

# The Spark

Magazine



PUZZLES, QUIZZES, OUTDOOR LEARNING

**ISSUE  
No13**

**FOOD CHAIN  
TAI CHI**

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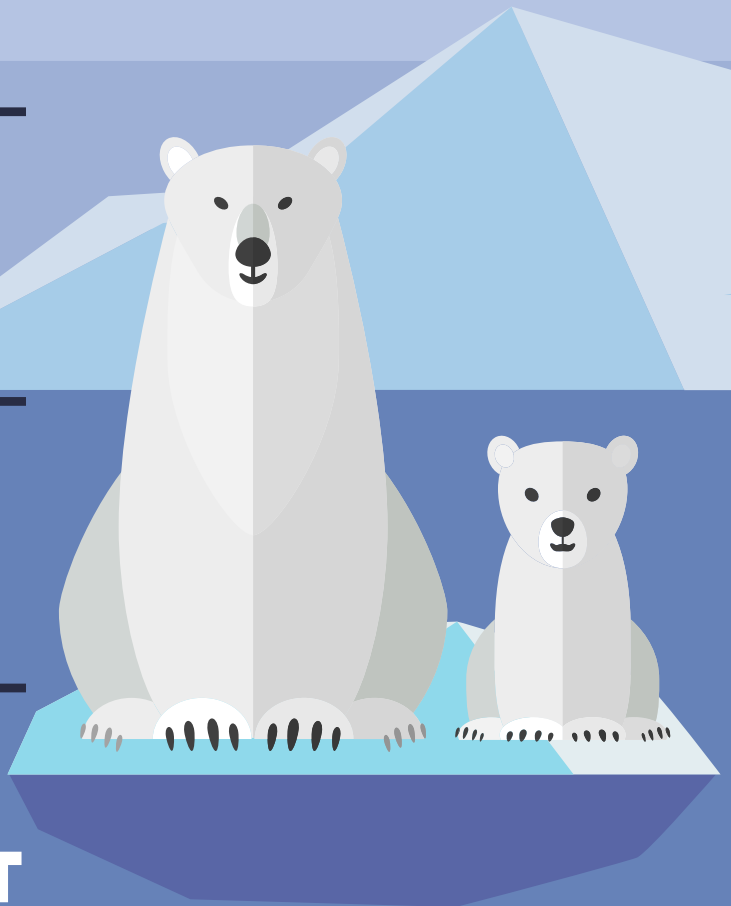
**EXPLORE  
INCREDIBLE ICE**

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**MAKE A  
PLANT MAZE**

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**MEET A  
WEATHER EXPERT**



With support from the Inspiring Science Fund – a partnership between UK Research and Innovation (UKRI) and Wellcome.



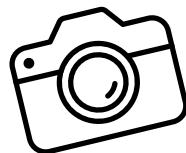
UK Research  
and Innovation



GLASGOW  
**SCIENCE  
CENTRE!**

# Inside

This issue



## WELCOME

Welcome to another exciting issue of The Spark - crammed full of creative and curious experiments, puzzles, quizzes and facts.

This bumper climate edition is packed with experiments to help us understand our planet. Investigate Arctic and Antarctic ice and its effect on the rising sea levels. Meet a weather expert and learn all about the wonderful world of clouds. Find out about the world's biggest climate conference, COP26, taking place in Glasgow this November.

Plus, we'll be making our own weather instruments, plant maze and cloud in a jar.

Best wishes,  
Glasgow Science Centre

## SHARE YOUR PICS WITH US

If you try any of our activities this week, please show us how they turned out! Send your favourite pictures to **CLDteam@gsc.org.uk** or share with us **@TheBothyGSC** on Twitter. We'll share a selection of your pictures in the magazine.

## We only have one planet and it's our responsibility to look after it.

One of the ways we can do this is by recycling our waste!

When we recycle, our used materials are turned into something new.

Recycling helps the planet by conserving raw materials and reduces the energy and costs involved in manufacturing new products.

Recycling waste also reduces greenhouse gas emissions, which helps to tackle climate change. Greenhouse gases such as methane and carbon dioxide (CO<sub>2</sub>) are gases in the Earth's atmosphere that trap heat. They let sunlight pass through the atmosphere, but they prevent the heat that the sunlight brings from leaving the atmosphere, which can have an impact on our climate.

