press it against one end of the straw.

2. Bring the forefinger and the middle finger closer to the inside of your wrist until you feel your pulse. Now, put the straw with the ball of plasticine in that place and try to balance it, keeping the wrist straight.

3. With the timer, measure your pulse for 15 seconds. Count how many times the straw swings from its initial position. Finally, multiply this number by 4, so you know your pulse per minute (60 seconds).



Tip: if you can't easily balance the ball of plasticine in your wrist, try flatten its base.

Measure your pulse in different conditions: while you are sitting down and after you run a little. Are the results different?

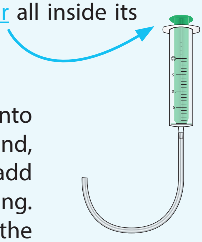
Explanation:
The blood circulation in our bodies is controlled by the heart. When the heart beats, chambers full of blood are closed and the blood is forced to go out of the heart and then flows to the lungs or the rest of the body. When measuring the pulse, you're measuring the heartbeats. This rate may change, for example, with exercise, emotions or even with the use of drugs.

Experiment 10
Blood

What you will need:
- Plastic tube (catheter)
- 2 Syringes
- Red food colouring
- Pasteur pipette
- Small measuring cup
- Wooden spatula
- Water

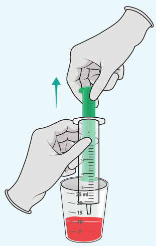
Catheters are an important object in medicine! These are small tubes, with small diameter that are introduced to inject liquids, drain cavities or examine organs in bodies.

Steps:
1. Fix one end of the plastic tube (catheter) in a syringe with its plunger all inside its barrel.

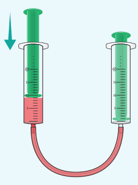


2. Add 10 ml of water into the small measuring cup and, with the Pasteur pipette, add 4 drops of red food colouring. This mixture will represent the blood.

3. Now, dip the tip of the other syringe in the water of the small measuring cup and pull its plunger in order to aspire the 'blood'.



4. Take out the syringe and put the other end of the plastic tube in the tip of this syringe.



5. Pull the plunger of the syringe that has the blood in order to inject the blood to the catheter.

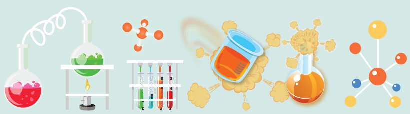
6. Now, push the plunger of the other syringe to aspire the blood.

Explanation:

This is what happens when you need to take blood for tests. Blood circulation is made in vessels, represented in this experiment by the catheter. The person that collects the blood uses a needle that is very thin and it's used to reach your vessels.

Then, a small amount of blood is pulled out, entering the syringe. With the collected blood, specialists can study your organism and observe if you're healthy.

3.2. Chemistry



Chemistry is the science that tell us from what things are made of. It's the science of the substances, its proprieties and it also explains what happens when we join some substances. Scientists that work in this area are responsible for studying how stuff works and its composition.

Curiosities

Do you want to know more about this scientific area?

Became a super scientist with the experiments we have for you at the following link:

www.science4you.co.uk/super-lab-sciences-6-in-1

Experiment 1
Atoms and molecules

Atoms are the basic unit of all substances and all the matter that exists.
Atoms make **chemical bonds** creating **molecules.**

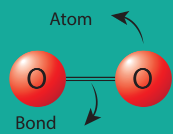


Image 3. Oxygen molecule (O_2).

What you will need:

- Plasticine in different colours
- Toothpicks

Steps:

1. With pieces of plasticine make small balls. These balls will represent the atoms while the toothpicks will be chemical bonds.

Tip: associate a colour to each type of atom. For example, associate the red colour to oxygen (O) atoms, the blue colour to hydrogen (H) atoms and the yellow colour to carbon (C) atoms.

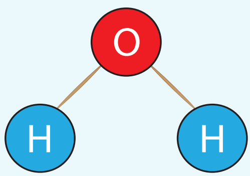
2. Follow the next instructions to build your molecules.

a) Water molecule

What you will need:

- 2 Atoms of H
- 1 Atom of O
- 2 Simple bonds

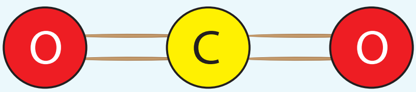
Representation of how your molecule must be:



b) Carbon dioxide molecule

What you will need:
- 1 Atoms of C
- 1 Atom of O
- 2 Double bonds

Representation of how your molecule must be:



Experiment 2
What are solutions, solutes and solvents?

What you will need:
- Test tube with lid
- Plastic spoon
- Test tube rack
- Water
- Sugar

Steps:

1. Fill the test tube with water up to the last mark and then put it in the test tube rack.

2. With the plastic spatula add one spoon of sugar. Put the lid on the tube and then shake it.

Are you capable of dissolving all sugar?

