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Democratia – Aqua – Technica VI

Environmental communication for the next generation

FUN WITH WATER-EXPERIMENTS

DEMOCRATIA

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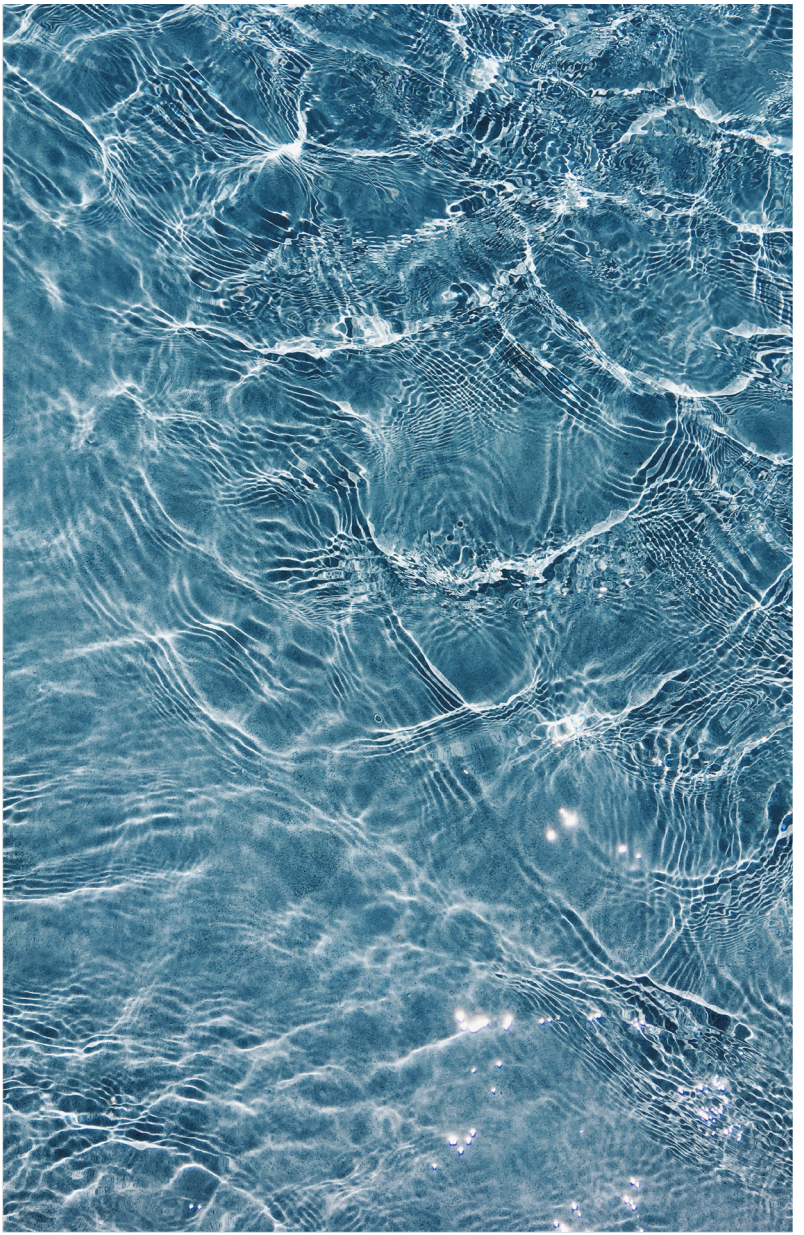

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FOREWORD

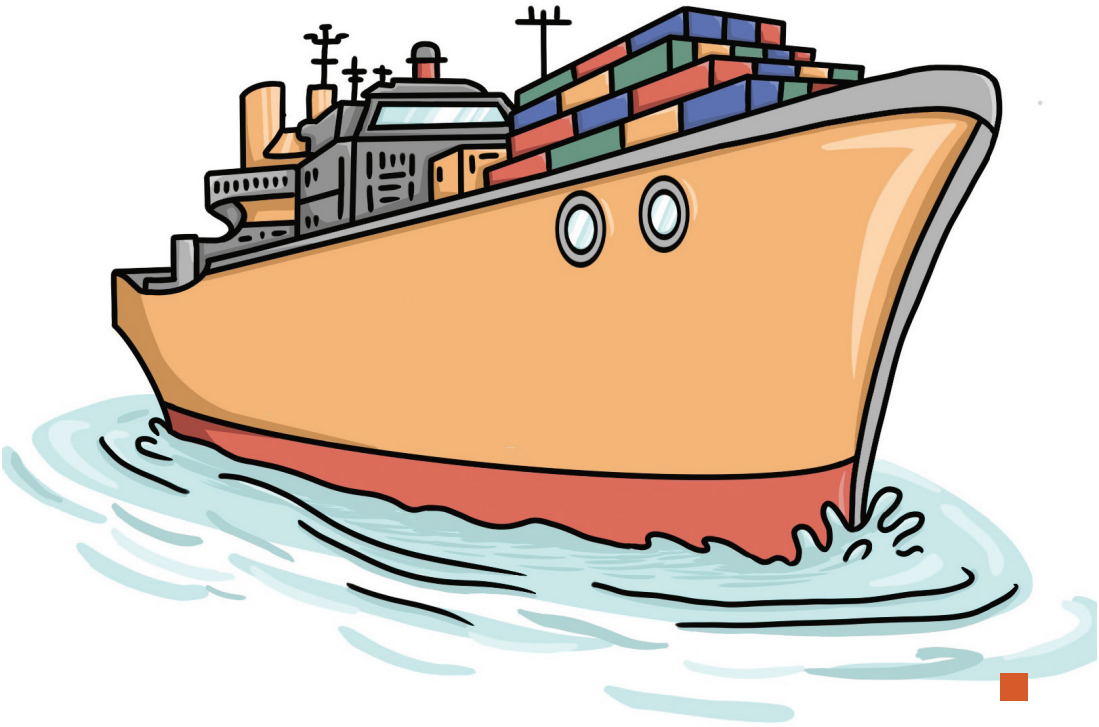
Dear Kids,

The world has a lot of water at its disposal - in fact, over 70% of the earth's surface is covered with water. Salt water has the largest share on our Earth. Our drinking water is called fresh water. Fresh water can be found in lakes, rivers, streams and in the ground, which makes up our groundwater. The ice at the North and South Poles consists also of freshwater. Only about 1% of the world's water supply is directly available as drinking water. In addition, available fresh drinking water is extremely unevenly distributed around the world and while some people flee floods, others struggle for a few drops of this precious resource. The history of many countries is also marked by struggles for natural resources. The access to water has been essentially fundamental to the survival and development of humanity. We all need water to live. Whether as highly polluted or salt water, the water on Earth will always be present in various forms such as ice, steam, or as we simply know it in its liquid form. Water cannot become more or less, it can only change its state and location. Thanks to state-of-the-art technologies, we can process various forms of water into drinkable water. The biggest challenges for such processing are the costs.

In this book, we introduce you to different experiments to help you get to know more about water as a resource. By conducting the various suggested experiments listed here, you get to know more about water; or even better, by going out into nature allows you to directly experience the different facets of water.

Have lots of fun!

Kenneth & Ulrike



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FOR ANDROID!

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FOR IOS!

WATER ON EARTH

Here you can see the different resources of water that we have here on Earth:

QUESTION:
What happens if you leave a cup of water standing for a couple of days?

TIPP:
Please take a coloured cup and a few teaspoons of salt!

IN THIS VIDEO THE TOPIC WATER AND CONFLICTS ARE BRIEFLY EXPLAINED:

A POEM

DAS WASSER

Vom Himmel fällt der Regen
und macht die Erde nass,
die Steine auf den Wegen,
die Blumen und das Gras.

Die Sonne macht die Runde
in altgewohntem Lauf und
saugt mit ihrem Munde das
Wasser wieder auf.

Das Wasser steigt zum Himmel
und wallt dort hin und her, da
gibt es ein Gewimmel von
Wolken, grau und schwer.

Die Wolken werden nasser
und brechen auseinand',
und wieder fällt das Wasser
als Regen auf das Land.

Der Regen fällt ins Freie, und
wieder saugt das Licht, die
Wolke wächst aufs Neue, bis
dass sie wieder bricht.

So geht des Wassers Weise:
es fällt, es steigt, es sinkt in
ewig gleichem Kreise, und
alles, alles trinkt!

James Krüss

HAVE A LOOK AT OUR VIDEOS!

STATES OF MATTER

Do you know that everything around you is made of matter? We are going to learn about matter and the three states of matter. Solids, liquids, and gases make up matter. Everything around us including the things in our kindergartens, playgrounds, supermarkets and restaurants are all made of matter. An example of matter in the form of gas is the air that we breathe. The water, milk and fruit juice we drink is matter in its liquid form. Toys, footballs, shoes and bags are examples of solid matter. Solid, liquid and gaseous matter are made up of tiny particles called atoms. On Earth, the most common states of matter are solids, liquids, and gases. You can learn about solids, liquids, and gases by doing the yummy ice pops experiment.

CHANGING STATE OF MATTER EXPERIMENT

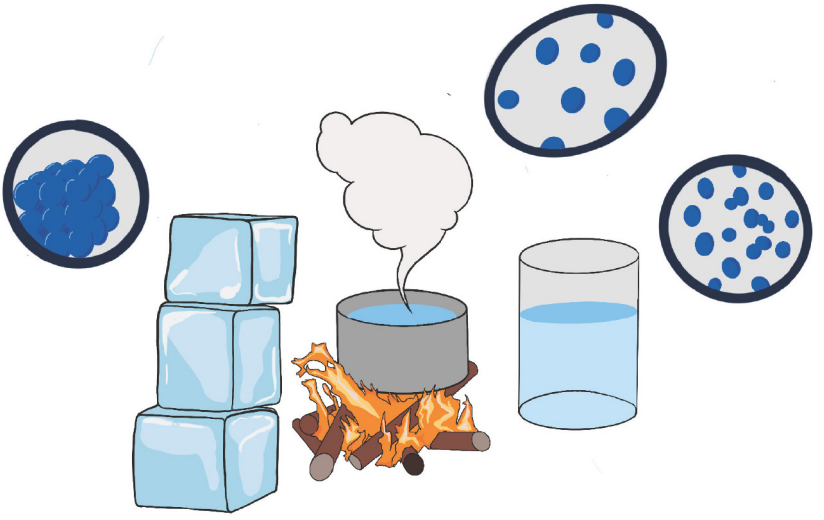
Do you know that you can learn about the different states of matter by making yummy ice pops with orange juice? We can change the ice pops (solid) into juice (liquid) or gas by changing the temperature of the ice pops. This is called changing the state of the ice pops. Orange juice is a liquid at room temperature, but becomes a solid (ice pops) if it is cooled down to 0°C. The temperature at which the orange juice turns into ice pops is known as the freezing point. When the orange juice is heated to 100°C the water in the orange juice turns into gas (water vapour). This is known as its boiling point.

