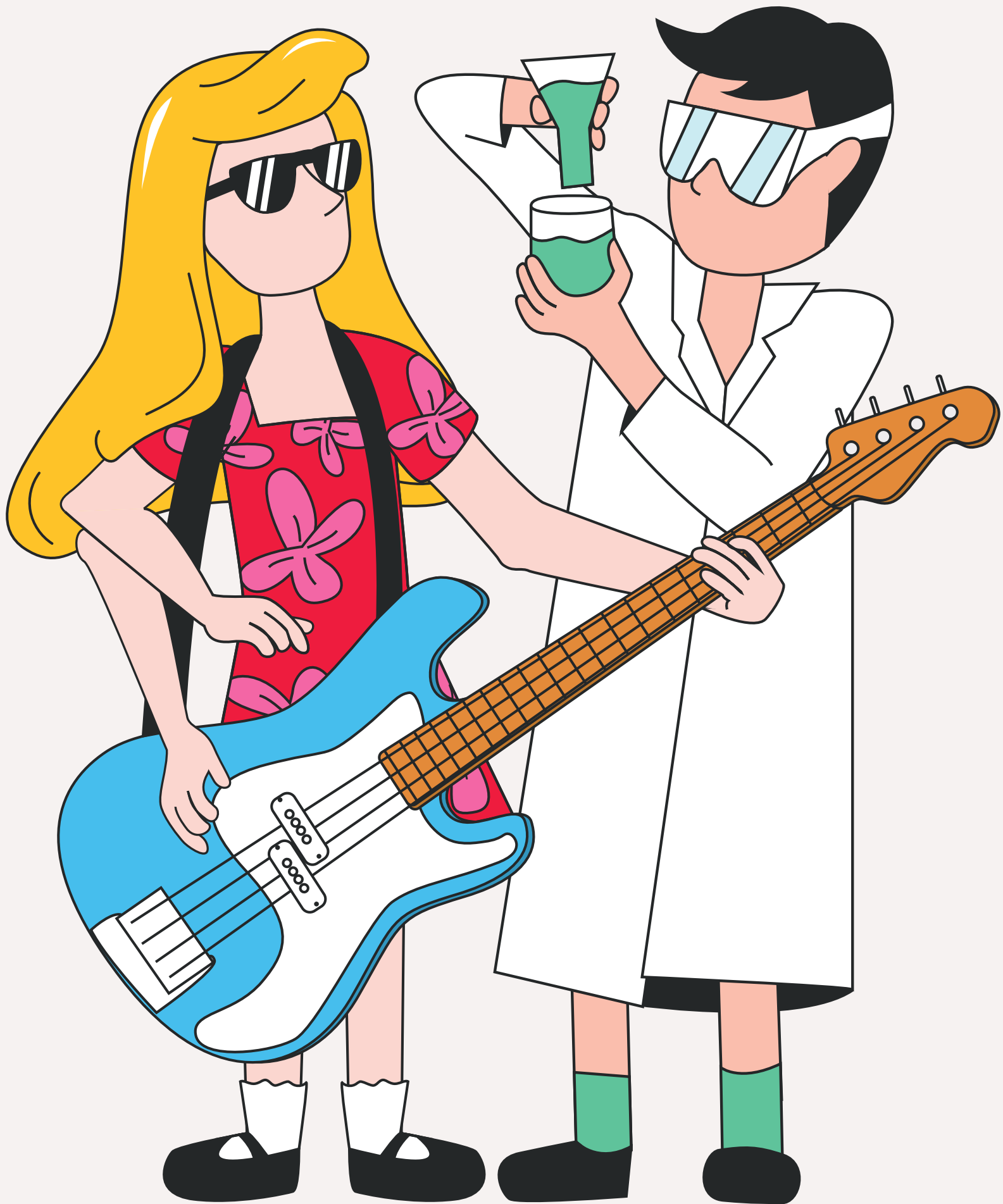


Glossobooks



Inquiring *Minds*

STEAM ACTIVITIES FOR CHILDREN

THIS IS A BOOK BY

Katerina Aspioti & Nadia Grigoriadou



Inquiring *Minds*

HANDS-ON STEAM ACTIVITIES

Inquiring Minds is an educational framework based on big questions, world exploration, science, and art. The principles of Inquiring Minds are related to cognitive development theories and the Montessori approach. This program aims to children aged 6-12, placing emphasis on learners' voice and choice. It is a content-based approach of language acquisition with hands-on activities and various resources chosen by the learners themselves.

Eleni Evangelidi is an English teacher and a researcher. She holds a BA (hons) in Psychology with a minor in Biology, the Trinity Cert-TESOL (level 5) teaching qualification and is currently completing a Master's of Research in Brain and Cognitive Sciences.

Danae Patsaoura is an experienced ESL/EFL teacher and teacher trainer. She has obtained her BA in English language and literature, minoring in linguistics, and her MA in Linguistics. She is currently undertaking a MSc in Child Studies.

Eleni and Danae are the designers and coordinators of the English language program Inquiring Minds.

Authors

Nadia Grigoriadou has studied translation in Corfu at the Ionian University, but after working as a translator for some years, she realized that what she was really passionate about was being with children, communicating, exploring, and asking questions about the world with them. She has worked in English language schools, primary schools, and kindergartens as an English teacher and a STEM instructor, exploring the world through play, experiments, constructions, the connection with nature and other cultures.

Katerina Aspioti has studied English Language and Literature and she is currently pursuing a MA in Technologies of Learning and Communication and STEAM Education. She has worked as an English teacher for more than 12 years, encouraging students to learn through play, experiments and creative activities. She believes that students learn best through their own curiosity and exploration.

This book was written with the help of the following teachers / co-authors:

Vicky Souitsmez

Eimi Koyios

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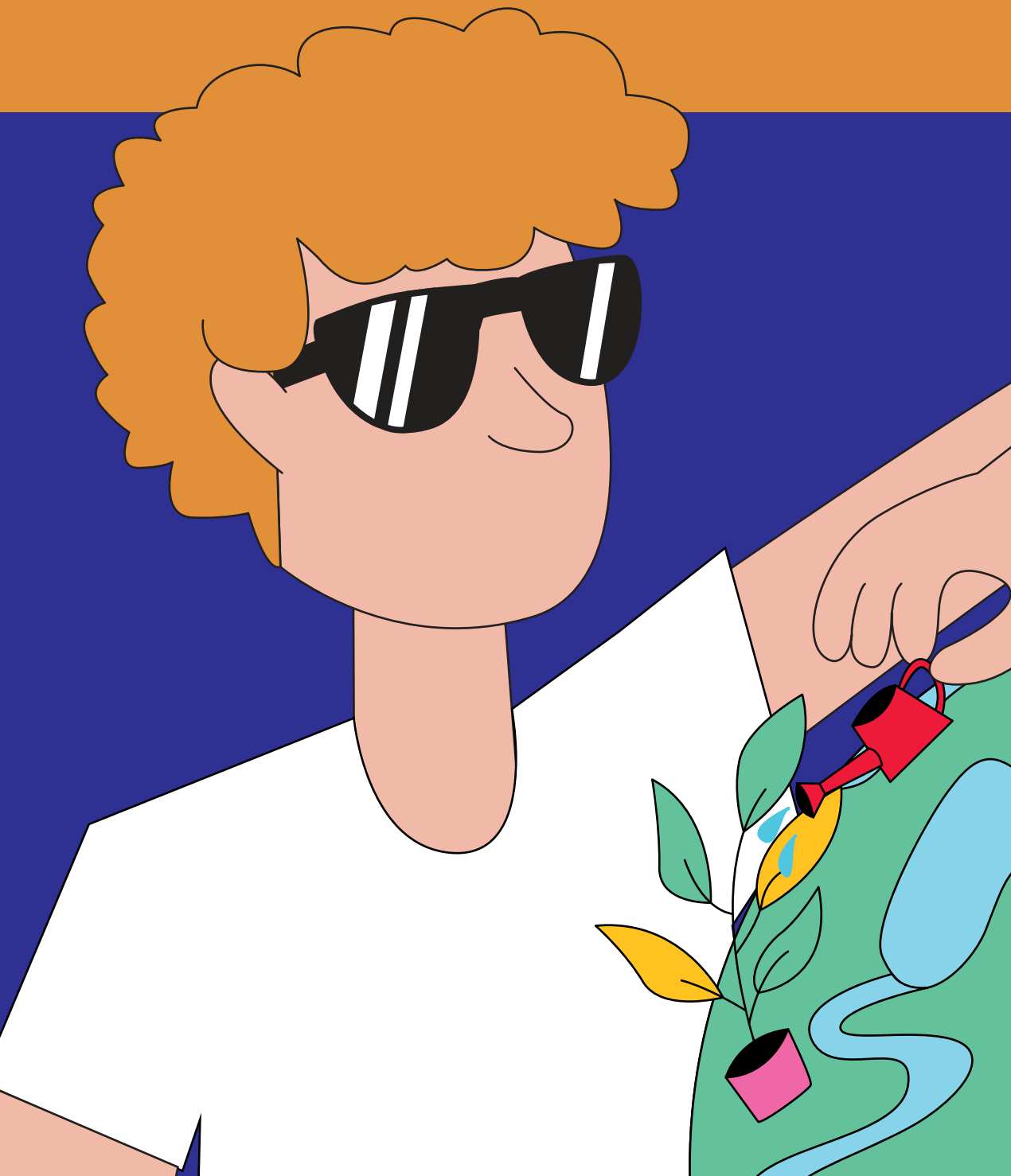
Why do we explore space?

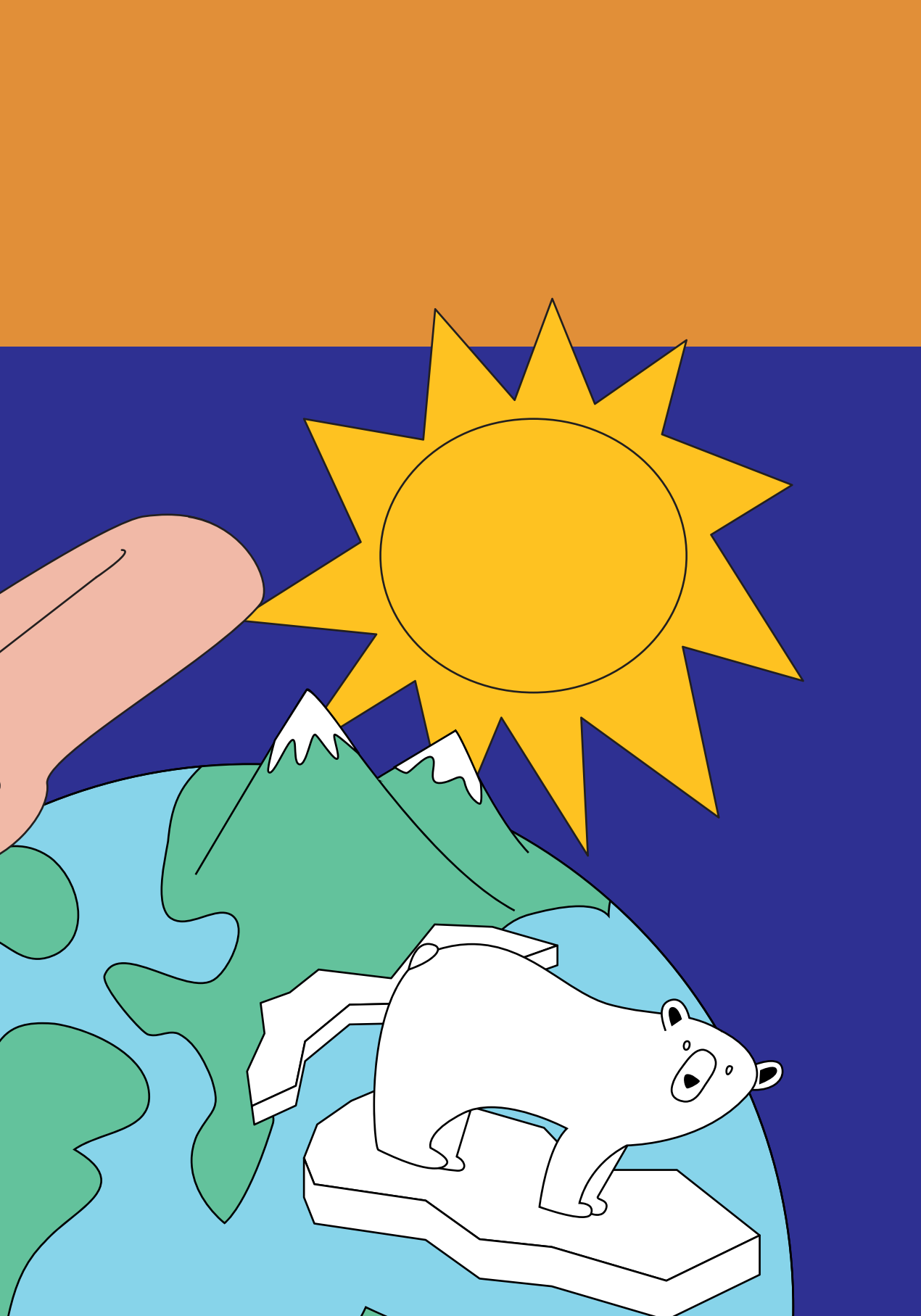
What is gravity?

Why do we only see one side of the moon?

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Earth our home





What is earth made of?

01

Think!

Have you ever felt the Earth shaking? What was it like? What did you feel? What do you think happened? Discuss in a group and write down your thoughts.

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Scan to watch

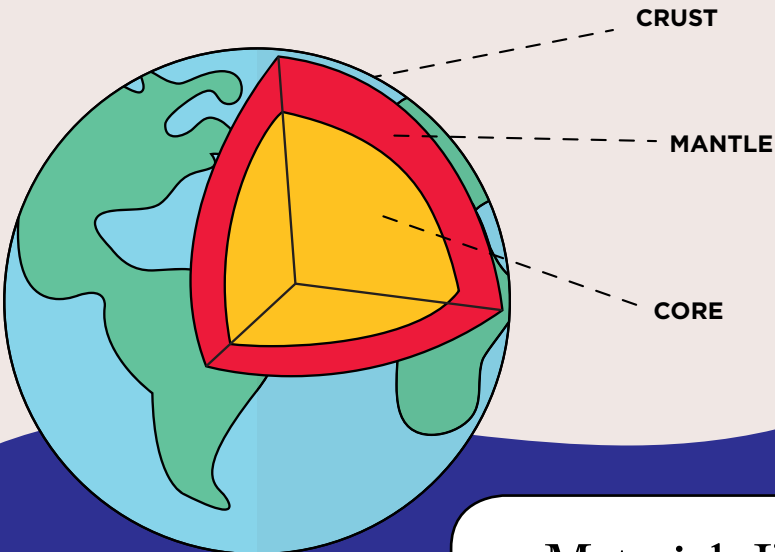


What you experienced when the Earth was shaking was an Earthquake. To understand why Earthquakes happen we must first understand what there is underneath our feet. So, scan the QR code and watch the video.

02

Do It Yourself

Now it's time to make our own model of the Earth. Think! What materials could you use to make your own Earth model? Write them down and get to work.



Materials I'll need:

-
- This image shows a vertical page of white paper designed for handwriting practice. It features eleven horizontal rows. Each row begins with a solid orange dot on the left margin, followed by a series of evenly spaced black dots extending across the width of the page. The pattern repeats down the entire length of the page.