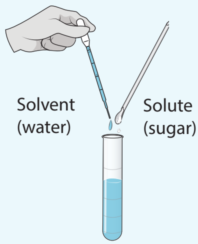
3. Again with the plastic spoon, add sugar until you can't dissolve more.

What kind of solution did you prepare?

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

Explanation:

In the first part of this experiment, you will dissolve all sugar in water. Water and sugar create a homogeneous mixture. To this kind of mixture we can also call **solution**. A solution is made of a **solvent** and, at least, a **solute**. The solvent is the substance that dissolves another, while the solute is the substance that is dissolved in the solute. In this case, water is the solvent and sugar is the solute.



If you keep adding sugar and shaking the solution you will reach a saturation point, being impossible to dissolve more sugar. In this case, the solution is saturated!

Saturated solution:
Solution that has the maximum amount of solute that the solvent can dissolve, in a certain temperature.

Experiment 3
Mixtures

What you will need:
- 2 Test tubes with lid
- Plastic spatula
- Test tube rack
- Sea salt
- Water
- Cooking oil

Steps:

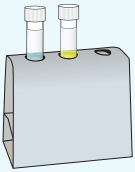
1. Fill half the 2 test tubes with water and put them on the test tube rack.

2. With the plastic spatula add 1 spoon of sea salt into one test tube.

3. On the other tube add 2 spoons of cooking oil, again with the plastic spatula.

4. Close the test tubes with their lids and shake the tubes.

Can you dissolve the sea salt and the cooking oil in water?



5. Put the tubes again on the test tube racks and wait a little.

What kind of mixture have you prepared in each tube?

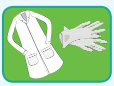
ATTENTION: when you finish the experiment throw away all used food.

Explanation:

The mixture of **water and salt** is a **homogeneous mixture**. This kind of mixtures has the same composition throughout and the individual parts of the mixture are not easily identifiable (salt and water mix). On the other hand, the mixture of **water and oil** is a **heterogeneous mixture**. In this type of mixtures we can distinguish its individual parts with the naked eye (oil and water do not get mixed).

Experiment 4
Separating water and sand

What you will need:



- Funnel
- Round filter paper
- Test tube
- Beaker
- Test tube rack
- Wooden stick
- Wooden spatula
- Pasteur pipette
- Water
- Sand

Steps:

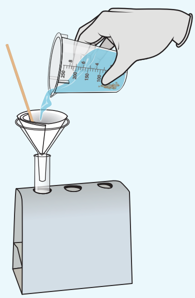
1. Fold the round paper filter as illustrated in step 6 of experiment 6 of the theme Life Sciences. You may also add some droplets of water with the Pasteur pipette so that the filter adheres better to the funnel.

In chemistry, filters are commonly used to **filtration** – the method that is used to separate solids and liquids.

2. On the beaker prepare a mixture of water and sand.

3. Put the funnel with the prepared filter on the test tube and then add them to the test tube rack.

4. Pour the mixture of water and sand into the funnel. Use the wooden stick to help you guide the liquid.



Note: if necessary use more than one test tube to filter the mixture.

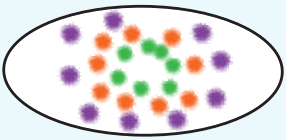
Can you separate the sand from the water?

Explanation:
The sand gets stuck in the filter because its particles are bigger than the 'holes' of the filter. On the other hand, water can freely pass through these holes so the water goes to the test tube, clean. This process is called **filtration**. In this kind of processes the solid particles that are suspended on a liquid are separated from the liquid.

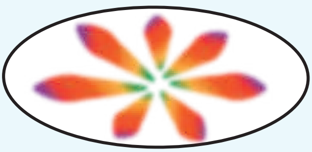
Experiment 5
What is a chromatography?

What you will need:
- Round filter paper
- Straw
- Coloured markers
- Water
- Absorbent paper
- Stapler

Steps:
1. With the coloured markers make circles of dots, until you fill the round filter paper completely, as illustrated.

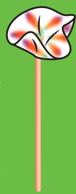


2. Make a small roll with the absorbent paper and dip its tip on water. Then, press the wet tip on the centre of the round paper filter.



Observe what happens to the dots on the paper filter!

SUPER SCIENTIST:
Let the filter dry for a while and then shape it into a flower. Hold it from the underside and make small folds, in order to get a similar effect of what you see in the following image. When it is ready, ask an adult for help and staple the bottom of the flower.



Explanation:
This process is a physical-chemical method of separating homogeneous mixtures in their components by weight, mass and density. In the case of secondary colours, chromatography decomposes them in their primary colours. This happens because colours have different weights and, as so, they get stuck in different positions on the paper when the water can't drag them anymore.