MATERIALS:

- Can of frozen orange juice concentrate
- Jug
- Spoon
- Water
- Paper cups
- Wooden craft sticks

INSTRUCTIONS:

1. Open the can of frozen orange juice concentrate which represents the solid state and scoop it into a large jug using a spoon.
2. Touch the frozen juice to feel that it is solid and cold.
3. Add water to the frozen juice to make orange juice.
4. Fill the paper cups to about 2/3 full with the orange juice.
5. Put a craft stick into the liquid juice in each paper cup.
6. Put the cups of juice into the freezer.
7. After two hours, check the cups to see if the liquid orange juice has frozen (solid state) around the stick.
8. Once the orange juice has frozen, peel off the paper cups and now you and your friends can enjoy a frozen treat.



MAKING SUGAR CRYSTALS

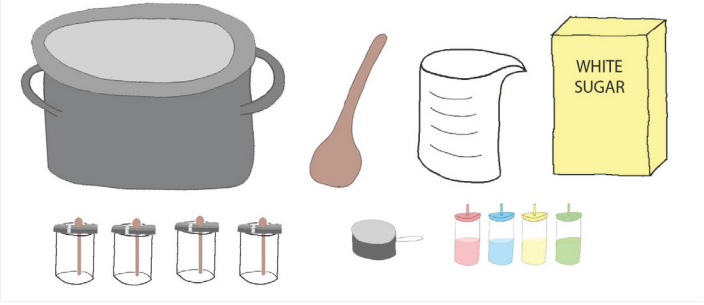
Making sugar crystals on wooden sticks, skewers or straws is simple and a lot of fun. Through this process, you can learn how different substances change when heated, cooled and mixed with other substances. Kids will be amazed to watch the sugar crystals grow and increase in size over 2 to 3 days.

WHAT YOU NEED:

- Saucepan
- Wooden spoon
- Measuring cups
- Clothes Pegs
- Metal fork
- Wooden sticks, skewers or straws

INGREDIENTS:

- 2 Cups of water
- 6 Cups of white sugar
- Food colouring
- Extra ¼ Cup of white Sugar



INSTRUCTIONS:

STEP 1:

1. Set up 4 glasses based on the number of coloured sugar crystals you want to produce
2. Place 5 drops of blue, red, green and yellow food colouring, into each of the 4 glasses
3. Place wooden sticks, skewers or straws in the glass so that they do not touch the sides or base of the glass.
4. Clip the clothes pegs to the wooden sticks, skewers or straws to balance them on the rim of the glass so the wooden stick, skewers or straws are centered in the middle of the glass.

STEP 2:

5. Heat the sugar and water together in a saucepan while stirring continuously

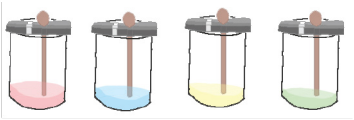
with a wooden spoon until the sugar syrup boils (**under adult supervision**).
6. After the sugar syrup begins boiling, for roughly 1 minute, turn off the heat.

STEP 3:
7. Pour the sugar syrup equally into each of the 4 glasses.
8. Add food colouring to the syrup in the glasses and stir with a metal fork.
9. Allow the sugar syrup to cool in the glasses for about 30 minutes.
10. Place the wooden sticks, skewers or straws in the liquid.

STEP 4
11. Wet the wooden sticks, sticks, skewers or straws by dipping them into the sugar syrup and then rolling them into the dry white sugar.
12. Place the sugar-coated wooden sticks, skewers or straws into the 4 glasses with the sugar syrup making sure that they do not touch the base or sides of the glasses.
13. Observe for 2-3 days as the sugar crystal grow.

STEP 5
14. On day 3, remove the sugar crystal sticks from the sugar syrup, allow the liquid to run/drip off before placing them onto a paper towel to dry.

STEP 1)



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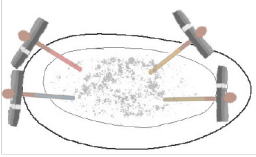
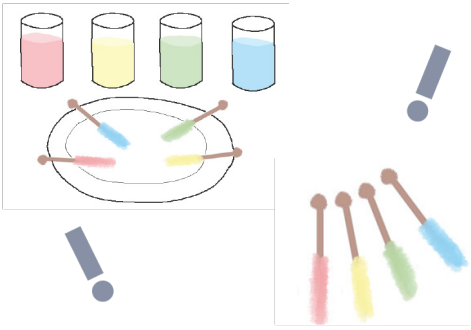




WHY DO SUGAR CRYSTALS FORM?

A crystal is any solid material with a natural geometric regular form. Diamonds are an example of crystals which take millions of years to form. The sugar crystals were made in just 3 days. When minerals are dissolved in water, some of them can form crystals when given enough time and space. The shape of the crystals formed depends on the mineral's molecule shape. The two processes which make it possible for the sugar crystals to grow are Evaporation and Precipitation. Through the process of evaporation, the water in the sugar syrup changes to gas. This makes the sugar syrup more saturated when the sugar molecules come out of solution and start collecting on the wooden sticks. Due to precipitation the solution becomes very concentrated.

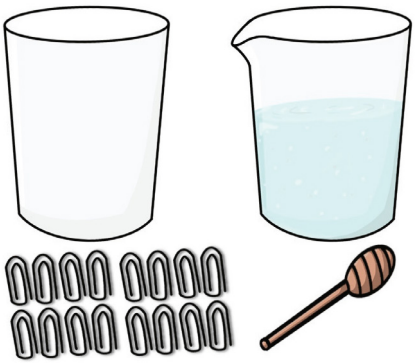
PROPERTIES OF WATER

EXPLORING THE SURFACE TENSION OF WATER WITH PAPERCLIPS

It may be hard to believe, but did you know that you can stretch the surface of water? In this experiment you will learn about surface tension, where you will find out how far you can stretch the surface of water by using water with paperclips.

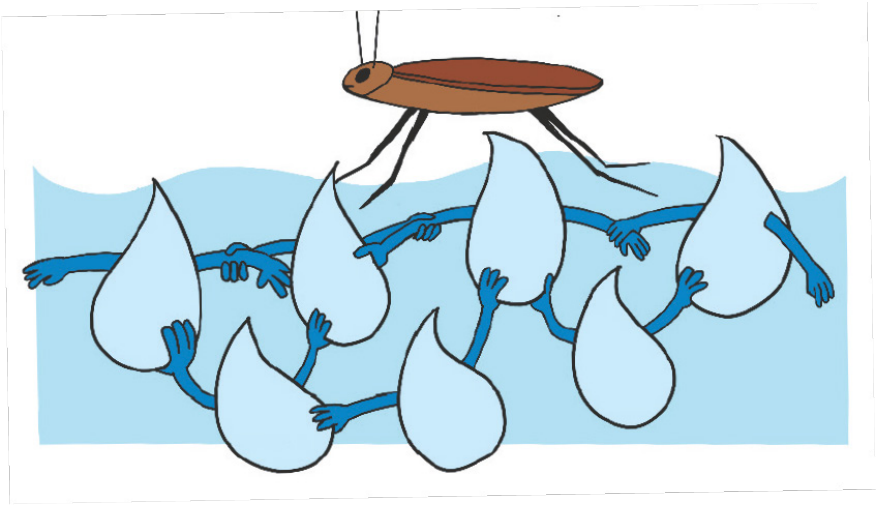
WHAT YOU NEED:

- Clear cup
- Water
- Dropper
- Paperclips



PROCEDURE:

1. Fill a clear cup with water as full as you can without spilling.
2. Use a dropper to add the last few drops of water, so it's as full as possible.
3. Take a guess on how many paperclips will fit into the cup before the water begins to overflow.
4. Start dropping the paperclips into the cup filled with water one at a time.
5. Keep dropping the paperclips until the water finally overflows.



DO YOU KNOW WHAT IS GOING ON?

Drops of water can stick to each other. That's why the surface of the water in the clear cup has bulged and formed a dome when the paperclips were added. The force which holds the drops of water sticking to each other and thus keeping the water in the cup from spilling over is called surface tension. Once too many paperclips are added to the water in the cup, the **surface tension** breaks, allowing the water to spill over. **Surface tension** makes it possible for light objects and animals to walk on the water.

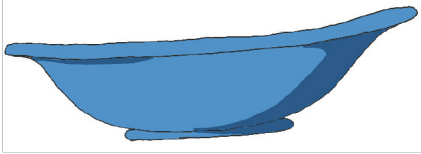
FISH RACE

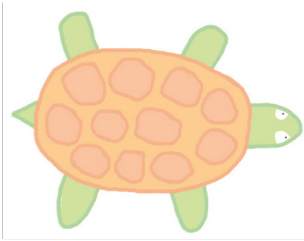
MATERIALS:

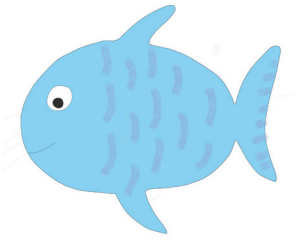
- Paper
- Color pencils or chalks
- Scissors
- Shallow vessel with water
- Liquid soap
- Toothpick

METHOD:

1. Draw fish on a piece of paper, paint them in different colours, and cut them out.
2. Put water in the shallow container.
3. Dip the toothpick in a little liquid soap and add a drop of the liquid to the tail of the fish.
4. Put the fish in the vessel and see what happens.