Scan to watch



The inside of the Earth consists of four main layers. The inner core, outer core, mantle and crust. The crust is the thinnest of the four layers and is made up of pieces called plates. The Earth's crust is really cool! It's like a big puzzle made of huge pieces. **Check out this video to see how they have moved throughout time.**

The plates are made from solid rock and under them, there is a layer of partially melted rock (the top part of the upper mantle). The plates are slowly but constantly moving over this molten layer. This movement of the Earth's plates is called plate tectonics.

03

Let's experiment

How do plate tectonics move?

Use oranges and jam in an effort to understand the concept of how plates, that weigh billions of tons, can move across the surface of the Earth and interact resulting in wide rifts, towering mountains, violent volcanoes, and rattling earthquakes.

Grab your materials:

- 1 orange
- 2 plates
- a plastic knife
- jam

What to do:

- STEP 1** Remove the peel from the orange using your hands. Work over a plate to contain any pieces as they fall or juice. Try to make the pieces as large as possible; about 4 to 5 pieces would be ideal!
- STEP 2** Place the peeled orange and the pieces on the clean plate.
- STEP 3** Use the plastic knife to generously place jam on the surface of the orange. The jam should allow the orange peel to move around freely.
- STEP 4** Place the peel back onto the orange.

Move the orange peel around and see how they interact with each other. What happens to the jam?

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04

Think and complete the sentences:

- crust
- partially melted layer
- layer
- plates
- the Earth

The orange with peel represents

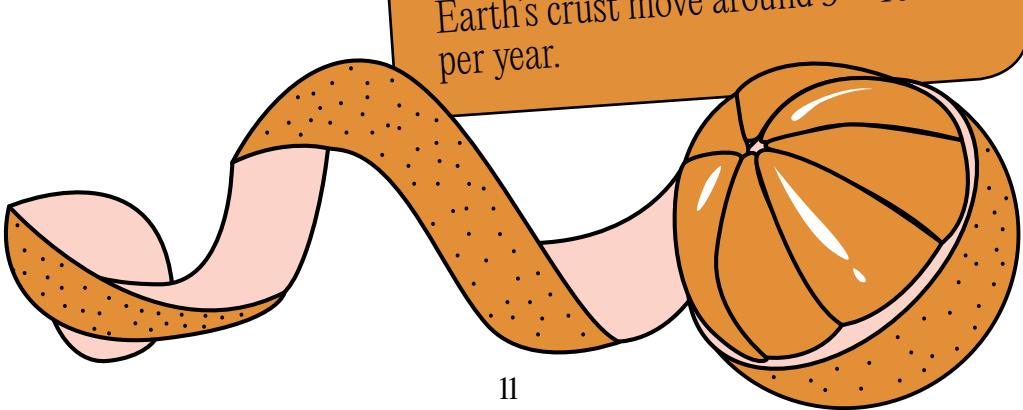
The peel represents the Earth's

The pieces of peel represent the

The jam represents the
of the upper mantle.

Did you know?

Most of the plates that make up the Earth's crust move around 5 – 10 cm per year.



Why does the Earth shake?

Now that you know all about the Earth’s structure and the amazing properties of its crust let’s scratch the surface a little bit more. The tectonic plates interact in three ways: move away from each other, move towards each other and move sideways past each other.

01

Let’s experiment

How are mountains and earthquakes created?

Grab your materials:

- Petit-beurre biscuits
- Whipped cream
- A cup of water
- A shallow plate or tray
- Red food coloring (optional)
- A big bowl

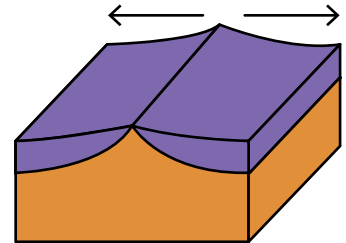
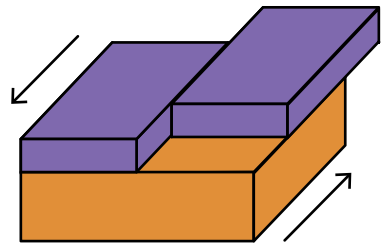
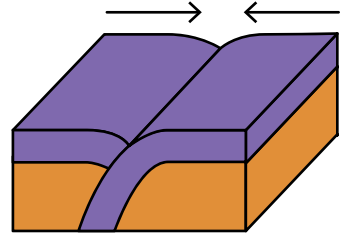
What to do:

STEP 1 The whipped cream is the Earth’s mantle, in other words magma, so mix the whipped cream and food coloring.

STEP 2 Spread a “bed” of whipped cream on your plate.

STEP 3 The biscuits are the Earth’s crust. Slightly dip the edges of two biscuits in the cup of water and place them on the whipped cream.

STEP 4 It’s time for the Earth to start shaking. What do you think will happen if you press the two biscuits against each other? Write down your hypothesis.



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Now try it out! What do you notice? **Write down your observations.**

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02

Think!

What should we do if an earthquake strikes. Discuss it in groups and make two lists. One in case you're inside a house and one in case you're outside on the street.

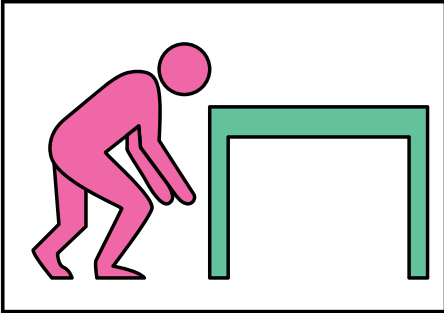
Inside

Outside

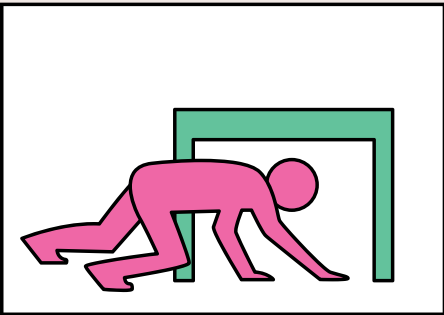
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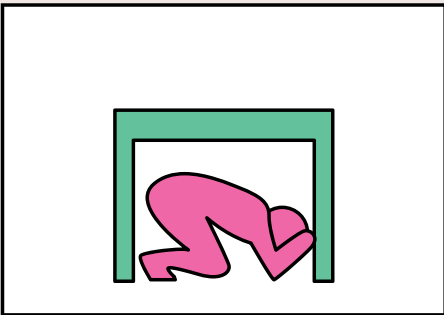
Now look at the picture below and label them.
Then act out an earthquake drill in class.



HOLD!



DROP!



COVER!

04

Make a list with all the things you'll need in case of an emergency. What would you pack?

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•	•
•	•
•	•
•	•
•	•

05

Engineering Time

Using only straws and tape to build a building that will be at least 15 cm tall. Will it be able to stand tall after an earthquake? To test it tape its base on your desk and move your desk as if it were an earthquake. What do you observe? What are its strengths and weaknesses? Write down your observations.

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Did you know?

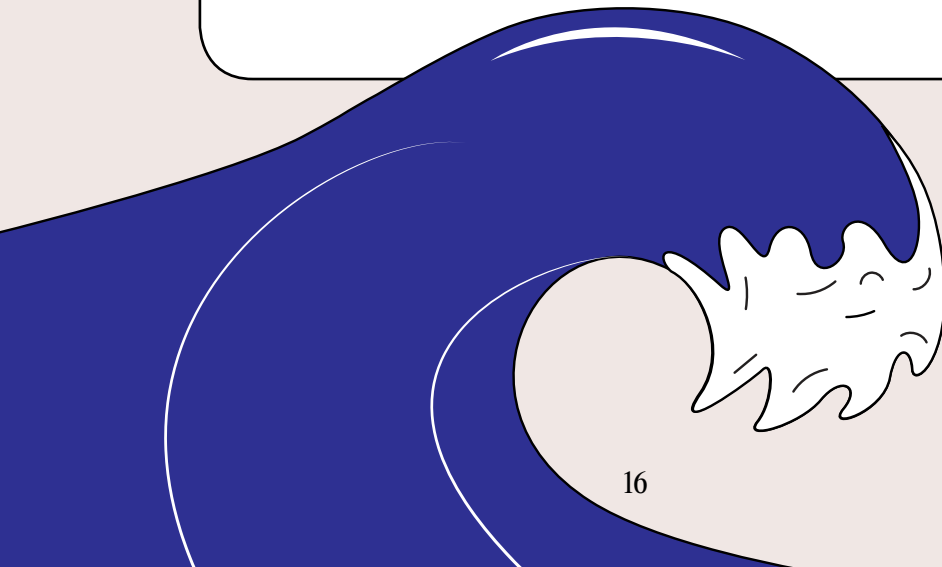
The earliest reported earthquake in California was felt in 1769 by the exploring expedition of Gaspar de Portola while the group was camping about 48 kilometers southeast of Los Angeles.

What is a tsunami?

01

Think!

What do you think will happen if an earthquake strikes in the ocean? Discuss it with your peers and make a drawing of what you think such a force will look like.



02

Now watch the video and fill in the gaps with the words below

Scan to watch



shore

earthquakes

ground

forward

recedes

eruptions

Tsunamis are dangerous and unpredictable massive waves. They can be caused by....., volcanic, landslides, or meteorites. In the deep ocean, a tsunami is barely noticeable but when the waves reach the their height can be as tall as 100 feet. A tsunami wave moves and crashes over the coastline obliterating almost everything in its path. Then it..... and drags everything back to the ocean. The best defense against a tsunami is early warning that will give residents time to seek higher before it hits.

03

Match:

Landslide

● hit with destructive force

Obliterate

● move back

Recede

● a person who lives in a place

Crash

● wipe out

Noticeable

● easy to see

Resident

● a mass of rock and earth quickly moving down a slope

Engineering Time

How can you prevent a tsunami from reaching the land? Imagine you're engineers working to find a way to protect tsunami-struck areas. Your goal is to find a "shield" that can be strong enough to keep the tsunami wave away. Work in groups and come up with solutions. **Make a plan where you draw your idea and write down the materials you'll need.**



Let's put your idea to the test.

Grab your materials:

- 1 shallow plastic bucket
- Soil (to make the land part)
- Water (to make the sea)
- Cardboard and glue (to make the houses)
- Whatever you think can act like a shield (write down your ideas in the list)
- A piece of plastic to move the water and create a tsunami wave
-
-
-

Don't forget to see what the other groups did and discuss what worked best. Write down your findings. What happened when the tsunami struck your "shield"? Is there anything you could improve?

Did you know?

Tsunamis can travel at speeds of about 500 miles or 805 kilometers an hour, almost as fast as a jet plane

Why do volcanoes erupt?

01

Think!

What do you know about volcanoes? Discuss in a group and write down your thoughts.

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02

Scan the QR code and watch the video about volcanoes and fill in the gaps with the correct words

ocean

destructive

active

lava

magma

rocks

gas

cools

melts

shape

surface

possible

Scan to watch



There are about 1.5000 volcanoes, on land and on the floor. There are many types of different volcanoes, classified by and size. All volcanoes emit and molten The core of the Earth burns as hot as the of the Sun. This heat rocks in the Earth's Mantle. This is called After it gets out of the volcano it is called The most eruption ever documented occurred in Indonesia in 1815. Even though volcanoes are so destructive they help make life on Earth Their ash helps plants grow and when lava down it creates new landforms.

What new things did you learn about volcanoes?

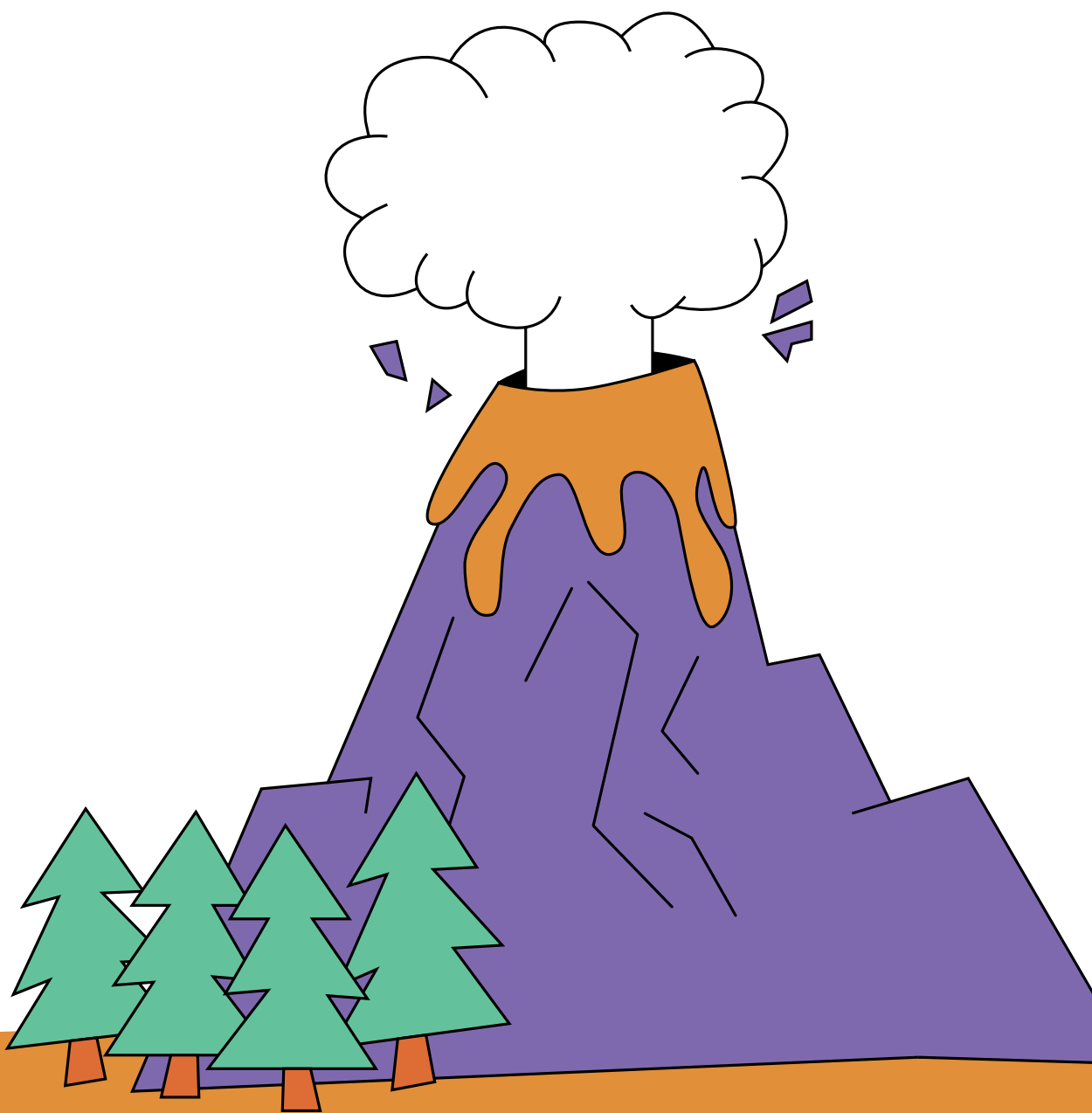
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Let's experiment

Can you make your own volcano?

Let's experiment

Can you make your own volcano?