Experiment 6
Magic potion

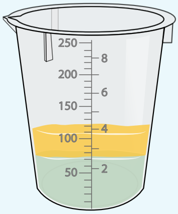
ATTENTION: ask an adult for help.

What you will need:
- Beaker
- Sodium bicarbonate
- Food colouring
- Pasteur pipette
- Plastic spatula
- Hot tap water
- Small measuring cup
- Cooking oil
- Vinegar

Steps:
1. Use the small measuring cup to pour into the beaker 50 ml of hot tap water and 20 ml

of vinegar. If you want, you may also use the Pasteur pipette and add 2 drops of a food colouring of your choice. Ask an adult for help because the water will be hot.

2. Next, again with the small measuring cup, add to the beaker 40 ml of cooking oil. Make two measurements of 20 ml each.



You will see that the oil stays on top and the water and the vinegar on the bottom of the beaker.

3. Now, with the plastic spatula, add 3 spoons of sodium bicarbonate and observe what happens!

What happens to your potion? Is it magic?

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

Explanation:
Sodium bicarbonate flows through the liquid, reaching the vinegar. When in contact with this liquid, a **chemical reaction** happens: sodium bicarbonate reacts with the acetic acid of the vinegar and carbon dioxide is released! It's due to this gas that you can observe the effervescent bubbles in the liquid. Can you hear the sound? This is the characteristic sound of all the effervescent reactions. This is a slow reaction, so you can observe it happening for a while.

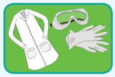
DID YOU KNOW...
That in the production of soft drinks the gas of the drinks is obtained in a similar way?

A chemical reaction occurs when two or more substances react, originating new substances with different characteristics.

Experiment 7
Lemon foam

ATTENTION: ask an adult for help.

What you will need:



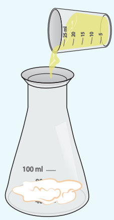
- Erlenmeyer flask
- Small measuring cup
- Washing-up liquid
- Food colouring
- Plastic spatula
- Wooden spatula
- Pasteur pipette
- Knife
- Sodium bicarbonate
- Lemon

Steps:

1. With the plastic spatula add 4 spoons of sodium bicarbonate into the Erlenmeyer flask.

2. Once again with the plastic spatula add 3 spoons of washing-up liquid and mix with the sodium bicarbonate.

3. With the Pasteur pipette add 2 drops of the food colouring you prefer. Mix well with the wooden spatula.



4. Ask an adult for help and cut a lemon in half. Squeeze the lemon to the small measuring cup and then add 25 ml of its juice into the Erlenmeyer flask.

What happens Scientist? Can you create lemon foam?

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

Explanation:

The foam is produced because of the carbon dioxide that results from the chemical reaction between the sodium bicarbonate and the citric acid of the lemon juice! The washing-up liquid helps to observe the gas that is formed.

Experiment 8
How to fill up a balloon without blowing

What you will need:

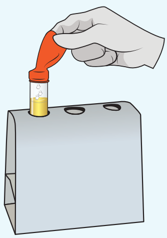
- Test tube
- Test tube rack
- Balloon
- Sodium bicarbonate
- Plastic spatula
- Funnel
- Vinegar

Steps:

1. Fill with vinegar the test tube until the last mark and then place it on the test tube rack.

2. With the plastic spatula add 2 spoons of sodium bicarbonate into the balloon. Use the funnel to help you!

3. Hold the nozzle of the balloon to the test tube. Be careful and don't drop the baking soda into the test tube.



4. Raise the balloon and let the sodium bicarbonate enter the test tube.

Scientist, can you fill the balloon?

Observe how the carbon dioxide produced fills up the balloon!

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

Explanation:

As we already know, the reaction between the sodium bicarbonate and an acid (in this case, the acetic acid of the vinegar) produces carbon dioxide. It is this gas that fills up the balloon. If you try to change the amounts of each reagent you will verify that the higher the amounts, the bigger the gas production.

Experiment 9
Coloured foams

What you will need:

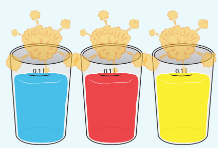
- 3 Plastic cups
- Small measuring cup
- 3 Pasteur pipettes
- Food colourings (3 different colours)
- Plastic spatula
- Sodium bicarbonate
- Washing-up liquid
- Vinegar

Steps:

1. With the plastic spatula add 2 spoons of sodium bicarbonate into each plastic cup. Add also to the cups 2 spoons of washing-up liquid.

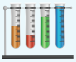
2. With different Pasteur pipettes pour 5 drops of each food colouring to each cup. Use one colour per cup and don't forget to use different Pasteur pipettes to each food colouring.