WHAT IS HAPPENING?

If you just put the fish into the water, nothing happens. The paper fish just remains on the surface of the water. But if you put liquid soap on the fish, the fish will dash away. Why does this happen? It is because of "surface tension". Because detergent is added to the tail, the fish will try to move in the opposite direction where there is no detergent. But if you notice, after some time it will stop working. Why is this? If you have already put a few fish into the water, it means that the liquid soap has already been spread into the water. If you want it to work again, you have to change the water.

ICE FLOATS ON WATER

Can ice float on water? Yes, it can! This simple but interesting experiment will make you understand why ice floats in water.

MATERIALS:

- Plastic bowl (large enough to hold 3 or 4 cups of water)
- Ice cubes (2-4 cubes)
- Water

INSTRUCTIONS:

1. Fill the plastic bowl with 2 or 3 cups of cold tap water
2. Place 2 - 3 ice cubes into the bowl containing water

WHY ICE FLOATS ON WATER:

Ice cubes floats on water because when water is frozen (ice), it expands and gets lighter (less dense) than liquid water. Anything that is lighter will float on a heavier substance. Floating ice cubes displaces the liquid water around it. As the ice cube melts its volume changes, but the weight remains the same (conservation of mass). The water obtained from the melted ice will have exactly the same weight as the water displaced by the ice cubes.

A POEM

A POEM ON OBJECTS THAT FLOAT AND SINK

Pebbles in a stream
Ice in a fruit juice
Some objects float
Some object sink

Floating objects are buoyant
You can test this with a toy

Does it float?
Does it sink?
Could you use it as a boat?

Try a pencil
Did it pop up?
Try a stone
Try a plastic cup

Test some objects in the bath
Did they float?
Did they sink?
Learning density is fun!

Objects heavier than water sink
Objects lighter than water float
Learning density is fun!
Learning density is fun!

Adated from Amy Ludwig VanDerwater)

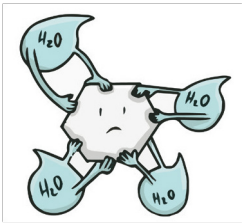
EXPERIMENTS ON PROPERTIES OF WATER

Do you know that when you mix sugar with water in a jug the sugar dissolves in the water? This does not mean that the sugar is no longer in the jug. The sugar is still present in the jug but has gotten so small you cannot see it with your eyes. You can do simple experiments at home and in school to show how substances dissolve in water. Which substances can dissolve in water and which substances cannot dissolve in water? To find out, get yourself some empty cups, water, paper towels and sand to do experiments on the properties of water.

SUGAR AND WATER SOLUTION

MATERIALS:

- Sugar
- Clear
- Water
- Stirrers



INSTRUCTIONS:

1. Add one tablespoon of sugar to clear jar.
2. Add 1 cup of water to the sugar in the jar.
3. Stir the sugar and water in the jar until the sugar disappears.

HOW DOES SUGAR DISSOLVE IN WATER?

Many small water particles wrap themselves around the tiny sugar particles like a coat and then loosens it. A sugar solution is created.

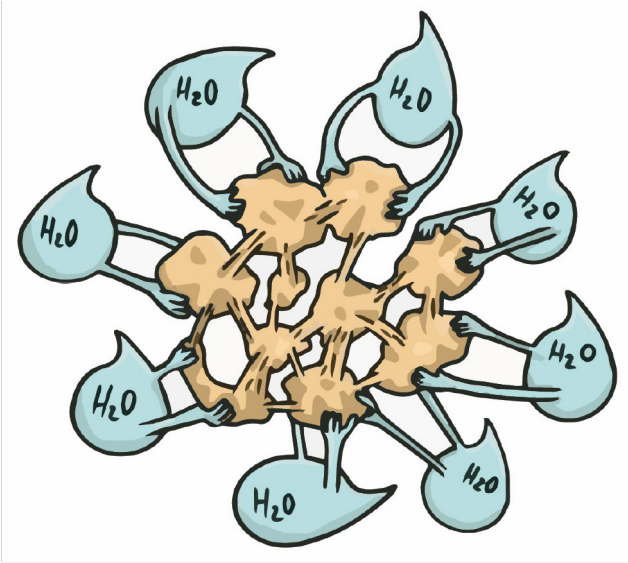
SAND AND WATER MIXTURE

MATERIALS:

- Sand
- Clear jar
- Water
- Stirrers

INSTRUCTIONS:

1. Add one tablespoon of sand to clear jar.
2. Add 1 cup of water to the sand in the jar.
3. Stir the sand and water in the jar for 60 seconds.



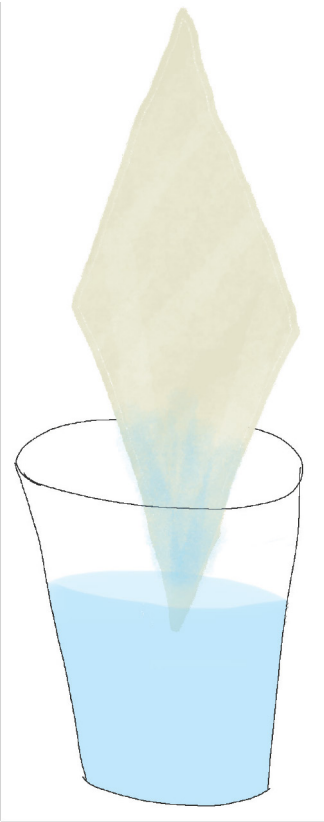
WHY DOES SAND NOT DISSOLVE IN WATER?

When sand is mixed with water, no matter how hard the water particles try, they do not manage to separate individual crumbs of sand. Water and sand are and will remain a visible mixture.

CAPILLARY ACTION OF WATER

MATERIALS:

- Water
- Paper Towel
- Cup



INSTRUCTIONS:

1. Pour a small amount of water in a cup.
2. Dip the tip of a paper towel in the water.
3. What do you notice over time?

WHY DOES THE WATER "RISE" UP THE PAPER TOWEL?

The water rises up the paper towel over time because of capillary action. Plants absorb nutrients from the soil through capillary action in order to stay alive.

SALT AND WATER EXPERIMENT

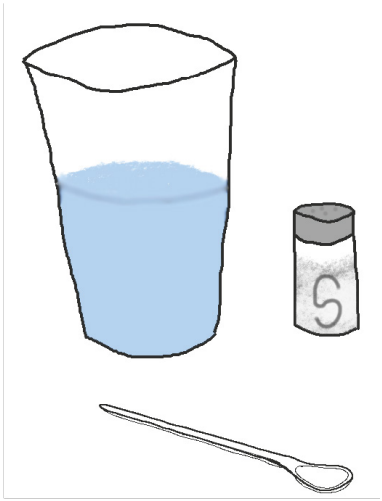
Did you know that the ocean is very salty? It is always fun to do experiments with water. We are going to show you how to conduct an ocean experiment which you can try at home. In this experiment, you will find out what happens when you place objects in salt water like what is found in the ocean versus fresh water. What do you think will happen if you place a ball in salt water? We will find out the answer in this interesting salt and water experiment.

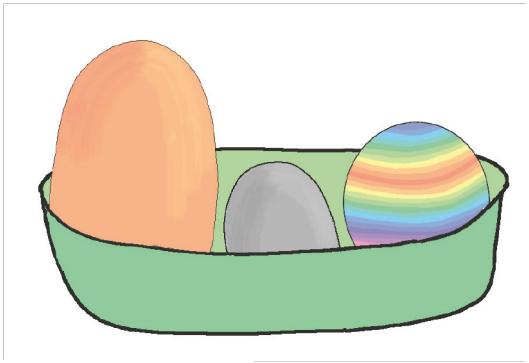
MATERIALS:

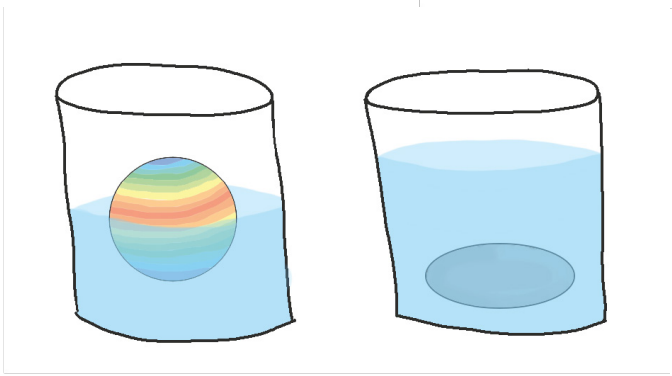
- 2 cups
- Salt (2 oz)
- Spoon
- Small bar of soap
- Various balls (that will fit in the cup)
- Paper / Pen to write down your observations
- Water

INSTRUCTIONS:

1. Fill both cups with water about to 3/4 full.
2. Add the salt to one cup and stir with a spoon.
3. Continue to mix the salt until is almost all dissolved.
4. Take one of the balls and make a prediction whether it will float or sink in the tap water vs. the salt water.
5. Place the ball in both and record your results.
6. Repeat with the other balls.
7. Now try the experiment again with a small bar of soap.







WHY DID THE OBJECTS FLOAT IN SALT WATER?

The objects floated in the salt water because salt water is heavier than fresh water. Lighter objects will float in both the tap water and the salt water, but slightly heavier objects will sink in the tap water and float in the salt water. If objects are very heavy, they will sink in both tap water and the salt water.