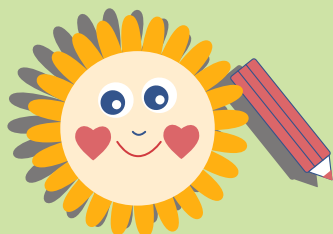
UK recycling is estimated to save more than 18 million tonnes of carbon dioxide (CO<sub>2</sub>) from entering our atmosphere per year. This is the same as taking 5 million cars off the road.



## MINI GAME

### Sort the waste.

Can you match the items to the correct bin?





# FAMILY QUIZ

All questions linked to activities in this issue

Answers on  
back page

## QUESTIONS

### HINT

You may find some answers throughout this magazine or in our #GSCAtHome videos.

- Q1.** How old is the world's oldest living individual tree?  
**A.** 100 years old **B.** 1,500 years old **C.** 5,000 years old
- Q2.** How was coal formed?
- Q3.** What is the rainiest country in the world?  
**A.** Scotland **B.** Colombia **C.** Fiji **D.** Singapore
- Q4.** Where is the world's largest desert located?
- Q5.** What planet has the strongest greenhouse effect?
- Q6.** What are clouds made of?
- Q7.** What do we call an organism that can make or produce its own food?  
**A.** Producer **B.** Consumer **C.** Predator **D.** Prey
- Q8.** What is the process plants use to make food from the sun?
- Q9.** What is the deepest lake in the UK?
- Q10.** Why do storm clouds appear dark?
- Q11.** What is the optical phenomenon called when the light from the moon is refracted through water droplets?
- Q12.** What is the name of a scientist that studies the weather?  
**A.** Meteorologist **B.** Geologist **C.** Palaeontologist **D.** Archaeologist
- Q13.** Stratus, cirrus, cumulus and nimbus are all types of what?
- Q14.** How many species of edible plants are there?  
**A.** 20,000 **B.** 60,000 **C.** 80,000
- Q15.** What percentage of the oxygen we breathe comes from plants in the sea?  
**A.** 55% **B.** 70% **C.** 85%
- Q16.** CO<sub>2</sub> is the chemical abbreviation for which greenhouse gas?
- Q17. True or False:** There are enough clothes on the planet right now to clothe the next 6 generations of the global population.
- Q18.** Woodlands in Glasgow remove how much carbon from the atmosphere each year?  
**A.** 2,000 tonnes **B.** 5,000 tonnes **C.** 9,000 tonnes
- Q19.** In which year did the first COP (United Nations Climate Change Conference) take place? **A.** 1990 **B.** 1995 **C.** 2000
- Q20.** What agreement was signed in 2015 at COP21 to limit global warming to 1.5°C?  
**A.** The Paris Agreement **B.** The Glasgow Agreement **C.** The Madrid Agreement