3. With the small measuring cup add 25 ml of vinegar in each cup and observe your coloured foams.



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

Explanation:
In this experiment you are able to produce coloured foams! The foam is produced due to the release of carbon dioxide of the mixture of washing-up liquid when the acetic acid from the vinegar reacts with the sodium bicarbonate (like in previous experiments).



Experiment 10
The pH of different mixtures

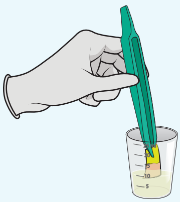
What you will need:

- 2 Small measuring cups
- Plastic spatula
- Pasteur pipette
- Tweezers
- pH test strips
- Lemon juice
- Sodium bicarbonate
- Wooden spatula

Steps:

1. Add 10 ml of lemon juice to one of the small measuring cups.

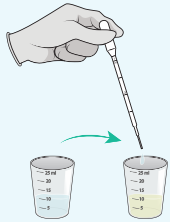
2. Now, with the tweezers, dip one pH test strip into the lemon juice.



Observe and register what you observe.

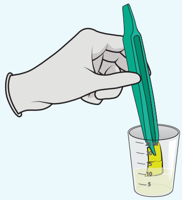
3. Prepare a sodium bicarbonate solution. Add 10 ml of water in a small measuring cup and add also a little bit of sodium bicarbonate. Stir this well with the wooden spatula.

4. Again with the tweezers, dip other pH test strip in this solution.



5. With the Pasteur pipette pour some drops of the sodium bicarbonate solution into the lemon juice of the other small measuring cup.

6. Use another pH test strip and with the tweezers dip it inside the mixture.



Observe and register!

7. Add the rest of the solution of sodium bicarbonate to the original solution.

8. Again with the tweezers use other pH test strip and dip it in the mixture. What happens?

Don't forget that lemon juice has citric acid!

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

Explanation:
Each pH test strip changes colour. When you add the sodium bicarbonate to the lemon juice the original pH changes and so the pH test strip shows another colour. In addition, citric acid is an acid and sodium bicarbonate is a base (alkaline). Adding the base to the acid you start neutralising the solution, this is to say, you are approaching the pH 7. However, this balance is difficult to predict and may be hard to neutralise the solution. However, you can see changes in pH test strips, indicating pH changes. By adding

the basic solution you're making the acid solution less acid, so the pH test strip shows other colour. Compare your results with the image (pH scale).

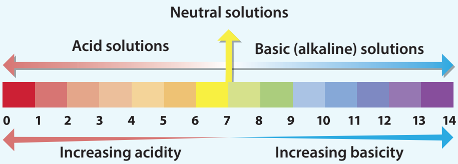


Image 4. pH universal indicator scale.

3.3. Science of Earth

The Science of Earth joins all sciences that help to study our planet (like chemistry, physics, mathematics, geography, geology...). Scientists of this area study the interaction and relations under Earth's subsystems: atmosphere, hydrosphere, geosphere and biosphere. In this way they are able to know better our planet.

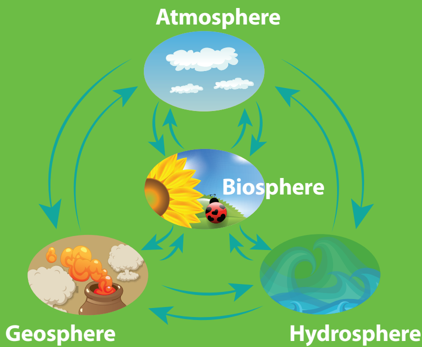
Earth's subsystems:

Atmosphere is the layer of gases that surrounds our planet and protects it from ultraviolet rays from the sun and helps maintaining the temperature in Earth;

Hydrosphere is the combined mass of water found under and over the surface of our planet (rivers, lakes, oceans, subterranean water...);

Geosphere is the solid part of Earth: Earth's interior, rocks and minerals, landforms and the processes that shape Earth's surface;

Biosphere includes all living beings of Earth.



Curiosities

Do you want to know more about this scientific area?

Became a super scientist with the experiments we have for you at the following link:

www.science4you.co.uk/super-lab-sciences-6-in-1

Experiment 1
The internal structure of planet Earth

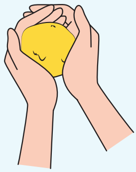
ATTENTION: ask an adult for help.

What you will need:

- Plasticine in 3 different colours
- Toothpicks
- Paper sheet
- Scissors
- Sticky tape
- Knife

Steps:

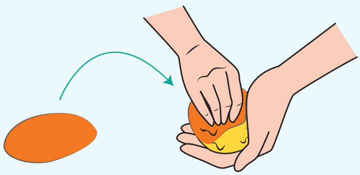
1. Choose one colour of plasticine and with your hands make a small ball.