WATER CYCLE

WATER CYCLE IN THE GLASS

Do you know that all of the water on Earth is recycled through the water cycle? When the sun shines on oceans, rivers, lakes, streams and ponds, some amount of water changes into water vapour (gas). When water changes from a liquid state to a gas the process is called **evaporation**. After water evaporates, it rises into the air. The warm vapour in the air mixes with cooler air in the atmosphere to create moisture through a process called **condensation**. The moisture comes back to the earth as rain, hail, sleet, or snow through a process called **precipitation**. When the rain, hail, sleet, or snow reaches the earth, it returns to oceans, rivers, lakes, streams, ponds and wetlands or is absorbed into the ground. The movement of water from rivers, lakes, streams and ponds on Earth into the atmosphere and back to Earth is called the water cycle. This is nature's way of recycling one of its most important natural resources in the world. You can see how the water cycle works by doing an experiment called the water cycle in a glass.

WHAT YOU NEED:

- Glass jar
- Small Cap
- Small stones
- Sand
- Soil
- Few small plants

INSTRUCTIONS:

1. Place the small stones at the base of the glass jar.
2. Cover the stones at the base of the glass jar with sand.
3. Fill jar with soil until half full.
4. Place a few small plants in the soil.
5. Fill the small cap with water and place next to the plants.
6. Cover the glass jar tightly with polythene.
7. Place the covered glass jar in the sun for a few days.

QUESTIONS:

1. What do you think will happen to the contents of the glass jar after a few days in the sun?
2. Did moisture appear through condensation?
3. Where did the condensation take place?
4. Why did condensation take place?
5. What happened to the plants?
6. How does the water cycle affect living things?

WATER CYCLE IN A BAG EXPERIMENT

The "water cycle in a bag" is a very simple experiment which is to be done **under adult supervision**. Here you will see the various steps of the **water cycle process** up close.

MATERIALS:

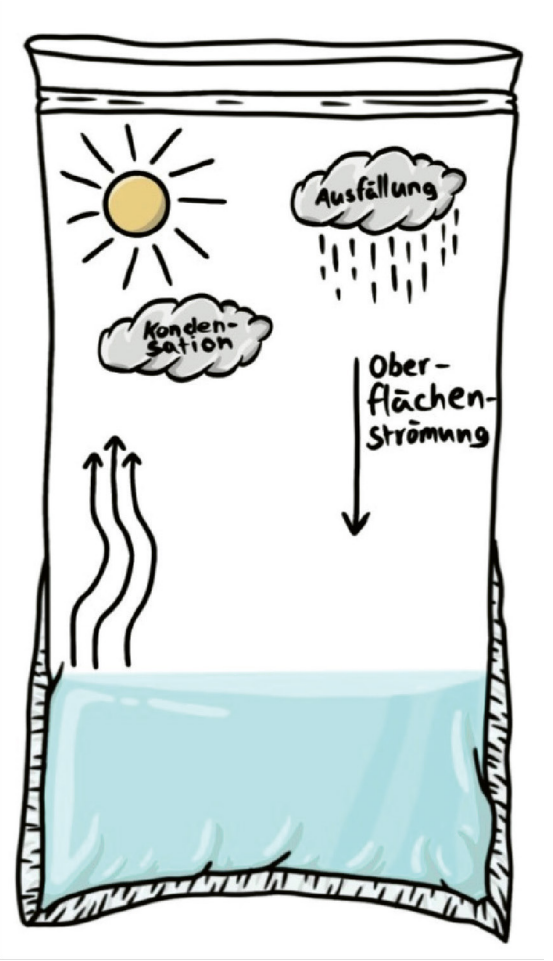
- Zip-lock plastic bag
- Permanent markers
- Water
- Packing tape

INSTRUCTIONS:

1. Draw a diagram of the water cycle on a zip-lock plastic bag.
2. Warm up water to a point where steam comes out (**under adult supervision**).
3. Add blue food colour to the water.
4. Pour the blue coloured water into the zip-lock bag and zip it up.
5. Place the zip-lock bag filled with the blue water up right at a safe spot near a window.
6. As the water in the zip-lock bag turns into water vapour and rises (**evaporation**), patches resembling clouds form at the top part of the zip-lock bag.
7. As the water vapour (gas) cools it changes back into water (**condensation**) inside the zip-lock bag.
8. The condensed water vapour appears as droplets (**precipitation**) in the zip-lock bag.

8 The water droplets slide downwards in the zip-lock bag in a process that resembles the stage of the water cycle that sends water back into streams, rivers and the sea.

8 The water cycle is the process of evaporation, condensation, and precipitation which allows the flow of water into the rivers and seas.



GO WATCH OUR VIDEO
ABOUT WATER CYCLES!

WATER PURIFICATION

EXPERIMENT ON WATER POLLUTION

Rivers, lakes and oceans are homes to beautiful animals. Dirtying the rivers and oceans with plastics and oil will destroy the habitat of these beautiful animals. This experiment will show you how humans are destroying the homes of beavers, otters, frogs, whales and other animals.

MATERIALS:

- Plastic container
- Water
- Oil
- Cocoa powder
- Cotton balls
- Plastic mini boat
- Plastic animals
- Plastic plants
- Small stones
- Toothbrush
- Plastic lids
- Plastic caps
- Strips of Paper
- Dirt
- Straws
- Tongs
- Strainer
- Trash bag
- Sponge

INSTRUCTIONS:

1. Fill the plastic container halfway with water.
2. Add clean stones and plastic plants to the water to create a nice habitat (home for the animals).
3. Add the plastic animals and the boat to the water.
4. Add plastic caps, plastic lids and straws to the water in the container.
5. Mix the oil with cocoa powder to make your own crude oil.
6. Pour the oil into the boat to have a tanker carrying crude oil.
7. Tip the boat over to spill the crude oil into the water.

CLEAN UP PROCESS:

- Which materials will you use in cleaning up the plastic?
- Do you think the spoon can clean the oil? Try it!
- Do you think the sponge can clean the oil? Try it!
- Do you think the paper towel can clean the oil? Try it!
- Do you think the cotton balls can clean the oil? Try it!
- Which was easier to clean up: the plastic materials or your crude oil?
- Do you know what will happen to animals and plants if water is polluted?

DID YOU KNOW...?

Do you know that dumping plastics, oil, and untreated sewerage in rivers, lakes and seas destroy the homes of my friends the dolphins, turtles, fishes, whales, sea horses and so many other animals? Say NO to water pollution to save us!

WATER FILTRATION EXPERIMENT

CAN YOU CLEAN WATER?

Playing with water can be fun and you can learn so many things. Do you know how important it is to have clean water? This awesome fun experiment will teach and help you understand how the natural filtration systems work.

MATERIALS:

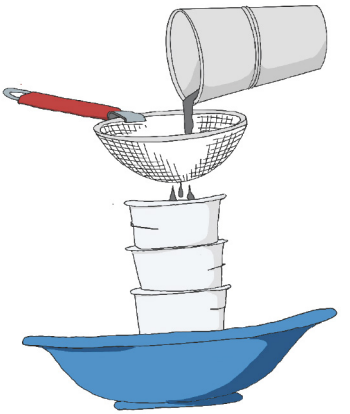
- Plastic cup with a hole at the base
- 3-4 Coffee filters
- 2 Glass jars
- Sand
- Gravels
- Dirty water

INSTRUCTIONS:

1. Fill one jar with dirty water.
2. Make a hole in the plastic cup.
3. Line the base of the plastic cup with 3-4 coffee filters.
4. Place a layer of sand on top of the coffee filters.
5. Place a layer of gravels on top of the sand.
6. Place the cup onto the empty jar.
7. Pour the dirty water into the cup in the empty jar.

QUESTIONS:

1. Is there less dirty water in the cup?
2. Where did the dirt go?
3. Is there water in the jug under the cup?
4. Why did water come from?
5. Is the water cleaner than the dirty water?
6. Do you see anything in the coffee filter?
7. Where did it come from?



WHAT IS GOING ON?

As the water moves through the sand, gravel and coffee filters, dirt including twigs, leaves, grass, grit and gunk is trapped while water slips through. The more and finer the layers of filters the longer it takes for water to move through the filter and the cleaner the dirty water gets. Even though the filtered water looks clean, it is not clean enough to drink. You will know why it is not safe to drink the filtered water in the water quality experiment.

WATER QUALITY EXPERIMENT

There are several reasons why water has to be tested. By sight, water may appear very clean but yet it may contain minerals, chemicals, germs and toxins, which the eye cannot see. These minerals, chemicals, toxins and germs, affects pipes, water heaters, laundry, shower pressure, fish, wildlife and human health. This experiment will teach you how you can use water-testing kits to easily know if water contains pollutants or not.

MATERIALS:

- A water test kit
- Three glass jars or cups 33
- Purified water
- Tap water
- Fresh water from a river, lake or a stream
- Pencil
- Note book

INSTRUCTIONS:

1. Fill the three glass jars with purified water, tap water and fresh water from a river, lake or a stream.
2. Insert a test strip into the water in each of the three glass jars.
3. Note the colour change on the test strips.
4. Compare the colour change on the test strips to the colours on the included chart.
5. What can you say about the quality of water in the three glass jars?

WHAT DO WATER QUALITY TESTING RESULTS MEAN?

Water quality testing results gives you an idea of the levels of minerals, chemicals, germs and toxic substances in a sample of water at a given time. The levels of pollutants in a water sample can let you know if there are problems with your water source or problems in your plumbing system. If the test results are too high, you should call your local water supplier.

WHAT IS IN THE WATER?

NITRATE:

Nitrates come from fertilizer used in farming. It is important to test for nitrates in water because it can cause eutrophication in rivers, lakes and streams making them very green. The rivers and streams become green because green algae grows very quickly in water with a lot of nitrate.

HARDNESS:

Minerals, particularly calcium and magnesium cause hardness in water. The more minerals, the harder the water. Hardness in water can cause spots on your dishware, can leave solid deposits behind on showerheads and water heaters. Water hardness can also reduce the efficiency of water heaters and builds up in pipes eventually slowing the flow of water.

ALKALINITY:

This is a measure of water's ability to neutralize acids. Alkalinity helps to balance pH levels and to neutralize water pollution caused by acids. Monitoring alkalinity is important because it can affect fish, frogs and other animals that live in water.

pH:

pH is a measure of how acidic our basic water is. Water with a low pH would be more acidity and leak metals and chemicals from the pipes into the water. It could make the water have higher levels of toxins and a sour taste.