Grab your materials:

- Soil or Modelling Clay
- Vinegar or Lemon Juice
- Red Food Coloring
- Dish-washing soap
- A plastic bottle
- Baking Soda

What to do:

Think about how you can make a volcano with the materials in the list and write down each step in detail

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Earthquake

Tectonics

Lava

Magma

Volcano

Crust

- the molten rocks inside a Volcano
- the hot liquid that comes out of a volcano
- a breaking point on the Earth's crust that allows magma to escape
- the energy released when two plate tectonics crush
- a thin shell on the outside of Earth
- big pieces that constantly move on the Earth's crust

***Did you know?***

The word volcano comes from the Latin word Vulcan which was the Roman God of Fire!

Water is Life





Why does it rain?

01

What do you know about rain? Discuss it in groups and write down your thoughts.

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04

Let's experiment

Why does it rain?

Grab your materials:

- Cling Film
- A mug
- Boiling water
- 2-3 ice cubes

What to do:

- STEP 1** Prepare the water. Wait till it boils.
- STEP 2** Cover the bowl with the cling film and make sure there are no gaps
- STEP 3** Place the ice cubes on top of the cling film and wait a few minutes

What do you think will happen?

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What did happen?

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Why do you think this happened?

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02

Watch the video and match the definitions to the words

Evaporation

- When the gas, also called water vapor cools down and forms clouds.

Precipitation

- When the Sun heats the ocean and turns the liquid water into gas which goes up in the air.

Condensation

- When the clouds become so heavy that they can no longer hold the water droplets inside them and it starts to rain.

Scan to watch



04

Draw your own water cycle model

Did you know?

There is a type of rain called 'phantom rain' that never makes the ground wet. In some very hot and dry regions, such as deserts, rain pours down from the sky but evaporates as it draws closer to Earth's surface.

Why is clean water important?

01

Think!

Where do people get water? Have you ever heard of people having difficulty getting water?

[illegible]

02

Watch the video and fill in the chart

Scan to watch

Setting	Characters	Problem



03

Can you rewrite the story in your own words?

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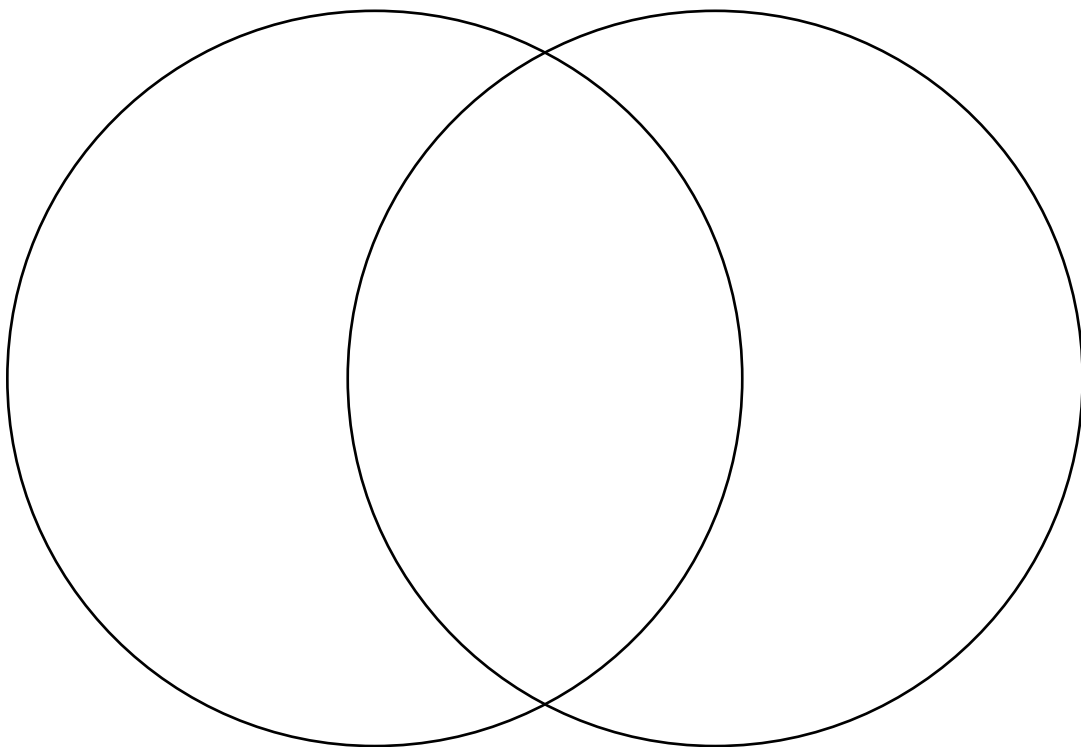
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04

How is your day different from Gie Gie's? How is it the same?



Let's experiment

How can we turn dirty water into clean water? Let's try out some water-filters. Which one works best?

Grab your materials:

- 4 plastic bottles
- 4 jars
- Cotton wool
- Sponge
- Sand
- Coffee filters
- Dirty water

What to do:

- STEP 1** Cut the bottom of the bottles and punch a hole through the bottle cups.
- STEP 2** Turn the bottles upside down placing the neck of the bottles in the jar
- STEP 3** Place one filter into each bottle. What's your prediction?
- STEP 4** Pour a small amount of muddy water into each sample.

Which water filter works best?

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Did you know?

A person can live about a month without food, but only about a week without water.

Can we undo pollution?

Pollution is a problem in our world. We pollute the water and ground by littering. Oil spills and weed killers make their way into our water. Smoke from vehicles, homes, and factories pollutes the air. The smoke travels into the atmosphere and gets trapped in the clouds. When it rains or snows, it brings the pollution along. This is called acid rain.

Not all rain is acid rain. Normal rain has a pH of 5.6, while acid rain generally has a pH between 4.2 and 4.4. Acid rain can harm plants and trees, animals, and humans.

01

Let's experiment

How does acid rain affect us?

Grab your materials:

- 3 jars
- water
- white vinegar
OR lemon juice
- 3 flowers

What to do:

- STEP 1** Label one jar "normal", one "little acid rain", and one "lots of acid rain"
- STEP 2** Add a green construction paper grass border on the jars (optional).
- STEP 3** Add the following solutions in the jars:
- "normal" jar = just water
 - "little acid rain" jar = 1/4 cup vinegar OR lemon juice and the rest water
 - "lots of acid rain" jar = 1 cup vinegar OR lemon juice and the rest water

STEP 4 Add a flower to each solution. At this stage:

Do the flowers look healthy?

Do they look about the same?

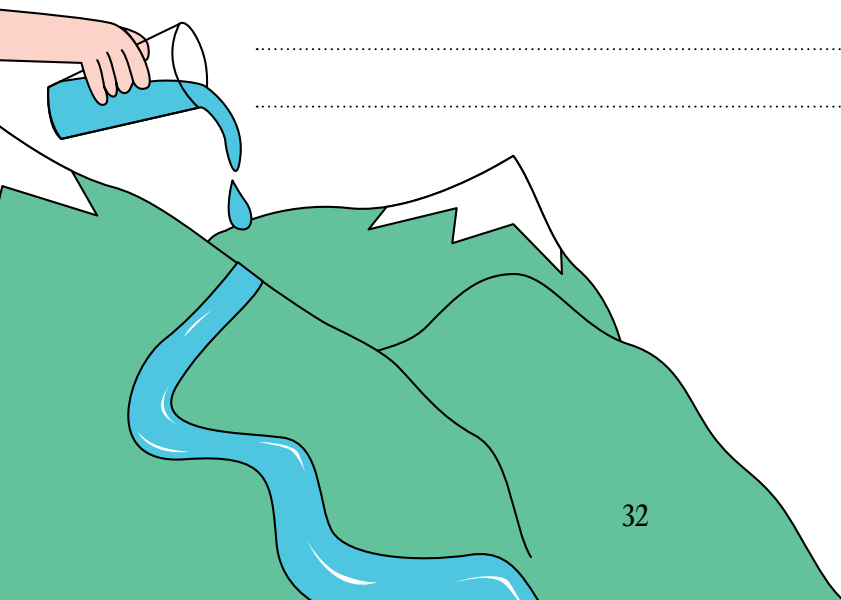
What do you think will happen?

STEP 5 Observe your flowers.

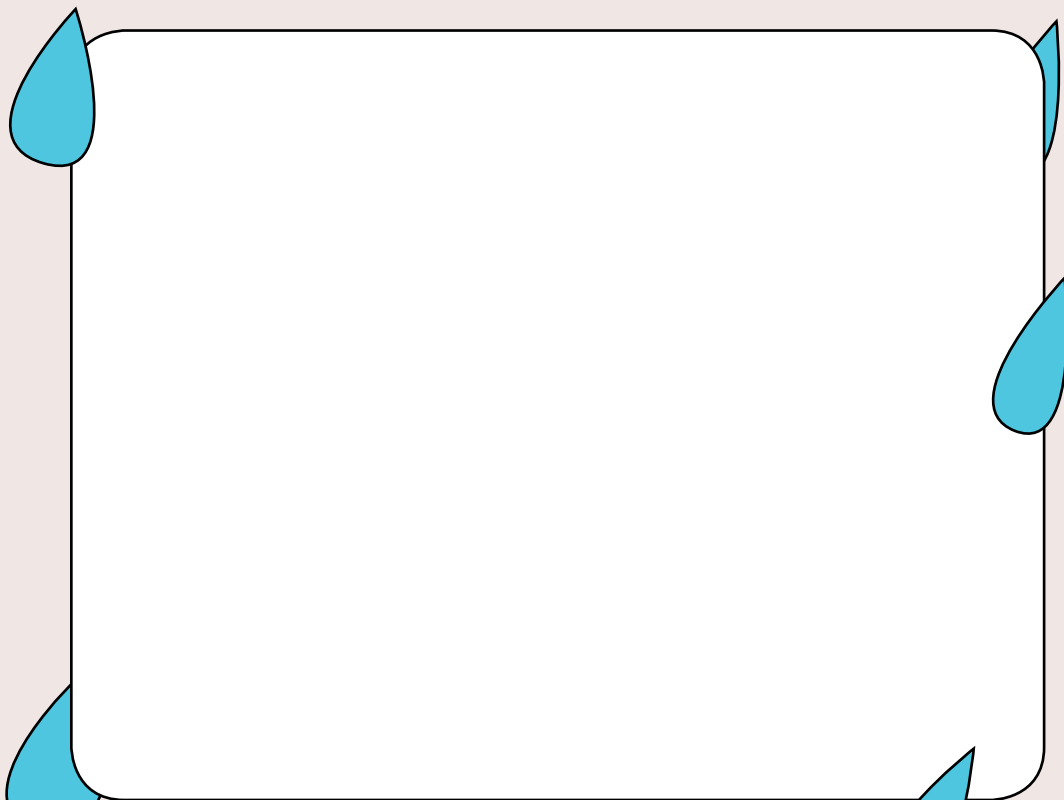
Do you notice a difference in the flowers?

Did the acid have an impact on the flowers?

Are your results what you expected?



Draw a picture of the results of the flowers:



Why do you think this happened?

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02

Let's do some research

Go online and find information on oil spills. Write a definition about it.

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03

Let's experiment

Can we "absorb" oil spills?

Grab your materials:

- A large bucket
- Water
- Garbage of all sorts
- Oil

What to do:

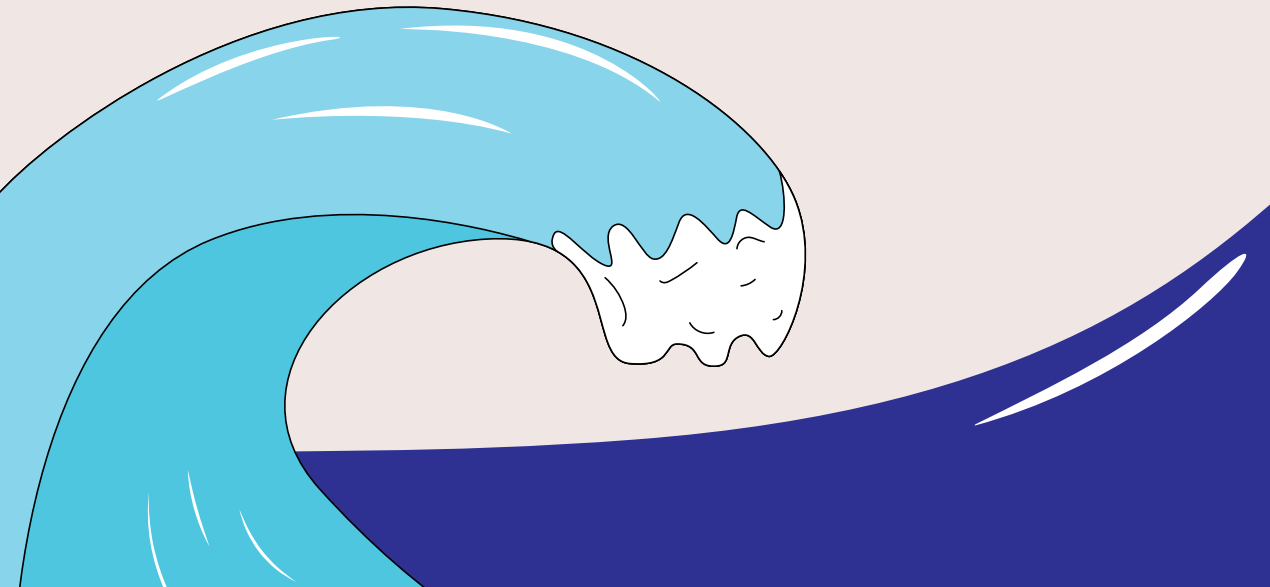
Before you start write down your thoughts. Which of these can you remove from the sea and how?

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Watch a video about oil spills and think about ways in which you can “absorb” the oil from your bucket.

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Scan to watch



Now let's put your ideas to the test. What do you observe?

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Did you know?

Pollution kills more than 1 million seabirds and 100 million mammals every year.

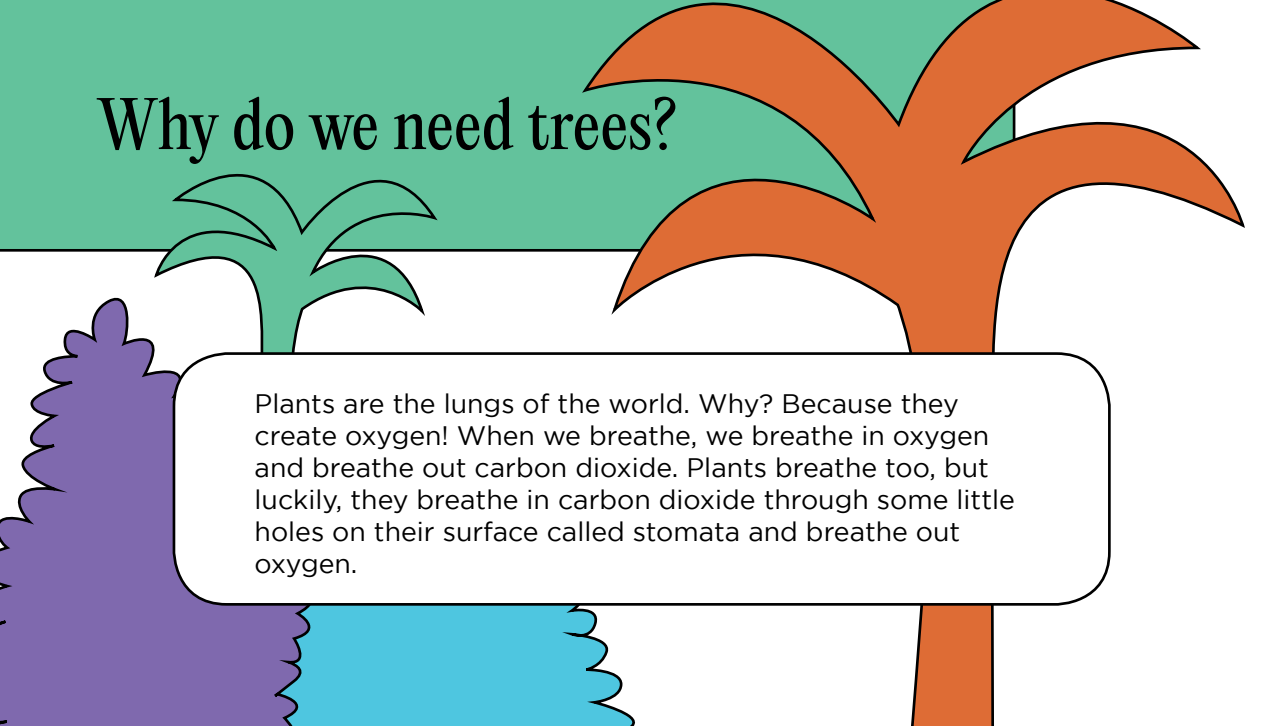


All Things Green





Why do we need trees?