This ball represents Earth's core!

2. Flatten another colour of plasticine. Pay attention because this layer may not be very thin.

3. Put this layer around the core.

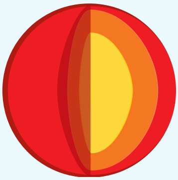


This layer represents the mantle.

4. Repeat the steps 2 and 3, using the last colour of plasticine.

This layer represents the crust.

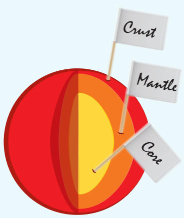
5. Now, ask an adult for help and cut ¼ of the ball. In this way you will be able to see all layers of Earth you have just created.



6. In three different pieces of paper write the names of each one of Earth's layers.

7. With sticky tape, glue each paper on a toothpick.

8. Stick each toothpick in the matching layer.

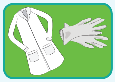


Explanation:
With this experiment you can recreate a model of our planet with its three different layers.

Experiment 2
The formation of Earth's continents

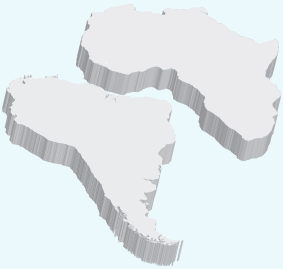
ATTENTION: ask an adult for help.

What you will need:
- Plastic tube
- World map, encyclopaedia or images of continents
- Large basin
- Piece of styrofoam
- X-acto knife
- Marker



Steps:
1. With the help of the images, draw on a piece of styrofoam the African and South American continents.

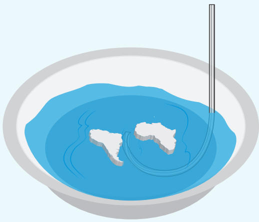
2. Ask an adult to help you cut, using the x-acto knife, the pieces you have drawn.



3. After cut, try fitting them. Do they fit as a puzzle?

4. Fill the large basin with water and place the pieces to float.

5. Place one of the ends of the tube under the puzzle and blow slowly through the other end.



Observe what happens.

Explanation:

The continents as we know them today are the result of the separation of the supercontinent called Pangaea that existed 250 million years ago. With this experiment you can see that the occidental coast of Africa fits perfectly in the oriental coast of South America. When blowing through the tube you are simulating the convection currents that led to the separation of Pangaea and caused the continuous distance of the continents.

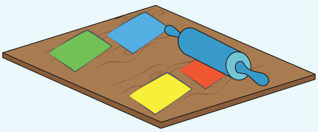
Experiment 3
Formation of a mountain

What you will need:

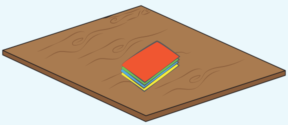
- Plasticine in 4 different colours

Steps:

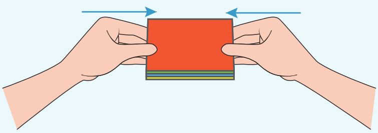
1. Mould the plasticine into rectangles. Make a rectangle with each colour.



2. Pile the 4 rectangles, creating one single block.



3. Place your hands on the sides of the block and squeeze it.



Scientist, can you create a mountain?

Explanation:

Most of the highest mountains come from wrinkle ridges of Earth's crust. In this experiment you will simulate the formation of a mountain.

This effect happens when two tectonic plates collide and lift the surface. In turn, in the compressed layers, folds that can break are created, originating the peaks of the mountains.

Experiment 4
Wind energy – Windmill

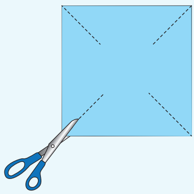
ATTENTION: ask an adult for help.

What you will need:

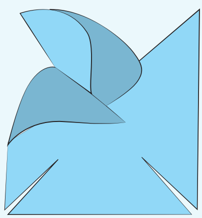
- Coloured paper sheet
- Straw
- Plasticine
- Round head pin
- Scissors

Steps:

1. With the scissors, cut the corners of the coloured paper sheet, as you can see in the illustration.

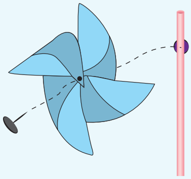


2. Fold one corner of each of the parts that you cut (always the same). To do this, you must bend a corner, leave the corner that is immediately beside, fold the next one, and so forth.



3. Ask an adult to hold the corners of the windmill with the round head pin and then to hold them to the straw.

4. On the back of the windmill put a bit of plasticine so you don't get hurt.



Try your windmill while blowing against it!