IRON:

Too much Iron in water may cause cloudiness and a bad smell. When exposed to air, iron in water can cause red staining and discoloration. Iron build up in pipes can lower the water pressure and increase water bills.

HOMEMADE WATER PURIFIER

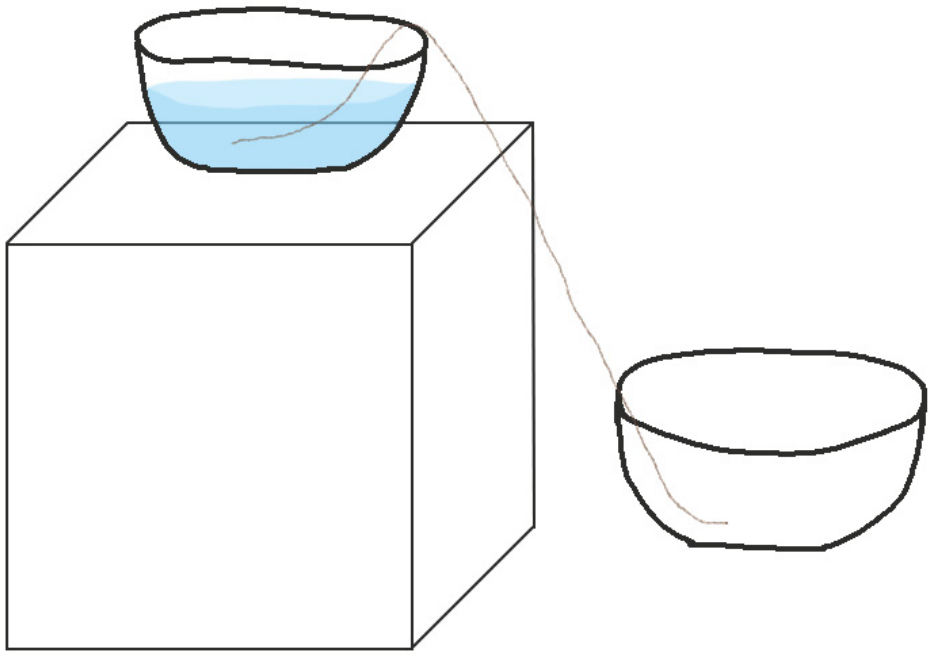
In this simple but interesting experiment, you can make your own homemade water purifier and see how suspended matter can be filtered from water which is an important natural process.

MATERIALS:

- Eight-inch tall cardboard box
- Two bowls
- Water
- Dirt
- Wool yarn

PROCEDURE:

1. Set an eight-inch-tall cardboard box on a table.
2. Place a bowl of clean water on top of the box.
3. Gently drop a small amount of dirt into the bowl of clean water to discolour the clean water.
4. Twist together several one-foot strands of wool yarn to make a rope.
5. Place an empty bowl on a table at a lower height to the bowl on the cardboard box.
6. Place one end of the rope made of wool yarn into the bowl of dirty water.
7. Place the other end of the rope made of wool yarn into the empty bowl.
8. Note what happens after a while to the empty bowl.



DO YOU KNOW WHAT IS HAPPENING?

The rope made of wool yarn absorbs water and draws clean water from the bowl of dirty water into the empty bowl. The dirt is left behind in the bowl containing the dirty water as the clean water drips into the second bowl.

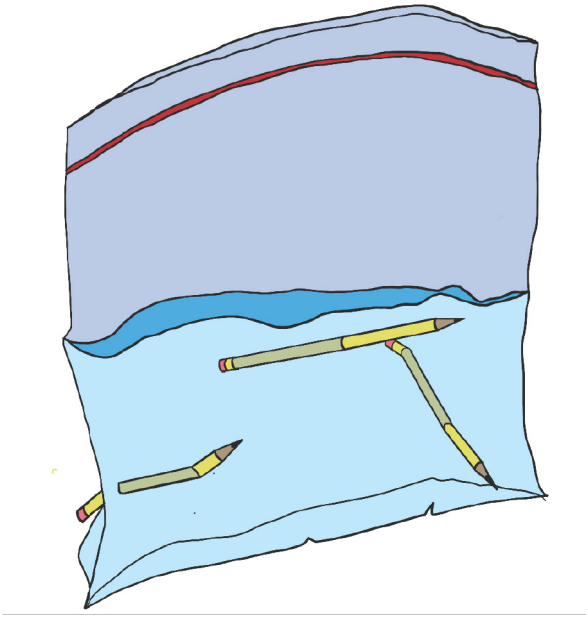
LEAK PROOF BAG

MATERIALS:

- 1 empty storage bag
- Water
- Pencil

METHOD:

1. Take a large storage bag and fill half of it with water.
2. Poke a pencil straight through the bag – in one side and out through the other side.



The water will not leak from the bag. Why is this? This is because the material of the bag is made of polymer. Now repeat the experiment with many pencils. What do you see? Will the water leak now?

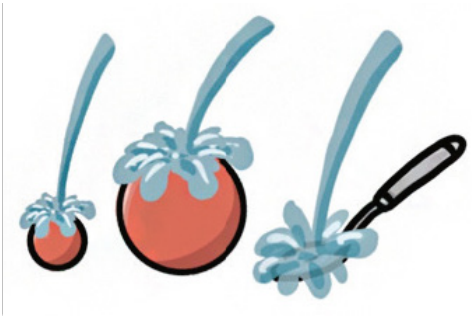
FLUID MECHANICS EXPERIMENT

DIRECTION OF WATER FLOW EXPERIMENT

What happens when water touches a curved surface? You will find out by doing this simple experiment which you can try at home.

MATERIALS:

- Water
- Spoon
- Various balls of different sizes or shapes



INSTRUCTIONS:

1. Take a spoon and turn it so that the curved back side of the spoon is facing up.
2. Open the faucet slightly so that the water is flowing gently onto the spoon.
3. Observe the direction of flow of water.
4. Turn the spoon the other way and observe the direction of flow of water.
5. Take other curved objects like balls of different size and shape and repeat the experiment.

Which direction does the water flow? The water flows along the surface of the curved objects because it needs a solid surface to travel from one point to another.

VISCOSITY EXPERIMENT

It is so annoying when the ketchup bottle is almost empty and you have to keep hitting the bottle to get the last bit out. Why do you have to hit the bottle to get the ketchup out? The answer is that ketchup is thick. Different liquids have different thicknesses, follow this fun experiment to see which liquid is the thickest.

MATERIALS:

- Glass jars or medium-sized glasses
- Stopwatch
- Various liquids (water, milk, ketchup, oil, any type of juice, milkshake)

METHOD:

1. Take an empty glass and place it on a small table.
2. Have water, milk, ketchup, oil, any type of juice and milkshake available.
3. Pour some water gently along the side surface of the glass, and at the same time, start the timer on your watch.
4. Record the time it takes for the water to reach the bottom of the glass.
5. Take another glass of equal volume and this time, instead of water, pour some other liquid into it and note the time it needs to reach the bottom.
6. Repeat the experiment with all the other liquids.

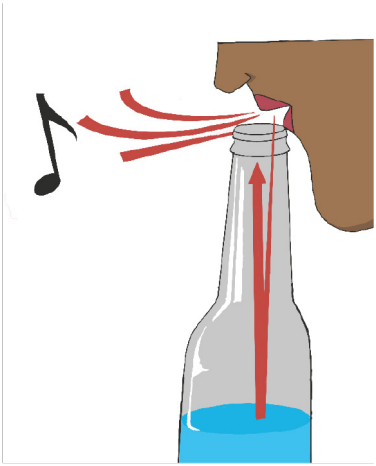
?

Which liquid takes the longest time? You will find out that ketchup takes the longest time to reach the bottom of the glass. Why is this? This is because ketchup is the thickest of all the liquids.

MAKING MUSIC WITH WATER

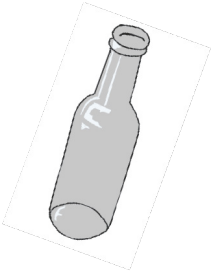
MATERIALS:

- Several empty glass bottles with a tight bottleneck
- Water



AND NOW?

1. Fill each bottle with a different level of water.
2. Blow from the side into the bottle openings.
3. Listen! Do you hear different sounds when blowing into the bottles with different water levels inside?
4. Try to play a sound, a musical scale or even try to perform a song.



BACKGROUND:

The bottleneck captures the air swirl from your blast. Due to the shape of the bottle, the air flow vibrates and a sound is created. Many wind instruments work according to this principle, too! The more water there is in the bottle, the less space the air has to swirl. Therefore, the tone in the fuller bottles is higher. When the bottles are empty, the air has more room to swirl. The tones are then deeper. Did you also hear it that way?

Try it a few more times. Maybe the angle at which you hold your mouth against the bottle wasn't right. Change it and try it again.

WATER BALLOON PARACHUTE

Want to play with something fun outside your home, in the garden? Then try this simple water balloon experiment.

MATERIALS:

- Water
- Balloon
- Shopping bag (any size)

METHOD:

1. Take an empty balloon and fill it with some water and tie it.
2. Loop the tied end of the water balloon around the handles of the shopping bag and tie it again.

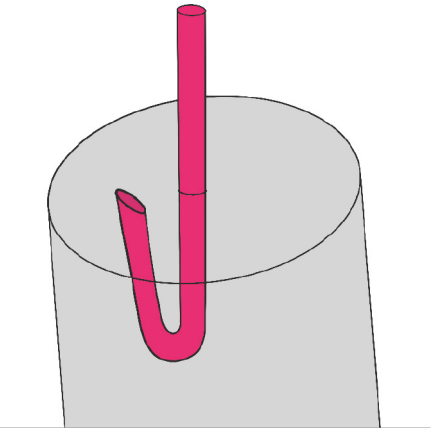
Now go and play with it! Throw it up, watch the balloon expand, try to catch it when it comes down.