Plants are the lungs of the world. Why? Because they create oxygen! When we breathe, we breathe in oxygen and breathe out carbon dioxide. Plants breathe too, but luckily, they breathe in carbon dioxide through some little holes on their surface called stomata and breathe out oxygen.

01

Let's experiment

How do leaves breathe?

Grab your materials:

- 1 bowl of water
- Different types of leaves
- Magnifying lens
- One small rock

What to do:

- STEP 1** Place the leaves in the water.
- STEP 2** Make sure that you place a rock on top of them so that they're fully covered with water.
- STEP 3** Place the bowl under direct sunlight

What do you think will happen?

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After a while take your magnifying lens and see what happens on the surface of the leaves. Write down your observations.

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Let's experiment

What is photosynthesis? The green from plant leaves comes from a chemical called chlorophyll. This chemical is produced during photosynthesis when the plant uses the sunlight to produce their own food. Let's do an experiment to see the process of photosynthesis.

Grab your materials:

- black cardstock
- scissors
- a geranium plant
- tape

What to do:

- STEP 1** Start by making different shapes out of the black cardstock. You want your shapes to be about 1/3 of the leaf.
- STEP 2** Now carefully attach the paper using tape to a leaf on the plant.
- STEP 3** Repeat so you have various paper objects in the middle of some leaves.
- STEP 4** Now you just wait for a week. Remember to keep the plant watered. Geraniums like warm weather, a sunny spot, and moist soil.

What do you think will happen?

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- STEP 5** At the end of a week, carefully pull off all the paper shapes. Remember to be gentle when removing the paper from the leaves as they are delicate. What do you notice?

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Why do you think this happened?

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Let's experiment

Chlorophyll, the green pigment found in a plant's leaves, is a key ingredient in the process of photosynthesis. It also makes great paint! What about making a chlorophyll painting?

Grab your materials:

- about 10 leaves from different plants
- a white sheet of paper
- a metal spoon

What to do:

STEP 1 Get into two teams.

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Team 1

- STEP 2** Draw a tree outline in the middle of the sheet of white paper.
- STEP 3** Fold the paper in half.
- STEP 4** Place several leaves between the folded paper.
- STEP 5** Press firmly on the leaves between the pages and rub with a metal spoon.

Team 2

- STEP 2** Draw a tree outline in the middle of the sheet of white paper.
- STEP 3** Ball up the leaves and use them as paintbrushes.
- STEP 4** Rub the leaves on the paper.

Which way is better?

How?

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Compare the different leaves.

Which leaves release the most chlorophyll?

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Which leaves release very little?

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04

Do it yourself

Make Clay Leaf Pendants

Grab your materials:

- Small leaves
- Clay
- Wax paper or plastic tray
- Barbecue skewers or drinking straws
- String
- Watercolor paint

What to do:

- STEP 1** Lay a small leaf on the wax paper, vein side up.
- STEP 2** Pinch off a small piece of air dry clay (maybe a tablespoon or two) and roll it into a ball between your hands.
- STEP 3** Then press down with the palm of your hand to flatten it.
- STEP 4** Remove the leaf
- STEP 5** Leave the leaf on the tray and poke a hole on its top part
- STEP 6** Color (don't use too much water) and leave it on the tray to dry
- STEP 7** Use the string to make a pendant

Think!

Why do you think the leaves of some plants work better while others don't? What qualities or characteristics of the leaf make it better or worse for this project?

Did you know?

Trees can actually talk to each other?
Watch the video to find out more
about it.

Scan to watch



Can plants move?

01

Watch these two videos and write down the ways in which plants move and the reasons why they do it.

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Scan to watch



02

Engineering time!

Designing an exploding seed pod.

Grab your materials:

- a balloon
- bird seed
- a small paper or plastic cup
- a funnel

How can you design a seed pod using these materials? Write down the steps.

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Did you face any difficulties? If yes, how did you overcome them?

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Now that your seed pod is ready, blow up your balloon to represent the building of tension in your seed pod. Be careful! Don't blow it too much or it will burst!

03

Let's go outside!

Seed dispersal simulation

Did you know?

The smell of freshly-cut grass is actually a plant distress call

Grab your materials:

- a sharp pencil or a pin
- a long sheet of paper or plastic table cloth

What to do:

- STEP 1** Place the long sheet of paper or table cloth on the ground.
- STEP 2** Stand at one end of the paper holding the balloon outward.
- STEP 3** Use the pencil or pin to poke the balloon and pop it up and watch what happens!

What happened when your pod exploded? Did all your seeds fall onto the paper or disperse farther?

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How far did your seeds travel from the pod? Use a measuring tape to measure the distance.

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Why are birds and insects important?

Pollination is an important process in the life cycle of plants. Let's have fun learning what bees, butterflies, or other insects are doing when they are pollinating flowers, fruits, and vegetables with a pollination experiment.

01

Let's experiment

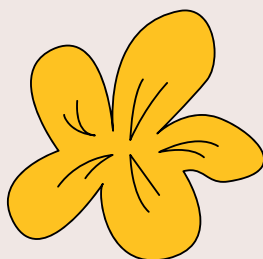
Chlorophyll, the green pigment found in a plant's leaves, is a key ingredient in the process of photosynthesis. It also makes great paint! What about making a chlorophyll painting?

Grab your materials:

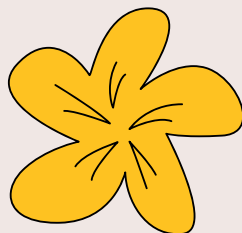
- yellow jello powder
- red jello powder
- four small, white paper plates
- black pipe cleaner
- a magnifying glass
- spray bottle filled with water

What to do:

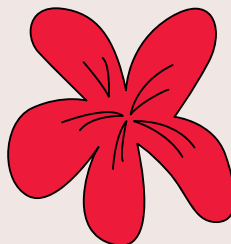
- STEP 1** Get into pairs.
- STEP 2** Draw a flower on each paper plate.
- STEP 3** Sprinkle yellow jello powder on the first two flowers.
- STEP 4** Repeat with red jello powder on the other two flowers.



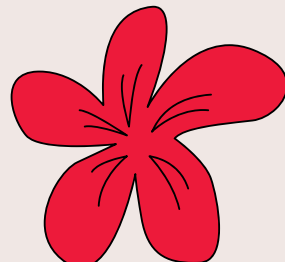
YELLOW JELLO



YELLOW JELLO



RED JELLO



RED JELLO

- STEP 5** Cut the pipe cleaner in half.
- STEP 6** Take one half each, fold it and twist it around your index finger. Bend the ends slightly to form the bee's feet.
- STEP 7** Imagine you're a hungry bee (finger). Fly and buzz around. Land on the 2nd flower and tap your feet in the pollen (jello).
- STEP 8** Fly to the 3rd flower and walk on the pollen.
- STEP 9** Fly between the 2nd and 3rd flower as you mock drink the nectar. Note: Don't land on the 1st and last flower.

Use the magnifying glass and look at your bee's legs. What do you see?

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How does the pipe cleaner mimic bee or insect's legs?

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- STEP 10** Spray all 4 flowers gently with a mist of water.

What do you think will happen?

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What happened?

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Did you know?
All worker bees are female!

How can we make our own vegetable garden?

01

Think!

What do plants need to grow? Discuss in groups and write down your thoughts.

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02

Watch a video to learn more about it.

Can you describe what Peep did to grow his sunflower?

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Why was waiting so difficult for him?

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Scan to watch



03

Let's experiment

What will happen if you plant bean seeds in three ways?

Grab your materials:

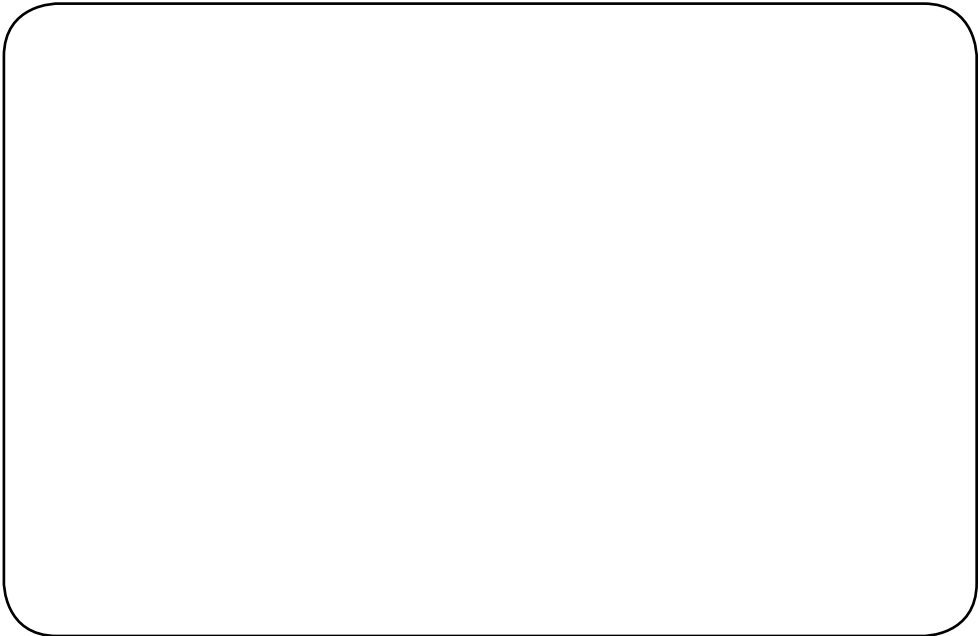
- soil
- used coffee
- small plastic food bag
- paper towel

Use soil, used coffee and soil, small plastic food bag and Paper Towel. Remember that seeds need water and sun to sprout, so place them somewhere sunny and cozy. Stick the small plastic bag on a sunny window. Observe the differences in the weeks to come. Use the Scientific Method chart at the end of the book to write down your hypothesis, process and observations.

Did you know?
Tomatoes, cucumbers and peppers are actually fruit!
WHAT?!?!?!?!?

04

Draw your favorite plant - flower and write a paragraph to describe it.



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What is a greenhouse?

A greenhouse (also called a glass-house or hothouse) is a building where plants such as flowers and vegetables are grown. It usually has a glass or see-through plastic roof. Many greenhouses also have glass or plastic walls. Greenhouses warm up during the day via penetration of the sun's rays which heat the plants, soil and structure. This heat is given up gradually throughout the night.

01

Why do you think people use greenhouses? Which places around the world use greenhouses the most and why? Research online and write down your findings.

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02

Let's experiment

How do greenhouses work?

Grab your materials:

- Tomato seeds/ any other type of seeds
- Big Plastic Bottle
- Soil

What to do:

- STEP 1** Cut the plastic bottle in the middle
- STEP 2** Place some soil and 6-8 tomato seeds on top
- STEP 3** Cover the seeds with a little more soil (shouldn't be too much)
- STEP 4** Water lightly

- STEP 5** Close the plastic bottle and make holes on the lid so that air comes in and out of it. Keep it inside near a window with lots of sunlight.
- STEP 6** Wait for about a week or two and water lightly (if you water them too much they will drown) until the plants are about 8cm tall and have at least two true leaves on them. Then, use scissors or a cutter to make holes at the bottom of the bottle.
- STEP 7** When your plant has at least 6 true leaves transplant in soil outside or in a bigger pot.

03

Think!

What is the greenhouse effect? What do you know about it?
Discuss in groups and research online to find out more.
Write down your ideas.

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Let's experiment

What is the greenhouse effect?

Grab your materials:

- Two identical glass jars with lids
- 4 cups cold water
- 10 ice cubes
- Thermometer

What to do:

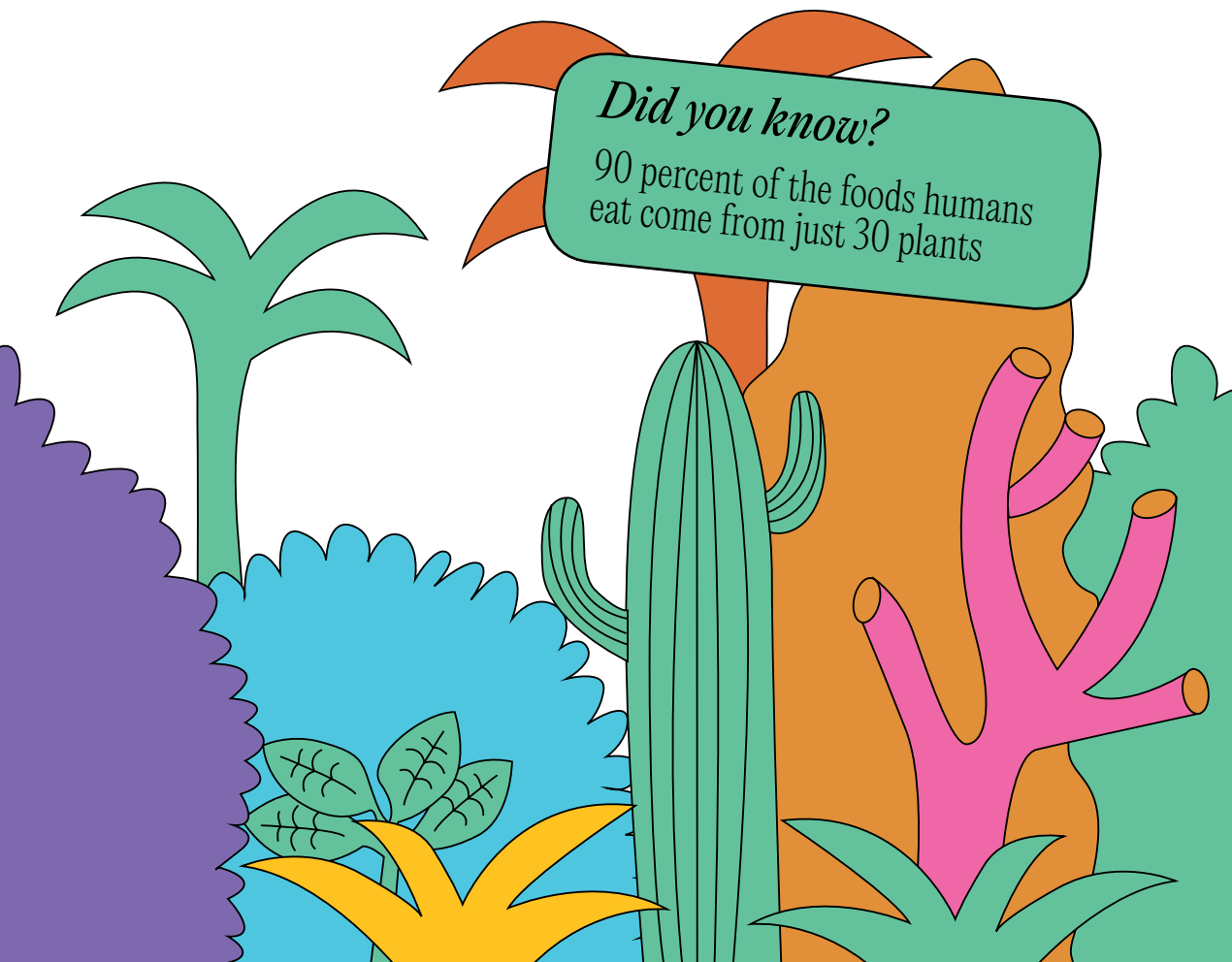
- STEP 1** Pour 2 cups of water and put 5 ice cubes in each jar and close their lids.
- STEP 2** Place one jar in the shade and one under direct sunlight and wait for an hour.