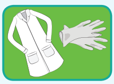
Explanation:
While blowing, the windmill blades start moving (rotating) like if it was by the action of the wind. Wind is the movement of the air: sometimes it's faster like tornadoes and hurricanes, others it moves slower, like a breeze. Wind may be used as a natural and renewable resource whose force can produce energy – eolic energy – that can be transformed in electric energy.

Experiment 5
Vanes and weather

A vane is a meteorological instrument that is used to indicate the direction of the wind.

ATTENTION: ask an adult for help.

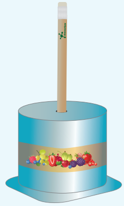
What you will need:



- Pencil
- Straw
- Plasticine
- Compass
- Round head pin
- Scissors
- Glue (prepared as shown on the beginning of this book)
- Cardboard
- Pen
- Clean yogurt cup
- Ruler

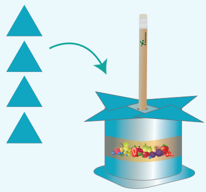
Steps:

1. With the pencil, make a hole on the centre of the clean yogurt cup. The pencil must stay inside the cup with the rubber on top, as shown in the image.



2. Draw 4 small triangles on the cardboard and then cut them with the scissors. Then, draw and cut a triangle with 3 cm and another with 5 cm. Don't forget to ask an adult for help to use the scissors. Use the ruler and the pencil to help you drawing the triangles.

3. Glue the 4 smaller triangles on the base of the yogurt cup, as shown in the image. Make sure they point to 4 different positions.

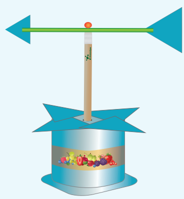


4. Make 1 cm slots at both ends of the straw. Then, put the larger triangles on each slot, pointing in the same direction, as you may see in the image.

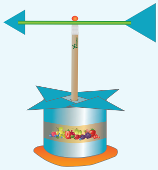
Note: the smaller triangle will indicate the direction of the wind.

5. Ask an adult for help and hold a round head pin on the centre of the straw. Then, hold it to the pencil's rubber.

Test your vane: make sure that the straw can freely rotate.



6. With the plasticine, make a ring with the same diameter of the yogurt cup and pour it in its base. In this way you'll be able to stick the vane on a flat surface. Your vane is ready!

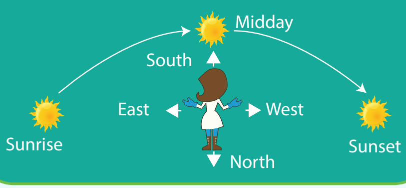


How to use your vane: put your vane on a flat surface. Then, use the compass to position it. You must be sure that one of the triangles of its base is pointed to North. Use the pen to identify the 4 cardinal points: North (N), South (S), East (E) and West (W).

Scientist, which direction does your vane point?

DID YOU KNOW...
That North winds, for example, blow from North to South?

Find out directions without a compass:
How can you find out where is the North on the North hemisphere?
Without a compass we can also find the cardinal points to guide ourselves.
For example, in the United Kingdom, that stays in the North Hemisphere, at midday sun indicates the South.
Sun does not move (it's our planet that turns around the sun) but you may say that the Sun rises at East, at midday if we are positioned to the Sun, it indicates South and our shadow will point North.
Sun sets in the West side.



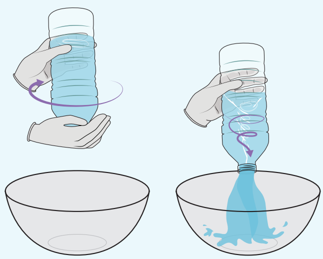
Experiment 6
How do tornadoes form?

What you will need:
- Red food colouring
- Pasteur pipette
- Ring
- 2 Plastic bottles (1/1.5 litres)
- Sealing tape
- Water
- Basin

Steps:

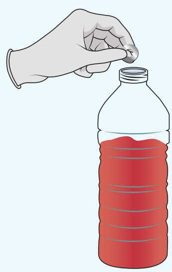
1. Fill one plastic bottle with water.

2. With the basin under the bottle, turn the bottle upside down, covering the nozzle with your hand. Shake the bottle with circular movements and then take off your hand, allowing water to fall down.



3. Fill again the bottle with water, but now use the Pasteur pipette and mix some drops of red food colouring.

4. Add the ring to the bottle.



5. Ask an adult for help to cut a little of sealing tape and use it to attach the nozzles of the 2 plastic bottles, as you may see in the image.

6. After attaching the bottles and being sure that they are well sealed, turn them so that the filled bottle stays on top. Shake the bottle in circular movements.

DID YOU KNOW...
That tornadoes that occur over the sea are called waterspouts?

Watch the water effect while passing from a bottle to the other.