PYTHAGORAS CUP

Want to do a fun experiment to see what happens to water when it is poured through 2 vertical cups with a straw in the middle? This setup is called the Pythagoras Cup, and it is easy to do.

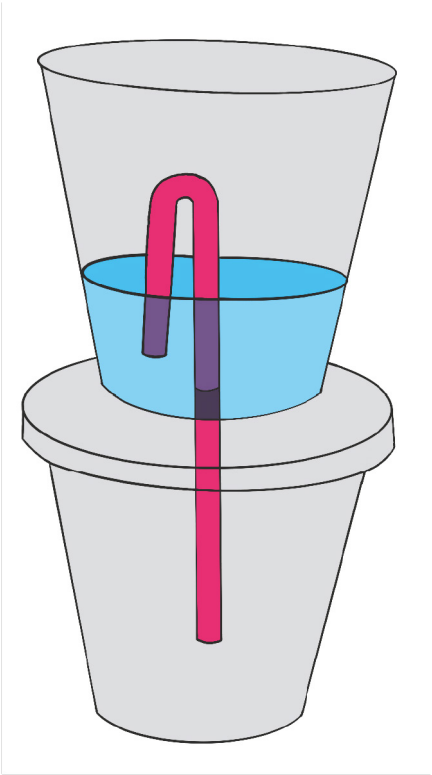
MATERIALS:

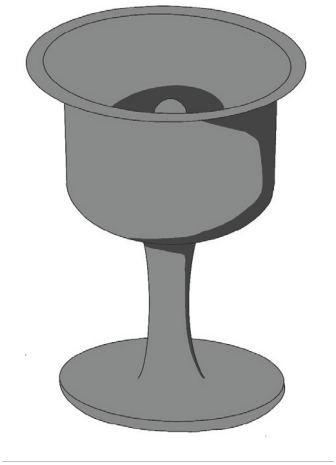
- 3 plastic cups
- Water
- 1 long straw
- Glue
- Scissors
- Food colouring



INSTRUCTIONS:

1. Take a straw and cut the end nearest to the bend at an angle.
2. Cut the tip off the pointy side.
3. Bend the straw.
4. Take one plastic cup.
5. Using a pen or scissors, make a small hole at the bottom of the cup.
6. Put the straw through the hole. It should fit exactly.
7. Push the straw through the hole until the bendy side of the straw is inside the cup.
8. Attach the flat end of the bendy side to the bottom of the cup using glue.
9. Turn the cup upside down and cover the hole fully.
10. Make a small hole on the cup lid and place the cup lid on top of a second plastic cup.
11. Put the first plastic cup on top of the lid. The straw should go through the hole in the lid.
12. Take the third plastic cup and fill it with water.
13. Pour it into the top cup.





WHAT HAPPENS?

Repeat the experiment by adding food colouring to the water so you can see more clearly what is going on. Now repeat the experiment by pouring water into the bottom cup. What happens? Is there any difference?

HAVE A LOOK AT OUR VIDEOS!

WATER DISPLACEMENT EXPERIMENT

Have you ever read the story about the crow and the pitcher? Do you wonder how the crow ever got the water out of the pitcher? Let's try this simple experiment to understand.

MATERIALS:

- Plastic bottle
- Decorative pebbles

METHOD:

1. Take a plastic bottle (to make it look like the pitcher story, select a bottle with a neck).
2. Fill the bottle partly with water.
3. Collect some decorative pebbles and drop them one by one into the water.

Do you see the water level rising? Why do you think it is so? It is because the pebbles have a higher density than the water and settles at the bottom of the bottle. This pushes the water up. If you add enough pebbles, the water will even overflow from the bottle. To see if water always behaves like this, try dropping other things into the water and see what happens.

THE CROW & THE PITCHER

In a spell of dry weather, when the Birds could find very little to drink, a thirsty Crow found a pitcher with a little water in it. But the pitcher was high and had a narrow neck, and no matter how he tried, the Crow could not reach the water. The poor thing felt as if he must die of thirst.

Then an idea came to him. Picking up some small pebbles, he dropped them into the pitcher one by one. With each pebble the water rose a little higher until at last it was near enough so he could drink.

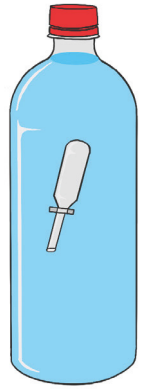
In a pinch a good use of our wits may help us out.

CARTESIAN DIVER

What is a Cartesian Diver? It is basically a little dropper which floats in a bottle of water. When you squeeze the bottle, the dropper drops down through the water, and comes back to its starting position when the sides of the bottle are released.

MATERIALS:

- Empty plastic 1-litre or 2-litre bottle with a cap
- Graduated pipette
- Hex nut (size depends on the size of the pipette)
- Scissors
- Sharpies to decorate your bottle and dropper



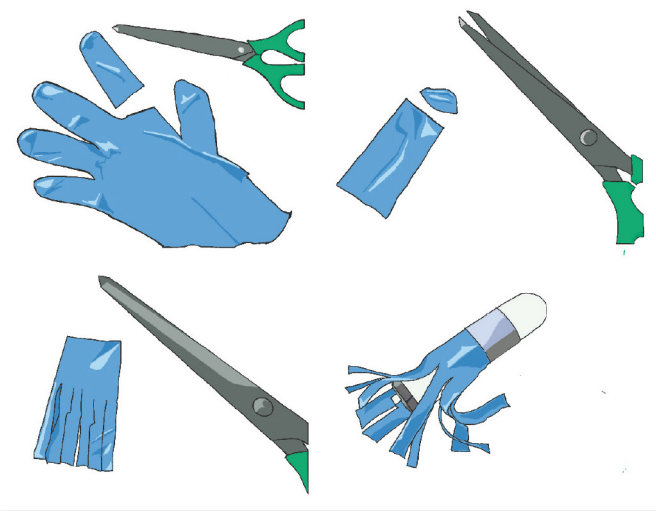
METHOD:

1. Cut off the bottom of the pipette, leaving around 2 cm.
2. Over the remaining portion of the pipette, insert a hex nut. If the nut is too loose, you can secure it with some electrical tape.
3. Fill your bottle with water.
4. Take a small cup of water. Place the dropper (diver) in the cup of water and squeeze the bulb to fill the pipette with some water. Let it go in the cup. If the diver sinks in your cup of water, squeeze out some water from the pipette until you get it to barely float.
5. Once you fill your pipette diver with water along with a bubble of air inside the top, drop it into your large bottle of water. Close the lid tightly. The cartesian diver should float in the bottle.
6. Squeeze the sides of your bottle. Your diver should go down. When you release the sides of the bottle, your diver should go back up.
7. Use coloured sharpies to decorate the outside of your bottle like an ocean. Be creative!

If the experiment doesn't work, then re-do the experiment by squeezing the bottle to get your diver out of the bottle, and repeat step 4 to step 6 until you get it right.

You can even make your diver into a squid if you want to.

1. Cut off a finger off a plastic glove. Cut off the top of the finger to create a sleeve.
2. Use sharp scissors to cut some legs along the bottom of the sleeve.
3. Slip it over your cartesian diver. Seal it with electrical tape.
4. Repeat steps 4 through 6 from above.



Try putting more than one cartesian diver in your bottle. What happens?
Repeat the experiment using different size bottles. Do they all work the same?
What happens when you fill your bottle with a mixture of water and another liquid? Does the diver work the same?
Extend your learning by trying all these and see what happens.

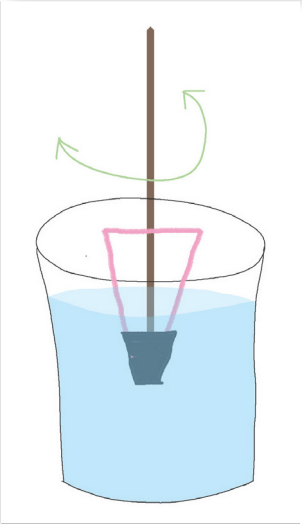
MORE COOL VIDEOS!

WATER PUMP

Want to play with water and make a mess at the same time? Here is how to do it.

WHAT YOU NEED:

- Plastic cup
- Water
- Pencil
- Straw
- Scissors
- Tape



INSTRUCTIONS:

1. Take a plastic cup and fill it half with water.
2. Take a straw and, using a pencil, make a hole in the centre of the straw and insert the pencil through it.
3. At around 1-2 cm from the centre on both sides, make a small cut with the scissors.
4. Bend the straw so that both the ends of the straw touch the pencil tip.
5. Attach all the 3 ends together by using tape.
6. Now dip it in the plastic cup and start rotating it and watch as the water splashes everywhere.

Why does this happen? The answer is because when you start rotating the cup, you create pressure in the water. So the water is forced to move out. What is the end result? The water splashes everywhere like a fountain. You can even invite your friends and try to play this with them.

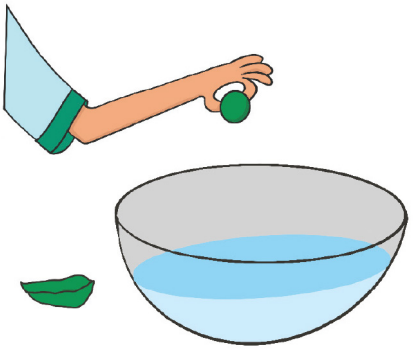
WHY AND HOW CAN A BOAT FLOAT?

MATERIALS:

- Water
- Modelling clay
- Bowl

AND NOW?

1. Form two equal balls with the modelling clay.
2. Form a boat out of one ball. (Press the sides upwards)
3. Fill up the bowl with water and place the ball and the kneaded boat on the water.
4. Observe what happens.



BACKGROUND:

Your ball and ship weigh the same. However, your ship is empty inside. This displaces a lot more water than your ball does. Therefore, the weight of the ship is spread out over a much larger space.

Whether an object floats or sinks does not only depend on whether it is lighter or heavier than an equal body of water but also its external shape is important. If an object is shaped and able to push more water to the side than it weighs itself, then it can swim.