What do you think will happen?

Write down your hypothesis, process and observations in the Scientific Method Chart.

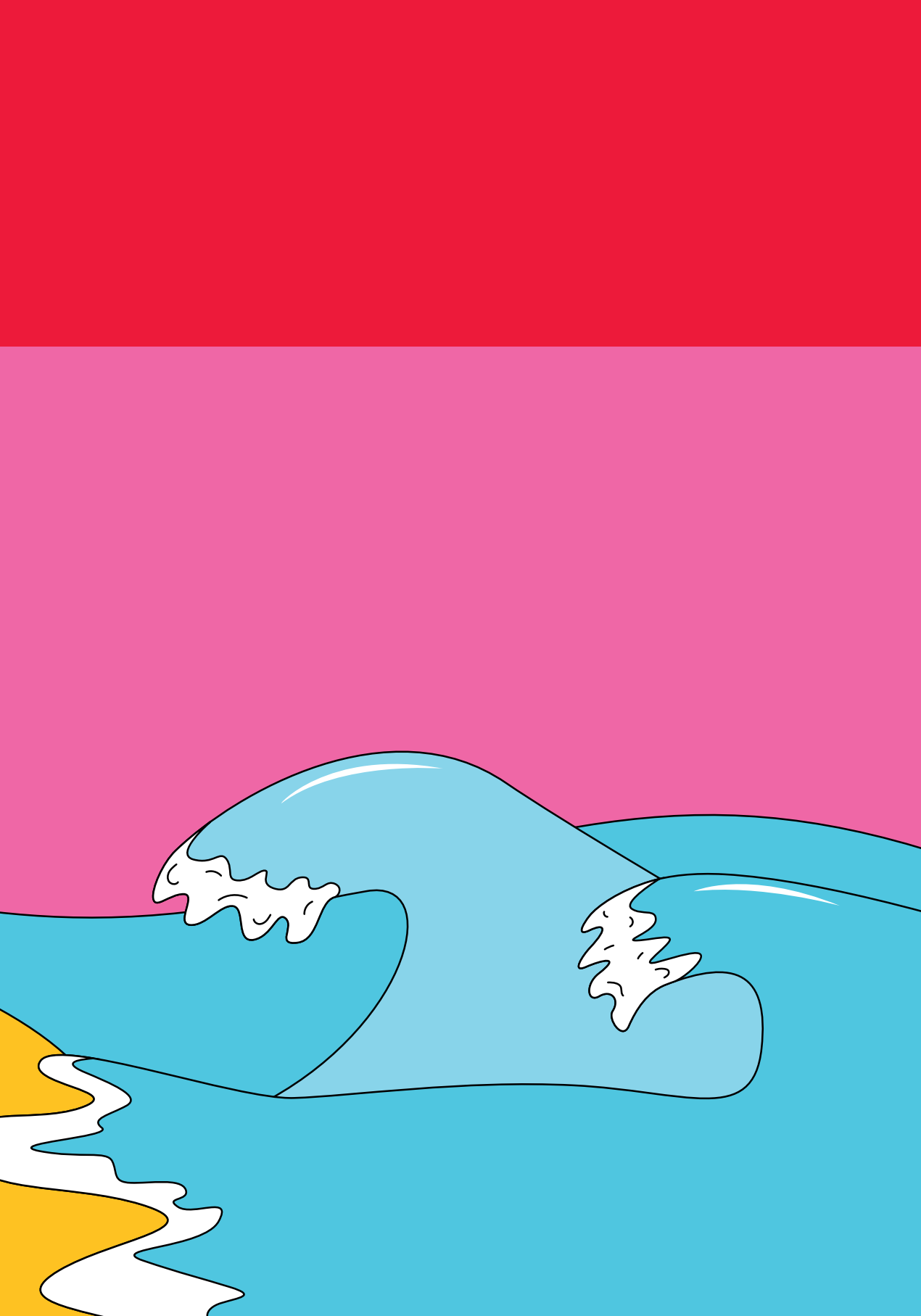
Did you know?

90 percent of the foods humans eat come from just 30 plants



The True Survivors





How can we survive being stranded on an island?

A survivor's journal

DAY 1 Our journey started a few weeks ago. We were sailing to the Pacific Ocean to trade spices. Suddenly, a huge storm struck! Rain was falling, the wind was howling and the waves were eating up our ship! Despite all our efforts, our ship was wrecked and we were left on a deserted island. But we didn't panic... We sat down and discussed what our next steps should be. We decided that the best solution was to make a shelter with logs and leaves and scout around the island in search of food.

How would you feel if you were in this woman's shoes?

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What would you suggest you do first? Why?

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a Grab your materials:

- skewers
- pieces of paper
- string

STEP 1 Use barbecue skewers (tree logs), pieces of paper (leaves) and string to make a shelter for the night.

STEP 2 You need to transfer all the food that you've found to your shelter, build something with wheels to carry the food on.

- b** **Let's build a car powered by a balloon.** Work in pairs.
Go online and find out how you can make a balloon-powered car.

Design Requirements

- The car should be sturdy and not fall apart when in use.
- The car should go straight.
- The car should go as far as possible.

Think about what materials you want to use for your car, and how you'll connect the different pieces together.

Make a sketch of your design on paper before you start building.



Write down the materials
you'll need:

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What to do. Write down each step:

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Now it is time to test your car, and possibly redesign it or make improvements, depending on how well it works. **Watch your car closely!**

Tick or Cross

- Does it move forward?
- Does the car go straight?
- Did any parts of the car fall apart?
- How far does the car go?

If your car does not work at all, try to figure out what is wrong. If your car works, but not very well, try to figure out how you could improve it. Even if your car works well, think about what changes you could make to improve it. It might take you many tries to get your car working properly, and this is okay!

DAY 2

Luckily, we found lots of food, mainly fruit and vegetables. But we didn't have electricity to cook them... That's when the captain said that we could make solar ovens to try and cook them. He had done one before so he knew how. It took us a long time but we finally made it. Who could have known that cooking with the sun could be so delicious.

02

Engineering time!

Make a solar oven to cook your food or make a cup of tea. Watch the video to see how and use the scientific Method chart to write down your hypothesis about how much time it took, the process and your observations.

Scan to watch



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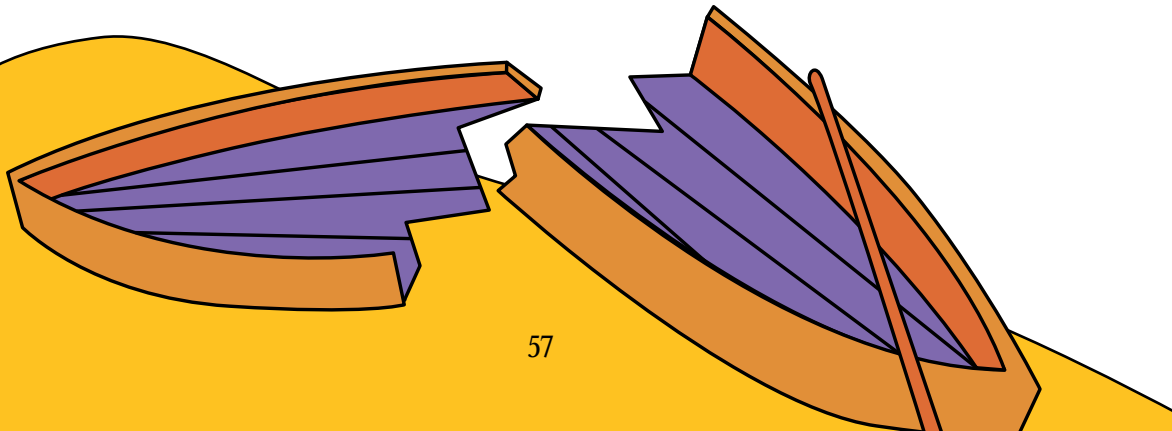
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DAY 3

The morning came with a really stressful realization. We are running out of freshwater and didn't find any rivers when we scouted around the island. What can we do with all the salt water surrounding us? Are we doomed?

03

Think!

How can we turn salt water into freshwater? Discuss.

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04

Let's Experiment

Grab your materials:

- 1 bowl
- 1 cup
- Salt water (you can make some by mixing salt in boiling water)
- Cling film
- A small rock/weight

What to do:

- STEP 1** Fill the bowl with salt water
- STEP 2** Place the cup in the middle of the bowl
- STEP 3** Cover the bowl with cling film (be really careful not to leave any openings)
- STEP 4** Put the small rock/weight in the middle of the cling film and place the bowl under direct sunlight. Then wait for an hour and observe.

What do you think will happen?

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What do you observe after some time has gone by?

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Why do you think this is happening?

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DAY 4 It's been four days already and lots of us are not feeling very well. Our spirits are low... We must find a way to get help... Send a signal somehow... I can't write any more.

05

Think!

How can the castaways send a signal to the ships that go by?
Discuss and work together to find a solution.

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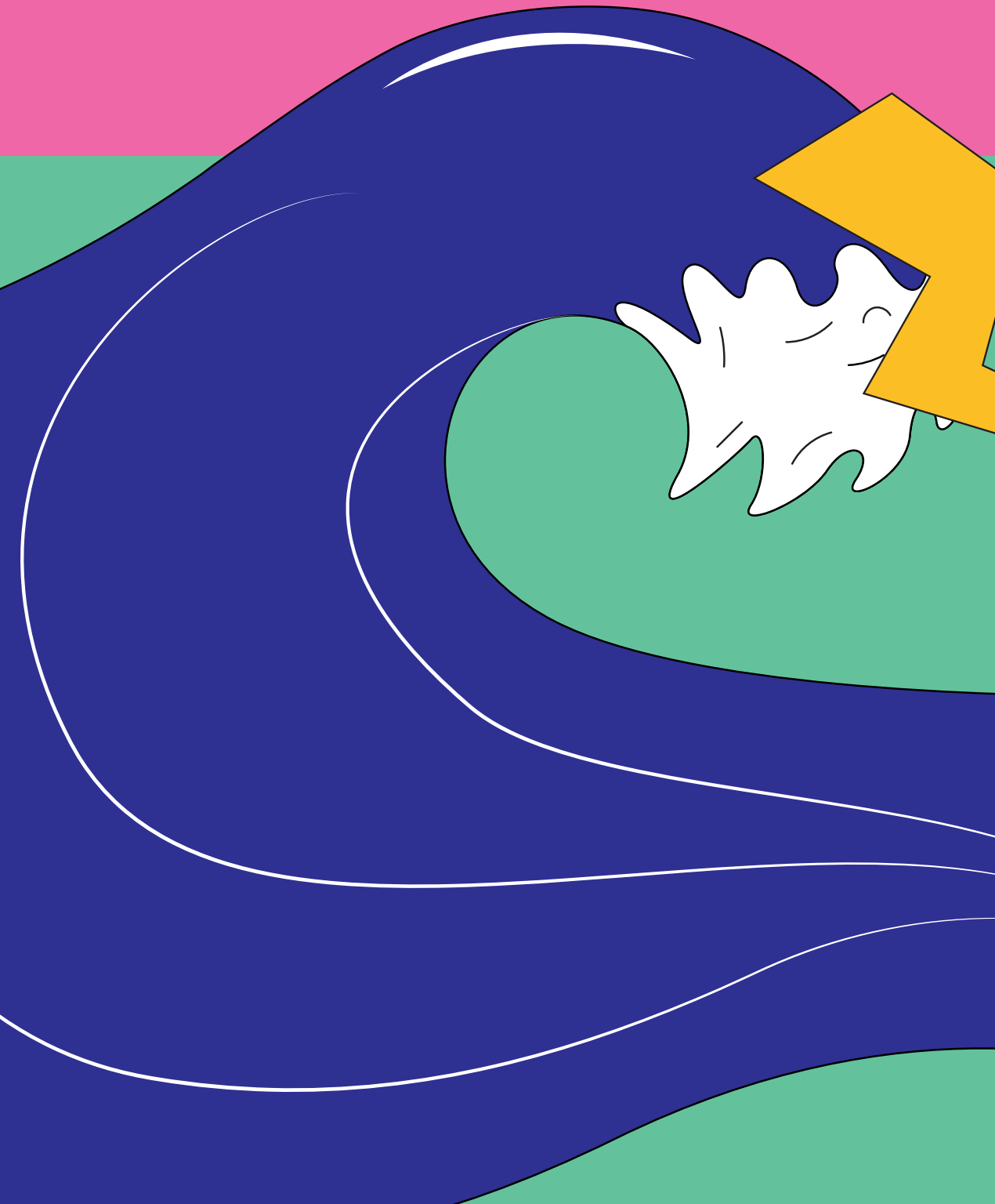
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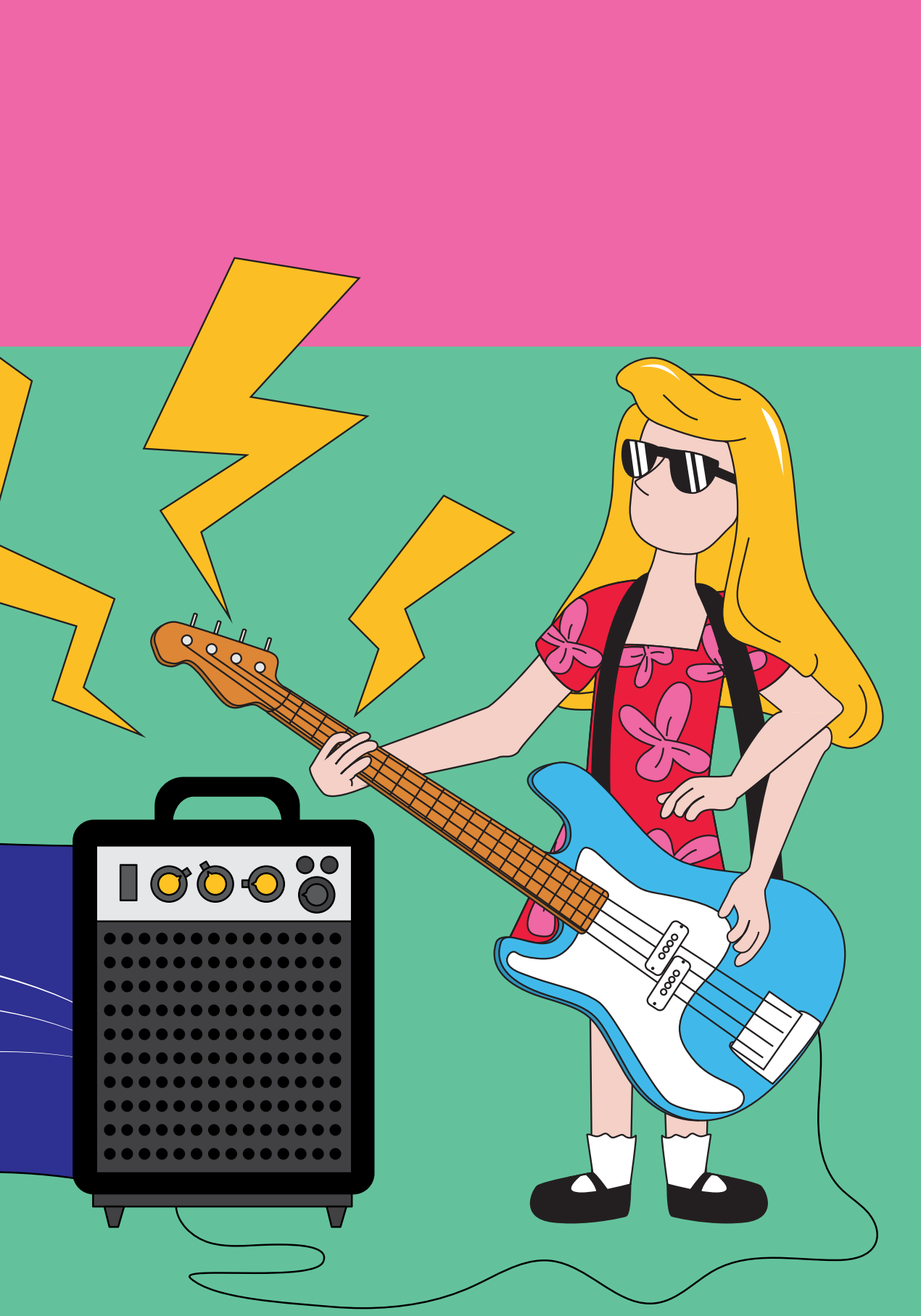
DAY 5 They saw us! They saw us! At last a ship saw our signal and is coming to our rescue. Mom, I'm coming home!!!!