Scientist, were you able to simulate the fantastic effect of a vortex that we observe in tornadoes?

Explanation:
When spinning the bottles, the water from the upper bottle, also starts spinning. You can see the formation of a vortex while the water is forced to move to the low bottle, through the hole in the stopper. This happens due to gravity! Tornadoes are the most destructive natural weather phenomena of all-weather hazards! A real tornado needs specific conditions to form, particularly intense heat. As the ground temperature increases, moist air heats up and starts to rise. When the moist and warm air meet the dry and cold air, it explodes upwards, perforating the layer above. A thunder cloud begins to form and a storm quickly develops – producing rain, thunder and lightning. The upward movement of air can become very rapid and the wind, from different directions, makes it rotate. A visible cone or funnel comes out of the cloud towards the ground, creating a tornado.

Experiment 7
Acid rain effect

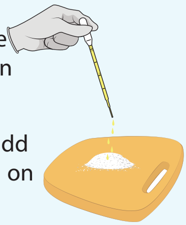
ATTENTION: ask an adult for help.

What you will need:
- Beaker
- Pasteur pipette
- Hammer
- Chopping board
- Lemon
- Knife
- Chalk

Steps:

1. Ask an adult to smash the chalk with the hammer, over the chopping board.

2. Again with the help of an adult, use the knife to cut the lemon in half. Squeeze the lemon into the beaker.



3. With the Pasteur pipette add some drops of the lemon juice on the smashed chalk.

What do you observe?

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

Explanation:
Acid rains are formed thanks to chemical reactions that occur in the atmosphere. Water, as a natural element, presents some natural acidity as the result of reactions between water and carbon dioxide. However, when water suffers reactions where reactive nitrogen and sulphur are active agents, the acidity level rises! This happens because in these kind of reactions sulphuric acid and nitric acid are formed, which are acids that produce negative effects in nature. The simulated effect in this experiment represents the effect of the acid rains on the limestone rocks (that are alkaline), eroding them progressively.

Experiment 8
Volcanos and volcanic eruptions

ATTENTION: ask an adult for help.

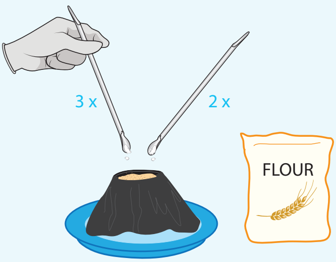
What you will need:

- Volcano mould
- Wooden spatula
- Plastic spatula
- Red food colouring
- Pasteur pipette
- Small measuring cup
- Sodium bicarbonate
- Vinegar
- Wheat flour
- Plate

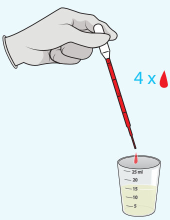
Steps:

1. Start by placing the volcano mould on the plate.

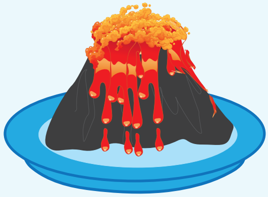
2. With the plastic spatula add to the volcano 3 spoons of sodium bicarbonate and 2 spoons of wheat flour. Then, stir with the wooden spatula.



3. Pour 15 ml of vinegar into the small measuring cup and, with the Pasteur pipette, add 4 drops of red food colouring. Once again, stir it well with the wooden spatula, that must be clean.



4. Count to three and pour the content of the small measuring cup into the volcano.



Observe the volcanic eruption!

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

Explanation:

In this experiment you can simulate what happens during an effusive eruption through a chemical reaction. The chemical reaction you have just seen is an acid-base reaction. Vinegar has in its composition an acid, acetic acid. Sodium bicarbonate is a base. This way, when mixed with an acid, baking soda ($NaHCO_3$) decomposes and releases gas, the carbon dioxide. But attention scientist! This is not what happens in a real volcanic eruption. This experiment just allow us to simulate one!

Experiment 9
What is a geyser?

What you will need:

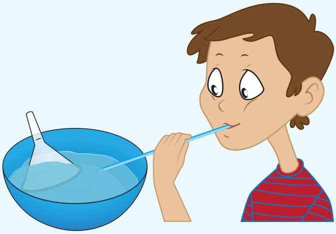
- Round plastic basin
- Funnel
- Straw
- Water

Steps:

1. Fill the round plastic basin with water.

2. Put the funnel with its base downwards in the basin.

3. Slightly tilt the funnel and, with the straw, blow to the interior from its base.



Scientist, were you capable of making a geyser?

Explanation:

When you blow through the straw into the funnel, the air flows through its thinner part. While escaping, the air drags some water, making this geyser effect. If you want to try a more awesome effect you just need to blow harder! When blowing inside the funnel you are increasing the pressure inside it and, as so, the amount of water that flows through the funnel will be greater as harder is the force of the blowing.