FLOATING PEEP BOATS

It is soon going to be Easter time and what better way to make a fun experiment than with Easter peeps?

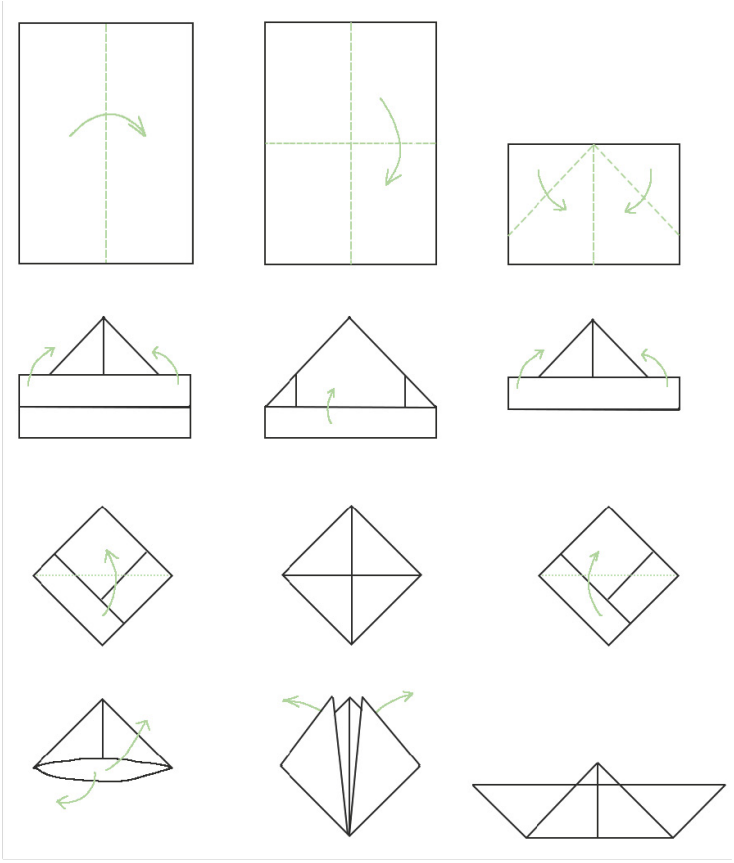
MATERIALS:

- Marshmallow bunny peeps
- Toothpicks
- Card stock paper
- Scissors
- Tape
- Container of water

METHODS:

1. Make triangle sails out of the card stock paper. You can make them from different materials and different sizes if you want.
2. Using tape, attach a toothpick to the sail.
3. Insert the sail and toothpick into the peep. Try inserting into various positions into the peep.
4. Fill a container with water.
5. Place the floating peep boats into the water container and let them float.
6. See which ones turn over, which ones stay afloat, which ones move forward, etc.

HOW TO FOLD YOUR OWN BOAT



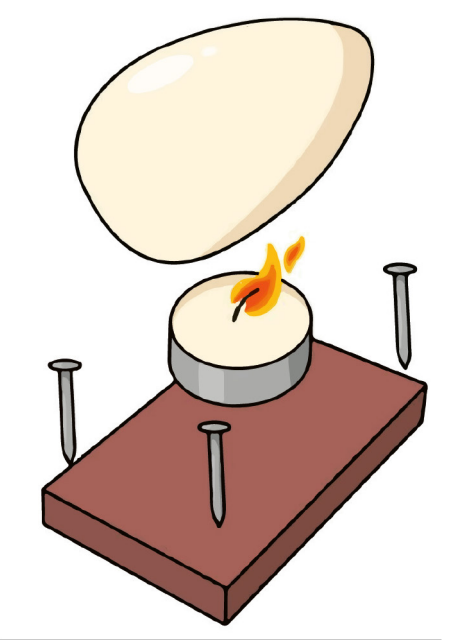
HERE YOU CAN FIND FOLDING SHEETS FOR YOUR BOAT!

BOAT IN THE TUB

In this fun and creative experiment, you can create a boat which you can propel by using just steam and make it swim in your bathtub! This experiment has to be done under strict adult supervision.

MATERIALS:

- Wooden board
- Candle
- Punctured egg
- 4 long nails
- Hammer
- Glue



METHOD:

1. Take a wooden board and hammer in 4 long nails.
2. Make a mini boat or take one of your toy boats.
3. Puncture an egg and remove its content, fill it with water and seal the hole in the egg with glue. Now carefully place the filled egg on the nail rack.
4. Place the candle underneath, light the candle and put the wooden board in the bathtub filled with water.
5. Wait a little while.

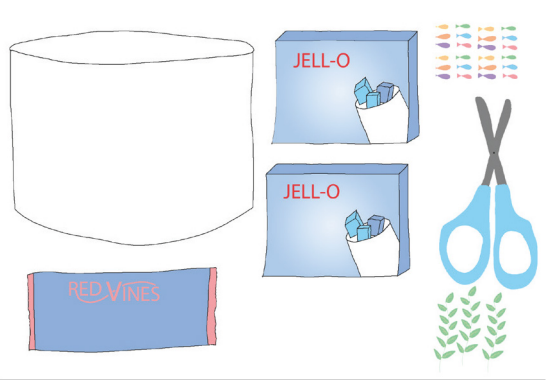
OCEAN ECOSYSTEM DESSERT

Everybody loves desserts. I guess you are already dreaming of some yummy desserts made of cakes, custards, ice creams, puddings, gelatines, tarts and pastries. We are going to learn how to prepare a very yummy dessert that looks like an ocean ecosystem. Do you know what an ecosystem is? An ecosystem is a place where living things also called biotic factors (plants and animals) as well as non-living thing also called abiotic factors (rocks, sand, water and soil etc.) live together and interact with each other. Can you name some living and non-living things in an ocean ecosystem? You can answer this question by thinking about animals in the sea. Examples of living things you can find in an ocean ecosystem are sharks, dolphins, whales, turtles, seahorses, sea lions, lobsters, crabs, fishes and coral reefs. Examples of non-living things you can find in an ocean ecosystem are rocks, sand, oxygen, nutrients, sunlight and temperature. With this yummy dessert activity, you can learn to make your cool and tasty ocean ecosystem at home.

WHAT YOU'LL NEED:

- A large, clear bowl
- Liquid measuring cup
- Scissors
- Spoon
- Hot water
- Cold water
- 6z of blue gelatine dessert mix

- Red licorice twists
- Gummy fish
- Gummy coral reefs
- Mint plant with leaves



PROCEDURE:

STEP 1: "MAKING THE OCEAN"

1. Pour the 2 boxes (6 oz) of blue gelatine dessert in a clear bowl.
2. Add 2 cups of hot water to the bowl containing the gelatine (under adult supervision).
3. Stir the mixture of water and gelatine for 2-3 minutes.
4. Add 2 cups of cold water after the gelatine dissolves in the hot water (under adult supervision).
5. Place the bowl with gelatine mixed with hot and cold water in a refrigerator for 45-60 minutes to allow the gelatine to become thick and slightly firm.

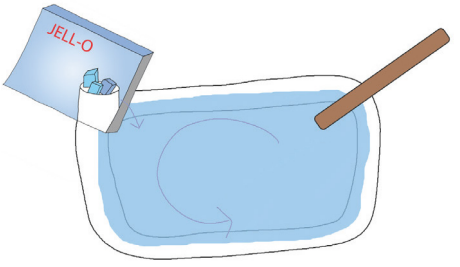
STEP 2: "MAKING THE CORAL REEFS"

1. Cut the red licorice strips into the length of your middle finger
2. Cut the mint plant into 2-3 inches long pieces

STEP 3: "ASSEMBLING THE OCEAN ECOSYSTEM"

1. Place the coral reefs made from licorice, the mint (seaweed) and gummy fish and things in the Katjes oceania pack firmly in the thick blue gelatine ocean in the bowl.
2. Place the gelatine back in the refrigerator for 2-3 hours.
3. Allow the gelatine to become totally firm
4. Your yummy ocean-ecosystem dessert is ready!

1)



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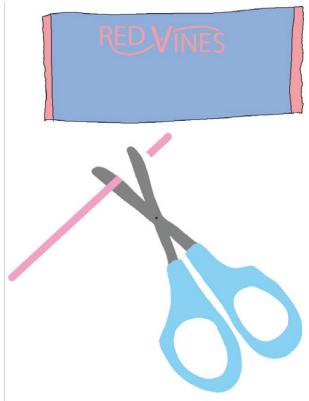

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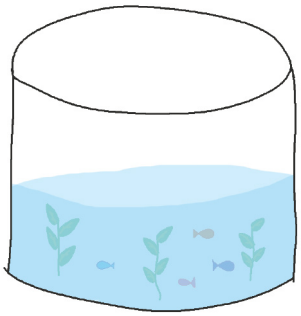
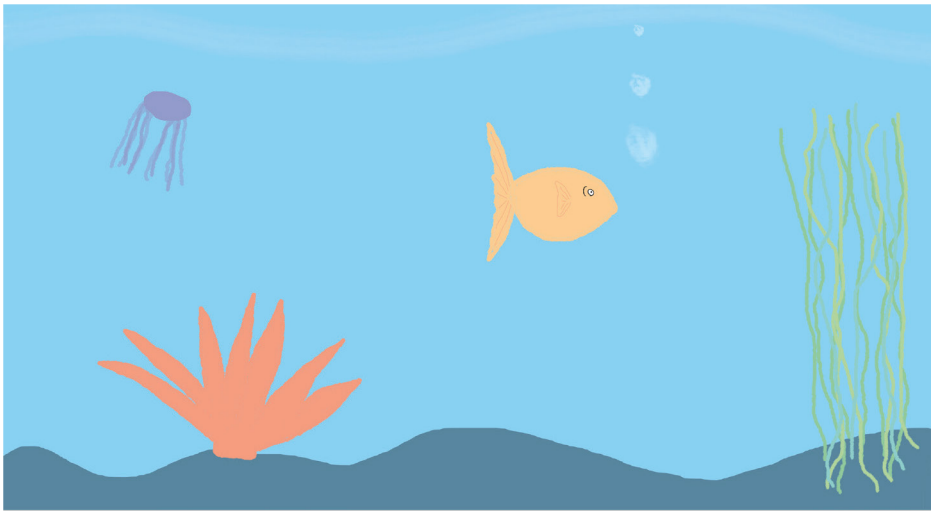


Try answering these questions before eating your yummy ocean ecosystem dessert.