05

Now that the adventure is over illustrate the story in a **zig-zag book**. Draw the main events and retell the story in your own words.

Surfing Sounds





What is sound?

01

Move around the classroom (or go outside) and spend some time listening for sounds. Then write down what you hear eg. I hear birds singing etc.

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02

How do sounds make you feel? Write the feelings next to the sentences.

- irritated
- stressed
- nervous
- terrified
- sad
- uncomfortable
- calm
- happy
- furious

Road traffic	Footsteps in the middle of the night
Birds singing	Two friends giggling
A dog barking	A baby crying

03

How do the following sounds make you feel?

School bell ringing

Alarm clock going off

04

Think!

How are sounds made? Discuss.

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Now, watch the video to find the answer.

Scan to watch



04

Fill the gaps.

wave

vibrations

brain

particles

drum

All sounds are made through When something vibrates it moves back and forth so fast that our eyes can't see it moving. However, our ears can sense these vibrations. The air around us is made of tiny which carry sound. When a sound is produced, it causes these tiny particles to bump into their neighboring particles, which then bump into their neighbors, and so on. This path of vibration is called a But how do we hear those vibrations? Inside our ears there is a little part that looks like the top of a This part of our ear vibrates when sound waves travel into our ear. There is a spot even deeper inside our ear that senses these vibrations and sends a message to our telling it that a sound has been heard.

How can you see sound ?

01

Let's Experiment

Grab your materials:

- Bowl
- Cling film
- Rice
- Spoon
- Tray

What to do:

STEP 1 Stretch the cling film over the top of your bowl. Make sure it clings tightly.

STEP 2 Sprinkle a handful of rice over the cling film.

What do you think will happen?

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STEP 3 Stand close to the bowl and hum!

Repeat the investigation by holding your tray close to the rice and hitting it hard with the spoon. What do you think will happen now?

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Did you know?
Sound cannot travel through space since there are no molecules to travel through.

How can we make sound?

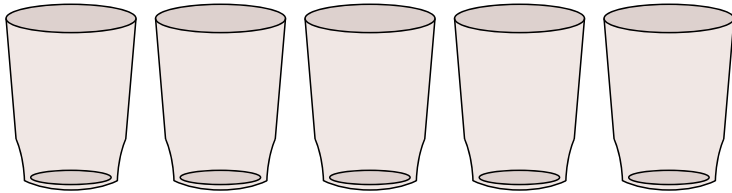
01

Let's Experiment

Let's see how we can create sound (and even music) with a few glasses of water!

Follow the instructions as shown in the pictures below and complete the Scientific Method Chart at the end of the book.

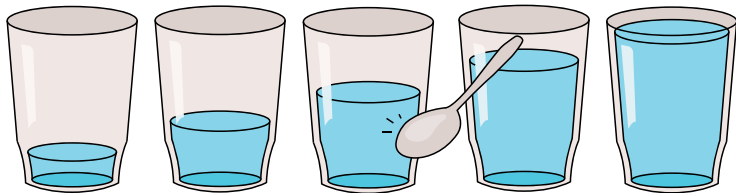
1



2



3



02

Try playing your favorite song on the water glasses!

03

Do it yourself

Check out how you can create your own musical instrument out of everyday items!

At home, create your own musical instrument and get ready to present it next time in class!

Scan to watch



Can you explain to your classmates how you made it? You might want to write down the steps you followed for somebody else to make it!

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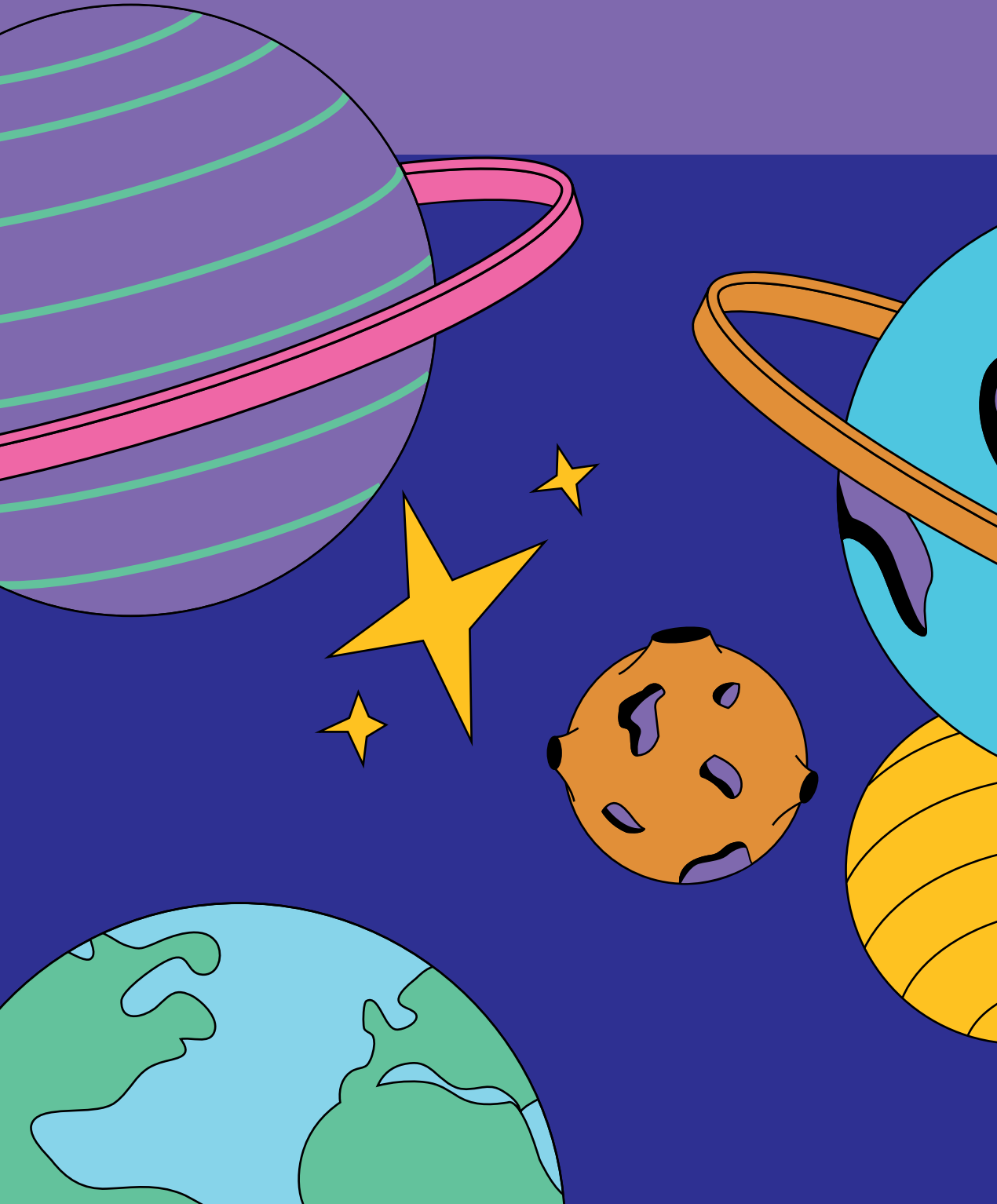
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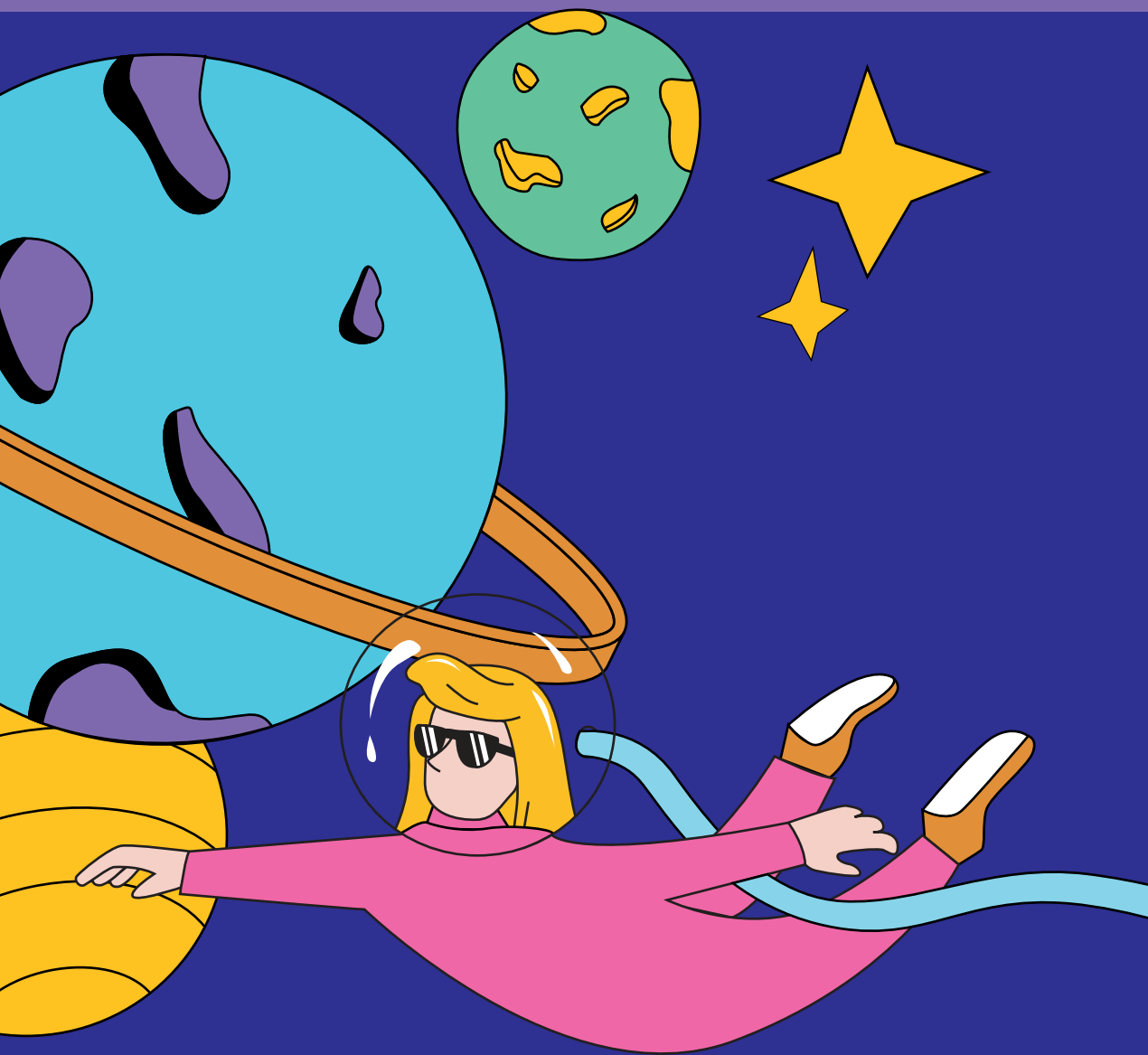
Did you know?

The loudest natural sound on earth is caused by an erupting volcano



Space Exploration





Why do we see stars at night?

01

Grab your coats, find a cosy spot to lie down in your back garden or look out of your window. The longer you look up, the more stars you'll discover. As you gaze, take some time to enjoy the moment - how does it make you feel? What words can you use to describe your special view?

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02

If you've got a star spotter guide with you, you could try to connect the dots of constellations like 'orion' and 'the bull'. And if you're lucky, you may even get to see a shooting star whizz across the sky... what will you wish for?

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03

Scan the QR code to find out more about constellations, the myths surrounding them and how to spot them.

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Scan to watch



04

Do it yourself

Let's make a constellation starscope

Grab your materials:

- 1 toilet or kitchen paper roll
- Colors and glitter to decorate it
- Printed constellation templates (see at the end of the book)
- Aluminum foil
- Toothpick
- Flashlight

What to do:

- STEP 1** Decorate your paper roll
- STEP 2** Cover one end of the paper roll with aluminum foil.
- STEP 3** Place the constellation card you like the most on top of the aluminum foil. Use the toothpick to poke holes on the stars depicted on the constellation cards. Be extra careful not to tear the aluminum foil while poking it.
- STEP 4** Look through the paper roll and see the constellation you've created
- STEP 5** Go into a dark room and shine the flashlight through the paper roll against a wall. You'll see your constellation right in front of you!