DID YOU KNOW...

That in real geysers the pressure is originated due to the boiling water that is in contact with the hot volcanic rocks that are in lower layers of our planet?

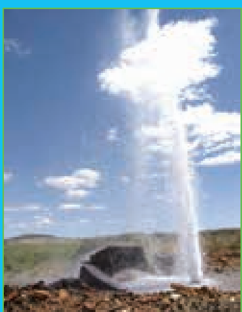


Image 5. Geyser.

Experiment 10
Let's recreate a fossil?– Moulding fossil

A moulding fossil is the most common type of fossilisation. The internal or external part of the living being is moulded on rocks. These fossils are, generally, from hard parts of the being, such as shells, teeth and stems.

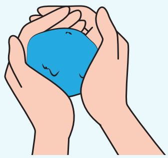
What you will need:

- Plasticine
- Seashells
- Gypsum
- Small measuring cup
- Wooden spatula
- Plastic cup
- Cooking oil
- Brush
- Gouaches
- Water

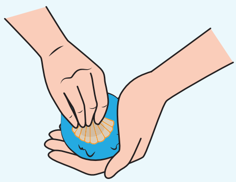
Note: use gouaches conform to the Toy Safety Directive 2009/48/CE.

Steps:

1. With your hands make a ball with the plasticine.

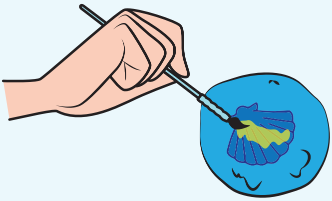


2. Press a seashell against this ball.

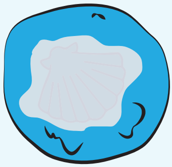


3. Carefully, take the shell of the plasticine so that its form stays printed on it.

4. With the brush, pass some cooking oil on the shell mark.



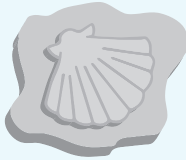
5. Add some gypsum to the plastic cup and then, with the small measuring cup, pour also some water until the gypsum gets liquid and very soft. Stir well with the wooden spatula. If the gypsum starts to solidify inside the cup, add some more water drops and stir again.



6. Pour this mixture in the seashell mould that you created on the plasticine.

7. Wait until the gypsum gets hard, this is to say, that it gets solid.

8. After this time you may separate it from the plasticine and your moulding fossil is ready!



Scientist, you may also give colour to your fossil! Paint it with the gouaches and have fun!

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

Explanation:

Due to water evaporation, the gypsum solidifies on the plasticine mould, creating a moulding fossil. But you must not forget that real fossils take several years to form! In this experiment you just simulate a fossilisation process.

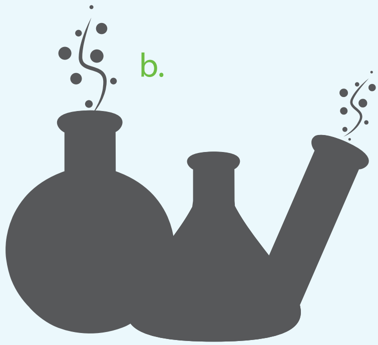
Shadows Game

Discover which of the outlines below matches the colour image.

Have Fun!

a.

b.



c.

d.

Correct answer: c.

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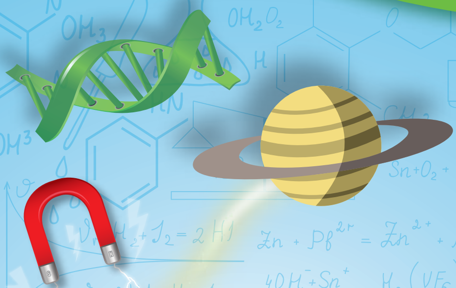
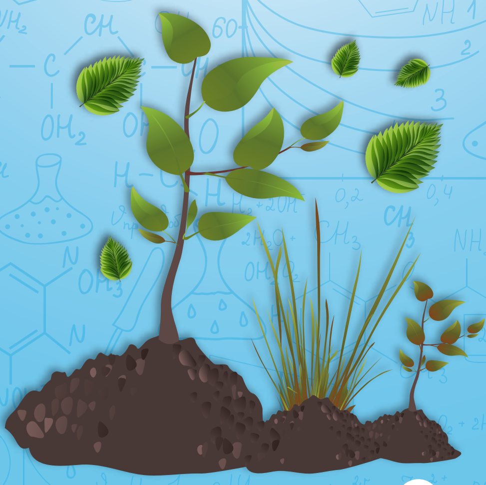


Super Lab Sciences

6 in 1



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