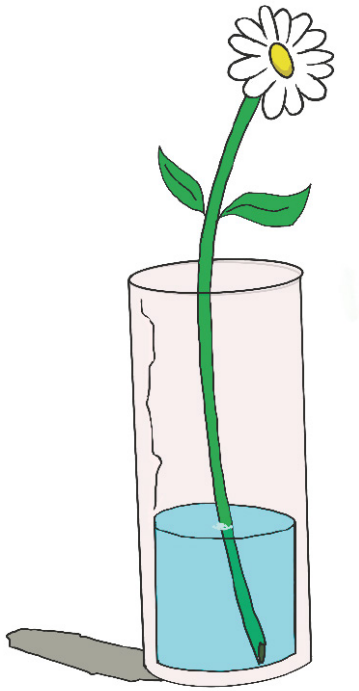
1. How do plants in an ocean ecosystem make their food?
2. What food does the very small fish in an ocean ecosystem eat?
3. What food does the shark in an ocean ecosystem eat?
4. What will happen to the animals in the ocean when humans dirty it?



WATER MAIN IN PLANTS

MATERIALS:

- Glass
- Ink
- Flower with white blossom (e.g., marguerite) or a plant with a transparent stem (e.g., impatiens, busy Lizzie)



AND NOW?

1. Fill the glass with water and colour it with the ink.
2. Place your flower in the glass.
3. Wait and write down what happens.
Tip: You can take a closer look with a magnifying glass.

TIDE POOL EXPERIMENTS

MATERIALS:

- Dish pan or plastic bin
- Lots of rocks and stones (different sizes and shapes)
- Mini toy creatures
- Water

INSTRUCTIONS:

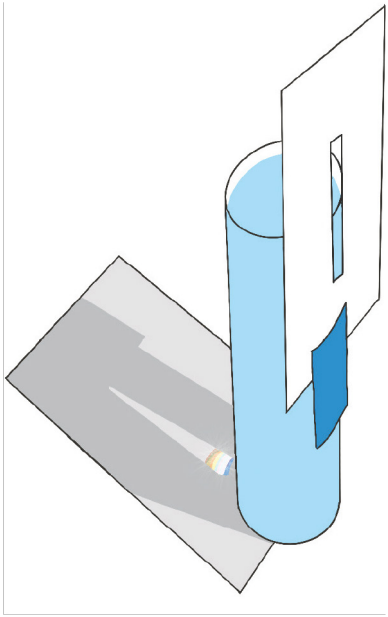
1. Fill your pan or bin with rocks. Arrange them so that there are different levels of rocks in your pan, creating a tide pool.
2. Place your mini animals in the tiny pool model.
3. Ask the kids which animals should be fully underwater.
4. Add water to the pan one cup at a time until high tide is reached. Notice how all animals are underwater during high tide.
5. Remove water one cup at a time until low tide is reached. Notice how most animals are above water at low tide.
6. Now play with it adding different amounts of water and see what happens!

MAKING RAINBOWS WITH A GLASS OF WATER

Did you know that when you pass light through a glass of water, you can produce a beautiful rainbow? This simple experiment will help you create a rainbow using a glass of water and sunlight at home or in school.

MATERIALS:

- Glass of water
- Piece of white paper
- Sunlight



PROCEDURE:

1. Get a piece of white paper.
2. Make a hole in the middle of the paper.
3. Tape the white paper with the hole onto the side of clear drinking glass.
4. Fill the clear glass with water to the brim.
5. Place the glass of water on a white floor or on a white piece of paper.
6. Allow the sun's rays to pass through the opening in the paper onto the surface of the water in the glass.

WHAT DO YOU SEE?

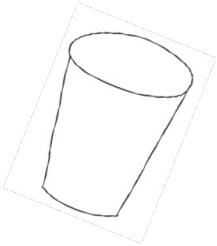
- Did a mini rainbow appear on the white paper?
- Can you describe the colours you see?
- Are the colours similar to the rainbows you see in the sky?

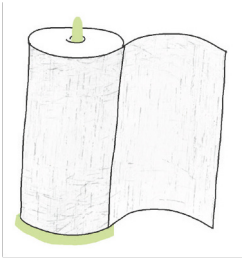
RAINBOW TRAVELING WATER EXPERIMENT

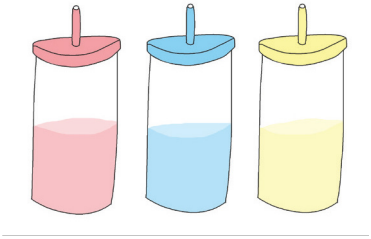
Did you know that water can 'travel'? I guess you would like to see water 'traveling' from one cup to another cup. Just as humans need a train, tram, car, bicycle or an airplane to travel from one place to the other, water also needs something to help it travel. Do you know what this is? It is a paper towel. In this experiment, you will get to know that water does not only flow in streams and rivers but can also travel on paper towels.

MATERIALS:

- Small plastic cups
- Paper towels
- Food colouring (Red, Blue and Yellow)
- Water

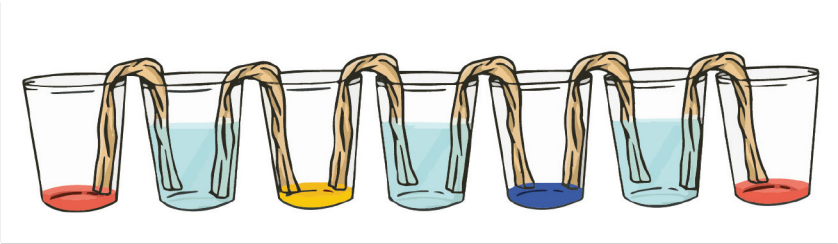






INSTRUCTIONS:

1. Place 7 cups in a row and fill the 1st, 3rd, 5th, and 7th cups with water.
2. Add 4 to 6 drops of red food colour into the 1st cup and the 7th cup.
3. Add 4 to 6 drops of yellow food colour into the 3rd cup.
4. Add 4 to 6 drops of blue food colour into the 5th cup.
5. Cut your paper towel into two halves.
6. Fold the half paper towel lengthwise and in half again lengthwise.
7. Place one half of the folded paper towel in the 1st cup and the other half in the 2nd cup.
8. Place one half of the folded paper towel in the 2nd cup and into the 3rd cup.
9. Continue placing folded towels in cups until you get to the 7th cup.



QUESTIONS:

1. What do you think will happen?
2. What do you see happening in the 1st cup to the 7th cup?
3. Has the water crawled up the paper towel?
4. Does the water travel down into the empty cup next to it?
5. Why did the water move against gravity?
6. Why do you think the colours are changing?
7. Do you see two colours mixing in the empty cups?

HOW RAINBOW TRAVELING WATER EXPERIMENT WORKS:

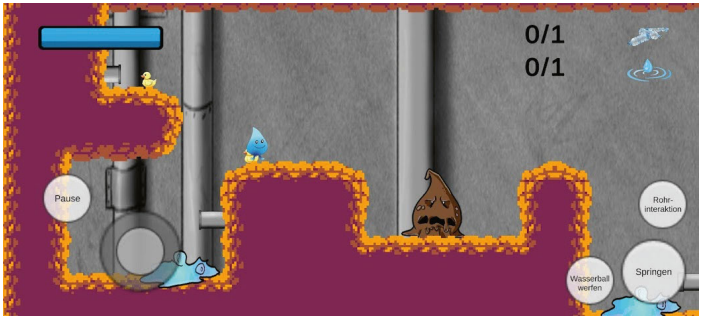
This traveling water experiment demonstrates two important properties of water namely **Cohesion** and **Adhesion**. Through cohesion, water molecules are attracted to one another, which makes them stick together. Through adhesion, water molecules are attracted to molecules of the paper towel. The water moves up the paper towels through a process called capillary action. The gaps in the paper towel act like capillary tubes and pull the water upward. This is what helps water climb from a tree's root to the leaves of the tree.

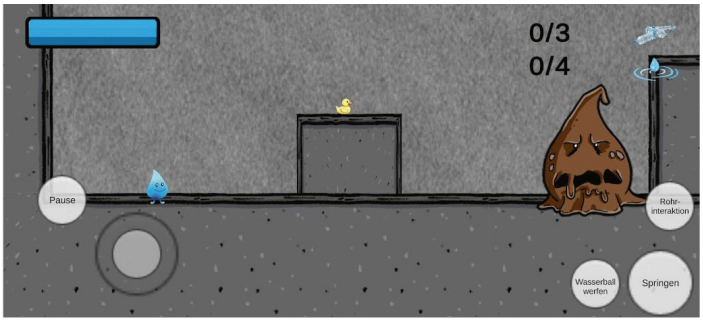
BLUPP THE WATERDROP

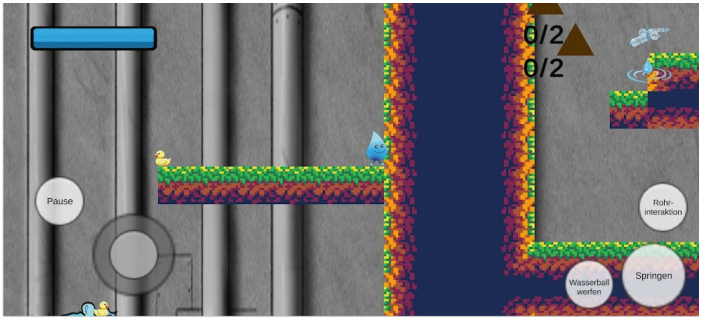
Do you know our app "Blupp the Waterdrop"? Here you can continue learning in a fun way on your smartphone.

What is it about?

Take Blubb the water drop through the water cycle of a sewage treatment plant. Let's go!





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