05

Imagine, draw and come up with a name and a story for your own constellation. Make sure you give all the details



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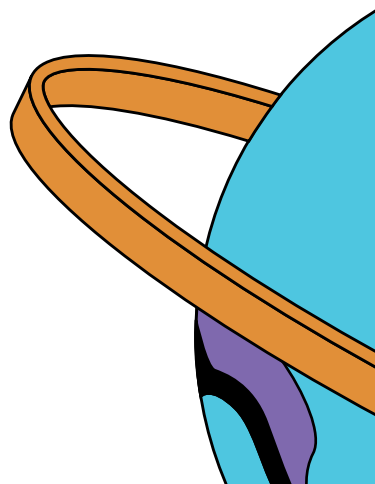
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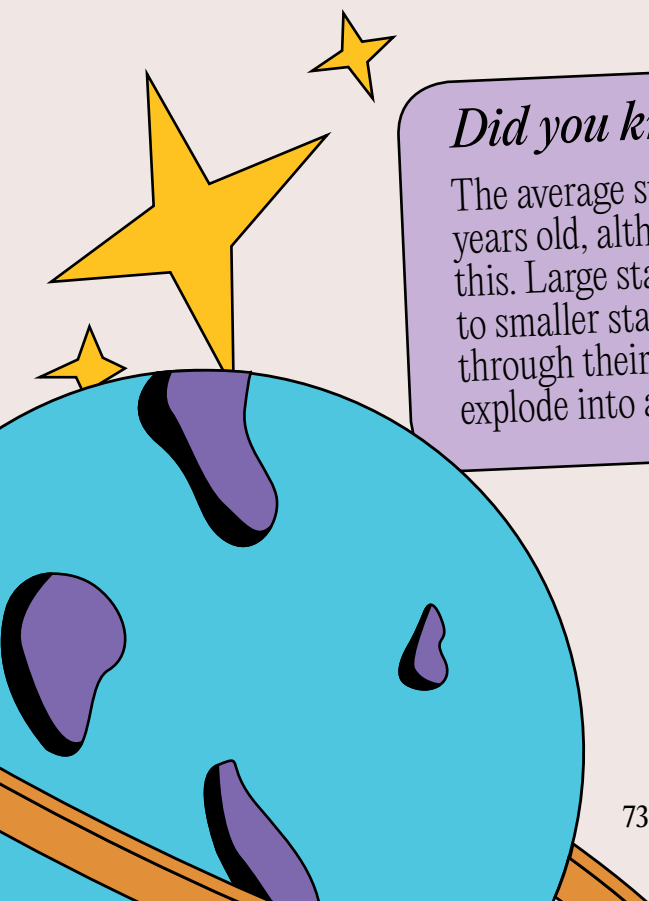
06

Check out this famous painting called "The Starry Night" by Vincent Van Gogh and try to make your own painting inspired by the night sky.



Did you know?

The average star is between 1 and 10 billion years old, although some stars are older than this. Large stars live shorter lives compared to smaller stars, because large stars burn through their fuel much faster. Giant stars explode into a bright supernova when they die.



Why do we explore space?

01

Think!

Where are we in the universe? What do you know about our place in our solar system. Discuss in groups and look for information in books and online and write down your findings.

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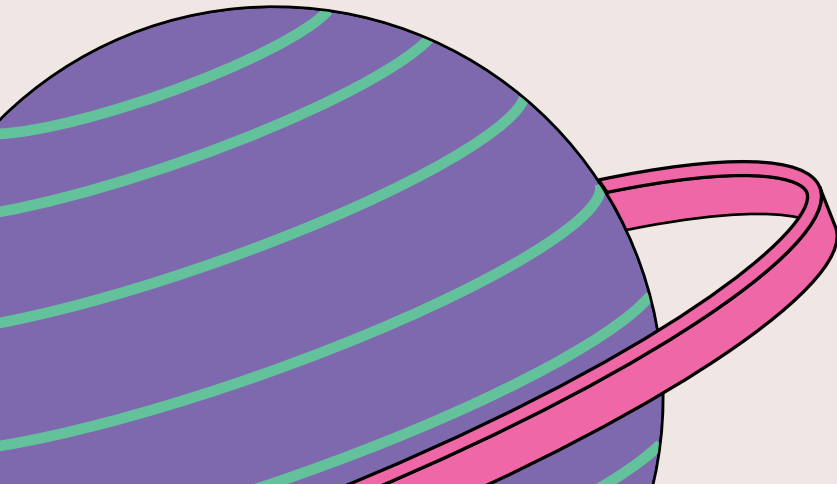
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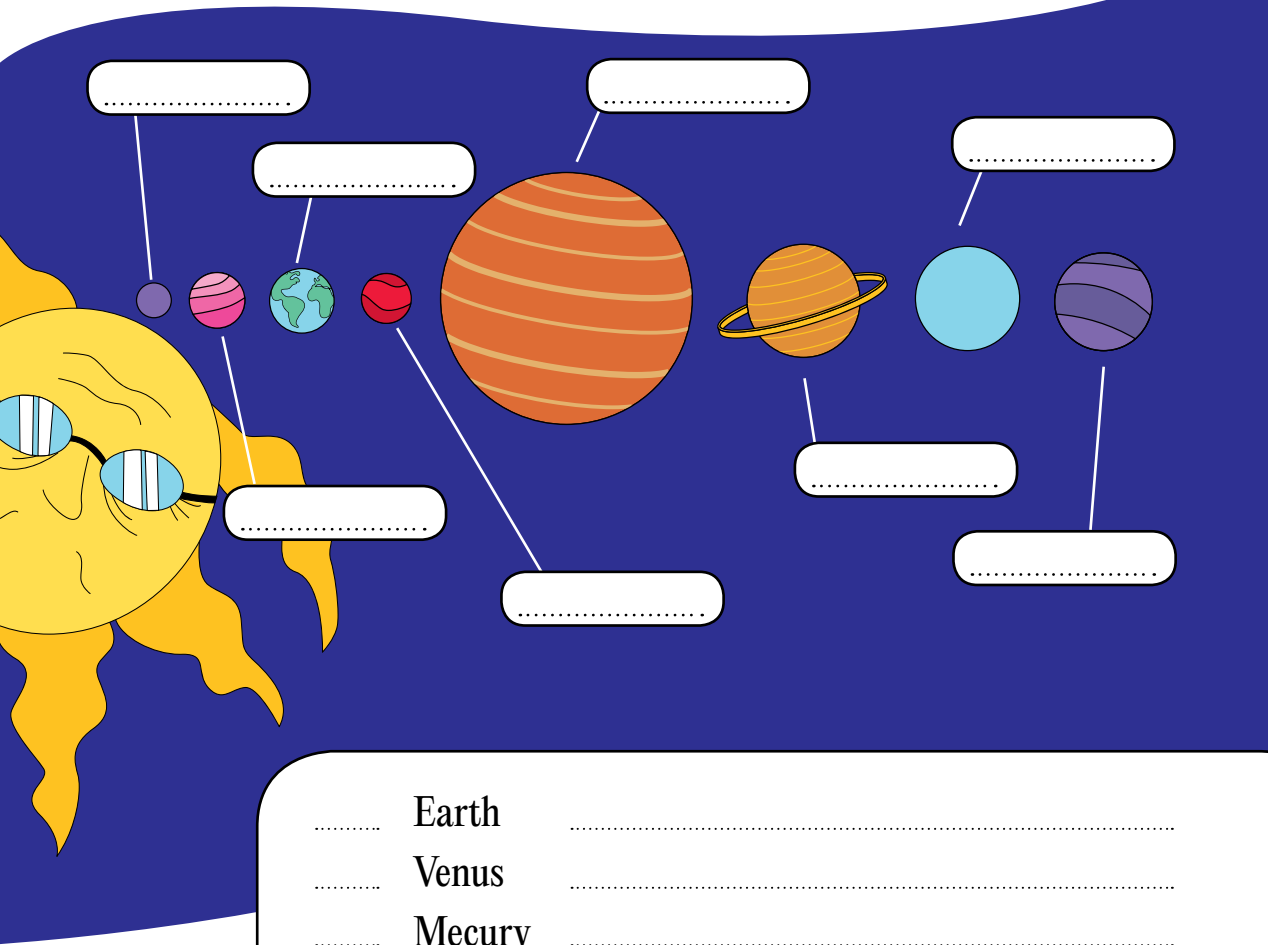
Now listen to the song about the planets and have a speed contest about who can say them faster in the correct order.

Scan to watch



03

Can you put the planets in the correct order, label them and write one piece of information about each one?



- | | | |
|-------|---------|-------|
| ..... | Earth | ..... |
| ..... | Venus | ..... |
| ..... | Mecury | ..... |
| ..... | Jupiter | ..... |
| ..... | Neptune | ..... |
| ..... | Saturn | ..... |
| ..... | Mars | ..... |
| | Uranus | |

04

Imagine and draw your own planet. Write a paragraph to describe it.

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05

Do it yourself

Let's create our own solar system.

Grab your materials:

- balloons
- acrylic paint (different colors)
- black cardstock
- paper plates
- plastic tablecloth or newspaper

What to do: *can you imagine what step 4 is?*

- STEP 1** Protect the table with a plastic tablecloth, or newspaper.
- STEP 2** Pour paint onto the paper plates.
- STEP 3** Inflate the balloons.
- STEP 4**
-

***TIP 1** Put two to three colors on the same plate for a swirled effect.

****TIP 2** Different balloon sizes can add interesting aspects.

06

Describe your solar system

How is your solar system called? How many planets are there?
What are they made of? Is there life on any of the planets?

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07

Why do you think people explore space?

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08

Engineering Time

Make a Slingshot rocket

Grab your materials:

- Big straws
- Rubber band
- Craft stick
- Paper clip
- Card stock
- Masking tape

Watch the video to see how to do it

and write down the steps

Scan to watch



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08

Engineering Time

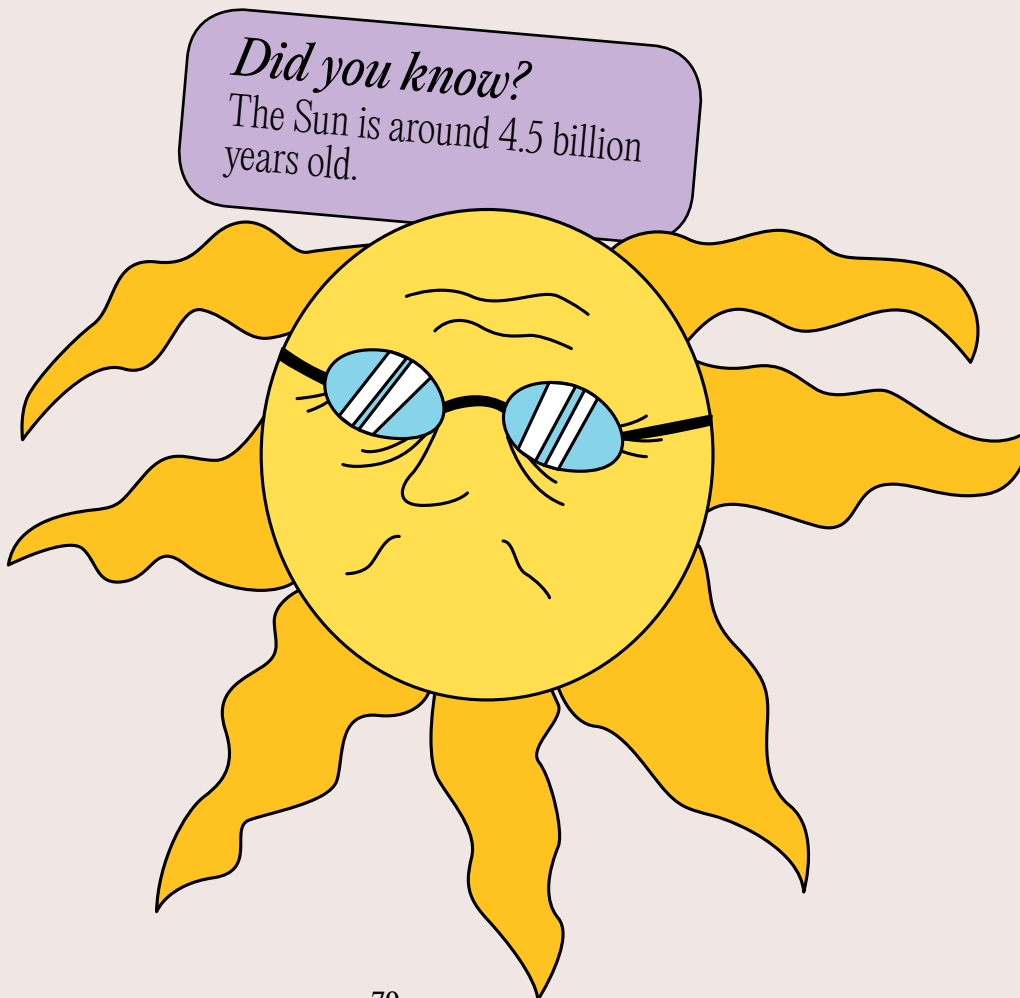
We'll take our rockets outside and make them a little messier.

Grab your materials:

- 1 plastic bottle
- 1 bottle of vinegar
- Some tablespoons of baking soda
- 1 napkin
- 1 cork
- Card stock to design the rocket
- Masking tape to stick the card stock on the bottle

What to do:

- STEP 1** Tape 4 straws to the top of the bottle to be used as legs for the rocket to stand on while launching.
- STEP 2** Decorate the rocket in any way you can imagine.
- STEP 3** Fill the bottle halfway with vinegar.
- STEP 4** Scoop a spoonful of baking soda in the center of a square of paper towel and roll it up. Twist the ends to close the baking soda in.
- STEP 5** Place the paper towel into the bottle, but don't drop it in the vinegar yet. Let the neck of the bottle hold the paper towel.
- STEP 6** Put a cork in the mouth of the bottle (If it doesn't fit you can use masking tape to make it a little wider and make sure that it closes)
- STEP 7** Turn the bottle upside down and let it stand on its legs.



What is gravity?

01

Many people believe that there is no gravity on the moon. Watch this video and discuss. What do you think?

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Scan to watch



Now check out your weight on other planets:



02

Think!
What is gravity? Watch the video and try to answer this question.

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Scan to watch



03

Match the words with their definitions.

Gravity

- the pushes and pulls that happen to objects

Forces

- the force that pulls us and everything else around us toward the Earth

Friction

- the force that happens when two things rub against each other

04

Let's Experiment

Grab your materials:

- A ball
- A feather
- 2 sheets of paper of the same size
- Any other object of different weight and size (eg. Book, pencil, sharpener etc.)

What to do:

STEP 1 Stand on a chair and hold the first 2 objects in front of you horizontally and at the same level. Which object will hit the ground first? Write your hypothesis.

STEP 2 Then, let go of the 2 objects at the same time. Which object hits the ground first? Write down your observations.

Repeat the experiment using different objects now. Grab the sheets of paper. Keep one piece of paper flat and crumple the other one up making a snowflake. Now hold both of them in front of you and drop them at the same time. Is the result different? Why? Why not?

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05

Think!

Would the result be the same if we did this experiment on the moon?