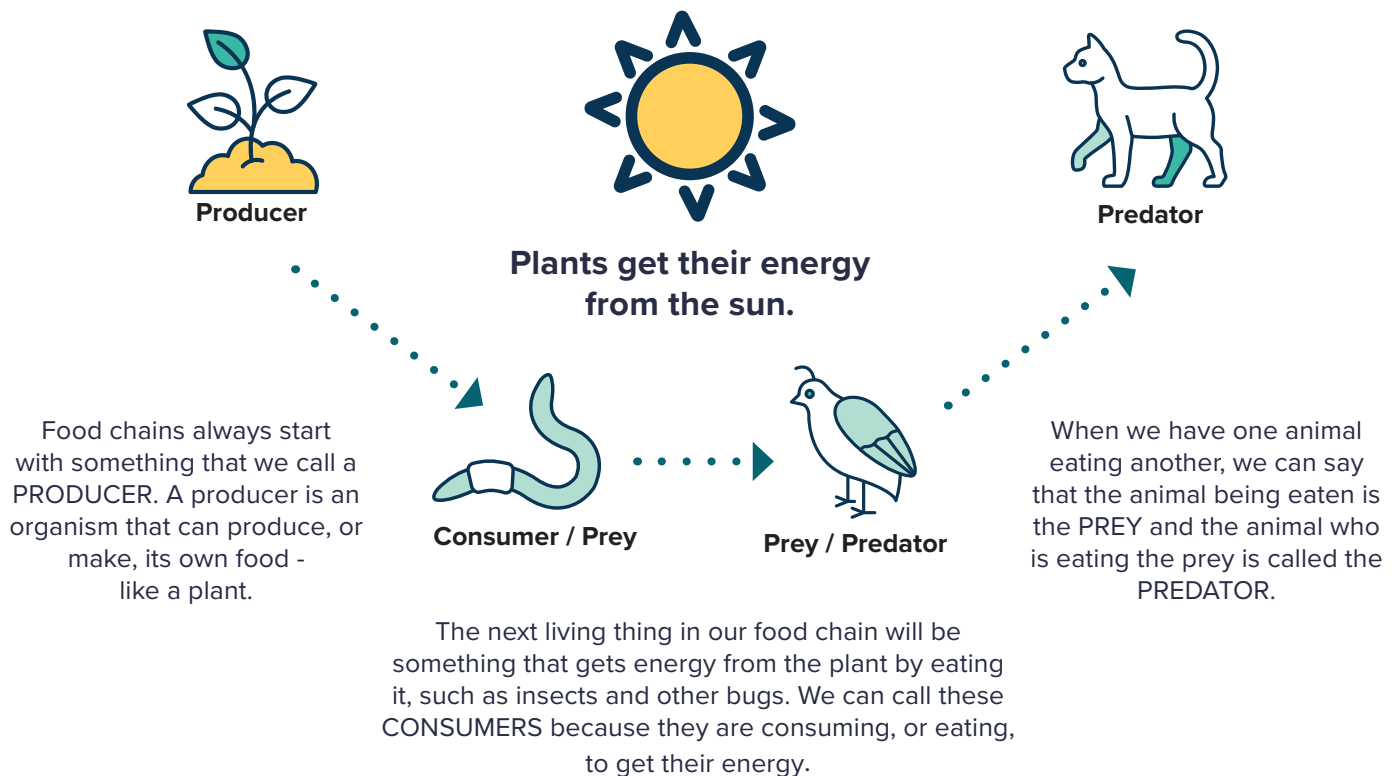
# Food Chain Tai Chi

Discover what food chains are and why they are important for our planet.



## What is a food chain?

A food chain is something that helps us understand how plants and animals get their energy and how all living beings are connected and have a big impact on each other.



**Animals - humans included - don't just eat one type of food. Our fox here, would eat both the robin and the worm.**

Try researching your favourite animal and find out what food chains they are part of. Are they predators or prey? Consumers or producers? Can you draw the food chain that they are part of?



**Food chains are a reminder that all plants and animals are part of a larger ecosystem where they rely on each other to survive.**

**Healthy ecosystems can:**

- Clean water
- Slow down climate change
- Provide oxygen to breathe
- Keep nature beautiful



**FUN FACT**

Getting out in nature has a positive effect on your mental health.

An ecosystem is a community made up of all the living things (like plants and animals) and non-living things (like water, rocks and soil) in an area. Having a large variety in the number of different plants and animals in an area is good for our ecosystem. We would call a healthy area like this 'biodiverse'.

## Food Chain Tai Chi

Tai chi is a form of martial art that uses slow flowing movements to help improve balance, posture and reduce stress. Here we will use our bodies to represent parts of the food chain and flow gently from one part to the other.



Our food chain will start with the sun. Stretch your arms up and move them in a circle to represent the big, bright sun.



Trees take energy from the sun. Stretch your arms up high as branches, wiggling your fingers like leaves. Sway gently from side to side.



What gets energy from trees? Caterpillars eat the leaves! Lie on the ground and wiggle along like a caterpillar.



Spiders get energy by eating caterpillars. Crouch down and hold out your arms as legs and scuttle around like a spider.



Birds get energy by eating spiders! Stand up straight again, hold out your arms and flap them like wings.



What might get energy from birds? Cats! Get on all fours and prowl your space like a cat hunting for prey.

# Plant Maze

Discover what important things plants need to survive and make a maze to find out how your plant grows inside it.

Plants come in all shapes and sizes, from flowers and trees to fruits and vegetables. Despite this diversity they all need the same things to survive and grow.

## FUN FACT

There are over 80,000 species of edible plants.

## What do plants need?

With sunlight, water and nutrients from the soil, the plant makes the energy it needs to grow. This process is called **PHOTOSYNTHESIS**.

As a part of this process, plants also take in carbon dioxide to help make energy and give out oxygen.

Most common plants are made of the same three parts: roots, leaves and a stem.

Roots, leaves and a stem hold the plant in place and take in water and nutrients from the soil.

The leaves provide a large surface area to take in sunlight.

The stem helps to hold the plant up to reach the sunlight.

## ACTIVITY

### What will you do?

Build a maze for your plant to find out how sunlight affects its growth.  
Make sure you have adult supervision before starting.

### What will you need?

A small plant pot, seeds (eg. pea seeds, as they grow quickly), soil, water, a cardboard box (eg. an adult's shoe box with a lid), two pieces of cardboard (the same width and depth as the box), scissors and tape.