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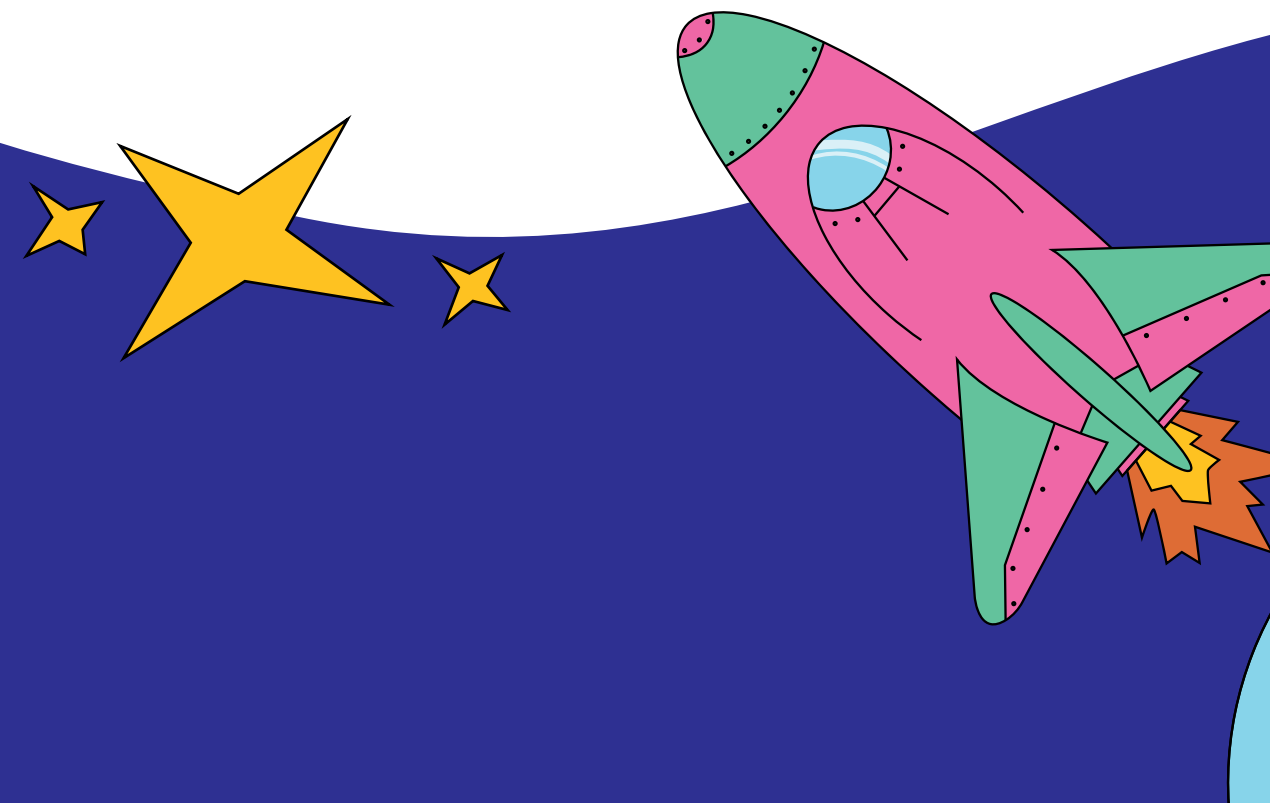
Did you know that Galileo was the first one to do this experiment many, many years ago? Go online and find out more things about Galileo. Share your findings next time in class.

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Do it yourself

Did you know you can defy gravity? Let's find out how you can do that using magnets

Grab your materials:

- Cardboard box or shoebox
- Cardboard
- Adhesive tape
- Magnets
- Paperclip
- String

What to do:

- STEP 1** Let's start off by decorating the cardboard (for example, you can draw the outer space in the background). Then, draw a spaceship (or any other object). Cut the spaceship out and add it to your paperclip. This is for decoration, you can just use an empty box and plain paperclip.
- STEP 2** Tie one end of your string to a paper clip and use the adhesive tape to secure the other end to the bottom of your box. The length of the string should be about 1cm shorter than the box.
- STEP 3** Put your magnet on top of the box.
- STEP 4** Hold the paper clip just under the magnet. Does it float or does it hit the ground? Write down your observations and try to explain why this is happening.



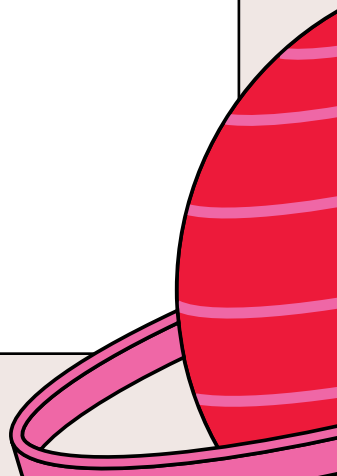
Stem Challenge

Let's try to defy gravity. Your mission is to work in groups and design a system to protect an egg from cracking or breaking from a high fall.

Grab your materials:

Anything you like! Some ideas include: paper towels, straws, tape, cardboard tubes, paper, popsicle sticks, baggies or old boxes.

Illustrate your design in the box.



Explain why you think your design will protect an egg from breaking from a fall:

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Find a spot someplace high and drop your egg “fort”
What happened? Look at what the other groups did and write down your observations.

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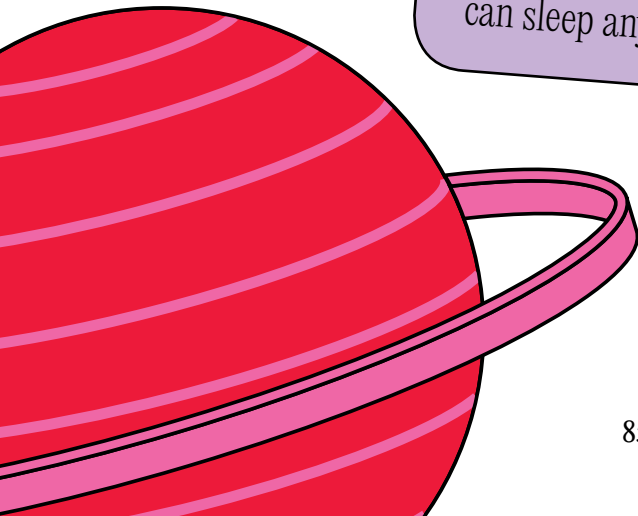
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Did you know?

The astronauts sleep in small sleeping compartments by using sleeping bags. They strap their bodies loosely so that their bodies will not float around. In the zero-gravity world, there are no “ups” or “downs”. The astronauts can sleep anywhere facing any direction!!



Why do we only see one side of the moon?

Rabbit Moon

A story from Mexico

In ancient times, an Aztec god chose to set himself on fire and jump into the sky to light the cold, dark world. He became the Sun. A second god jealous of the sun that the new god was getting, did the same. All of that light angered a third god who threw a rabbit at the second Sun's face to dim his light, making the Moon. Can you see the dark rabbit on the Moon?

01

Have you ever heard about any other moon stories? If not, don't worry! Here's your chance to create your own! Think about when you look up into the night sky, what does the moon look like to you? I bet it's more than just a plain white dot, right?

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02

Throughout the ages people from around the world have tried to explain what the moon is or why it constantly “changes”! Watch the following video to learn more about it:

Scan to watch



03

Now try to answer the following questions.

Why do we only see one side of the moon?

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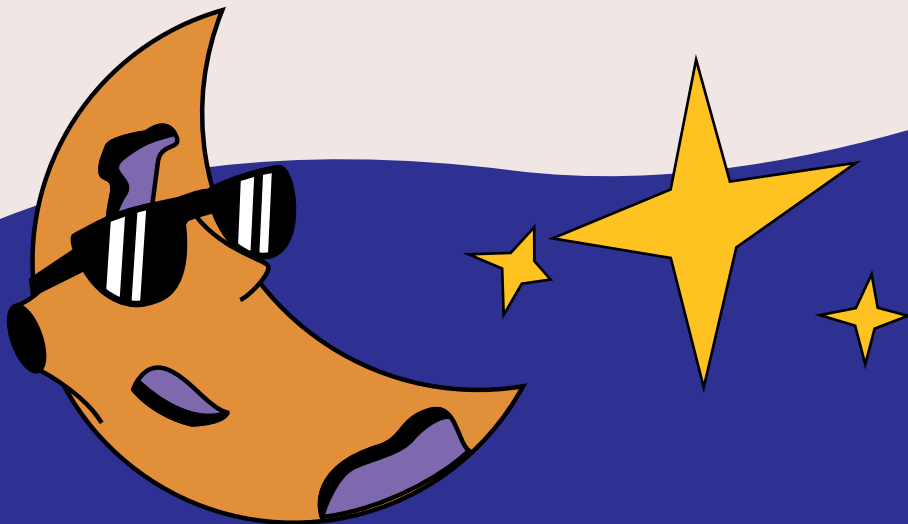
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Why does the moon seem to “change” shapes?

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04

Let's Act it Out

The One Side of the Moon.

After watching the video, get into teams and try to demonstrate in class what causes us to see only one side of the moon! Do you remember? If not, it's ok to watch the video again! Now, here's how you can make your moon dance performance!

There are two ways:

a

You can use equipment provided in class such as:

- a torch
- a small felizol / plastic ball
- a globe or a balloon.

b

If none of the above is available in class, you can design on a piece of paper and wear simple name tags or signs such as "Moon", "Sun", "Earth" and move around in class, in a way that reflects the way these objects move, similar to the video you have just watched!

05

If acting out is not your cup of tea, how about this?

First watch this video and then try to conduct the experiment at home or/and make your own video and narration!

Scan to watch



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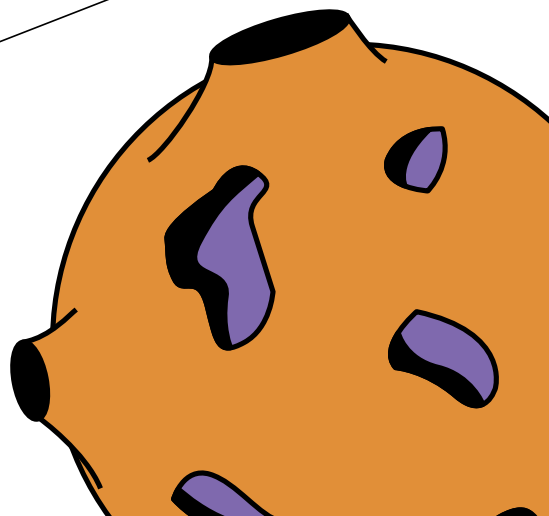
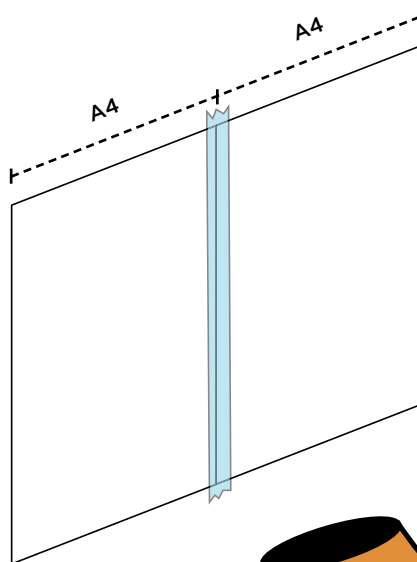
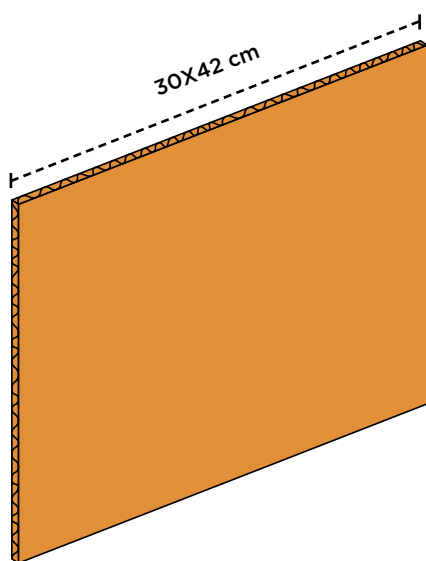
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Do it yourself

Delicious Moon phases

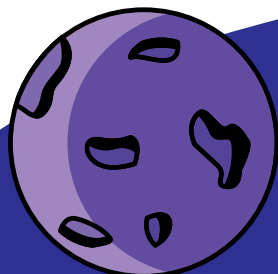
Grab your materials:

- 8 oreo (or any other brand of frosting filled) cookies
- A popsicle stick or a spoon or any other tool you find easy to use so that you can scrape the frosting from the cookies.
- A large flat plate or a thick piece of paper or cardboard 30x42 cm (if you don't have any of these, you can use two A4 sized paper sheets and join their vertical sides together with cello tape or glue)

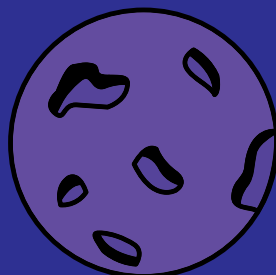


What to do:

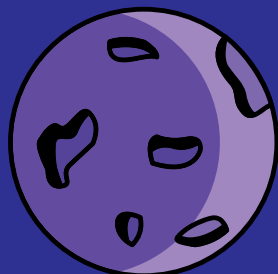
- STEP 1** Slowly twist an Oreo open to leave as much frosting on one side of the cookie as possible. If it doesn't work, eat the cookie and try again!
- STEP 2** Use the popsicle stick or spoon or other tool to create the phases of the moon by scraping out the frosting.
- STEP 3** Arrange the phases of the moon in order! Remember that the phases of the moon depend on its position in relation to the Sun and the Earth. You can use this diagram to help you!



WANING
CRESCENT

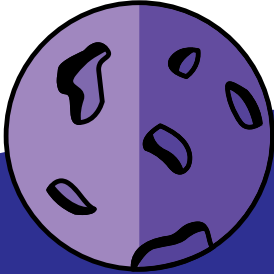


NEW
MOON



WAXING
CRESCENT

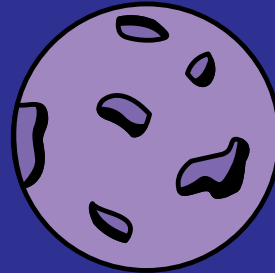
Did you know?
The rise and fall of the tides on
Earth is caused by the Moon.



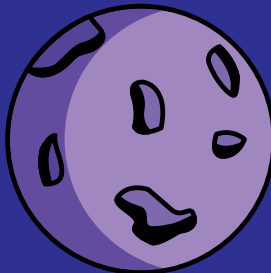
THIRD
QUARTER



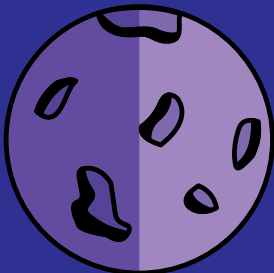
WANING
GIBBOUS



FULL
MOON



WAXING
GIBBOUS



FIRST
QUARTER

The Scientific Method

Name: Date:

Question

.....
.....

Hypothesis

.....
.....

Materials

-
-
-
-
-

Procedures

- 1
- 2
- 3
- 4
- 5

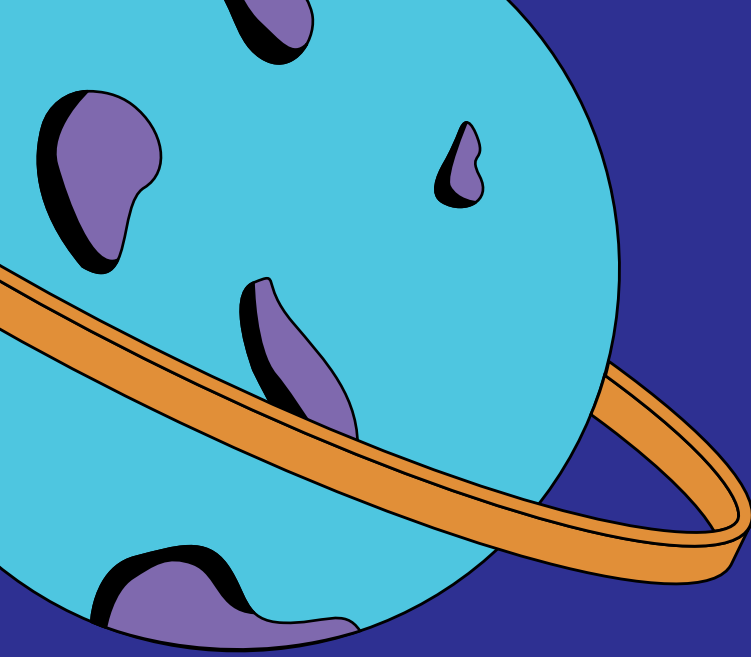
Observations

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Conclusions

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Glossobooks