### How to plant

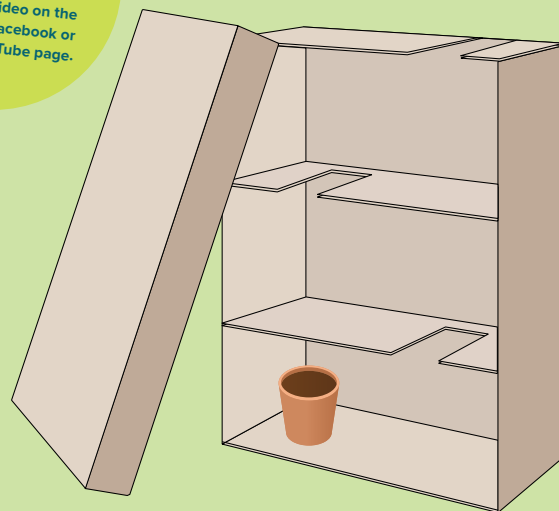
- 1: Fill your pot about two-thirds of the way up with soil.
- 2: Place a couple of seeds into the pot a few centimetres apart.
- 3: Cover with soil to just below the lip of the pot.
- 4: Water until the soil looks consistently moist and leave to sprout.



# How to make your maze

Use the cardboard box and two pieces of cardboard to make your maze.

1. Draw a simple maze design to plan a path through the cardboard box from the bottom to a hole in the top.
2. Make a line on the box to mark where each piece of cardboard will be inserted. Top Tip! Remember to leave enough room at the bottom of the box for your plant, plus a few centimetres of space above the pot.
3. Mark out where you will cut out a gap in the pieces of cardboard and in the top of the box. Cut out these shapes.
4. Tape the pieces of cardboard inside the box. Make sure the gaps are at opposite sides of the box, so the plant must zig zag to get out.
5. Tape up any unwanted gaps, in case the plant tries to grow in the wrong direction.
6. Put the sprouted plant in the base of the maze and leave in a sunny windowsill. It may take two weeks for your plant to complete your maze. Remember to water it as it grows and close the box tightly afterwards.



**Plants need sunlight to survive, and will grow towards the light so they can gather energy.**



**Sunflowers will move their flowers to face the sun as it moves across the sky.**



## More to try

What would happen if you grew your plant in complete darkness?

Re-pot your healthy plants to help them grow even bigger and if you used edible plants, give them a taste!

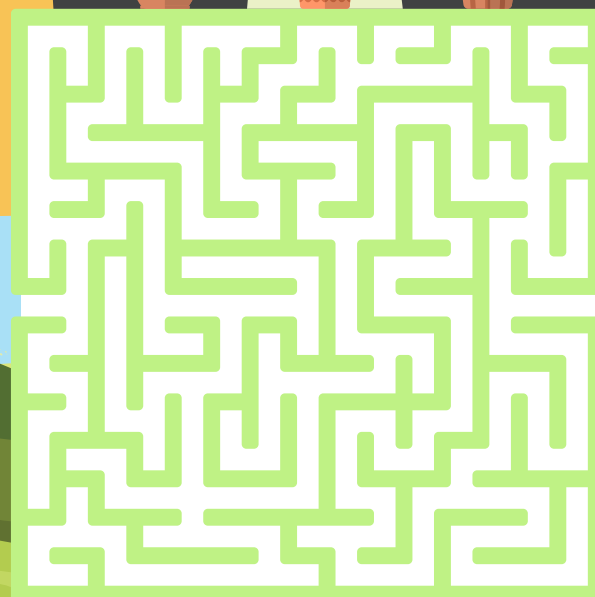
Why not investigate the types of plants in your garden and how they grow?



## MINI GAME

**Oh no! These vines have overgrown and made a maze!**

Can you help the hungry squirrel find their way through the maze to their lunch?



# Wee Forests

Part of the Tiny Forest family



## What is a Wee Forest?

A Wee forest is a densely packed, native woodland. Just one Wee Forest can contain 600 trees in an area as small as a tennis court!

You can find Scotland's first ever Wee Forest in Easterhouse, Glasgow. There are plenty more to be planted soon across Scotland, in a joint project by Earthwatch and NatureScot.

Coming to our neighbourhood!  
A Wee Forest is being planted in Govan this October, supported by Bloomberg.

DID YOU KNOW?

## New Neighbours

Wee Forests are brilliant for **biodiversity**.

A Wee Forest can become a habitat for over **400** species of plants and animals - creatures such as birds, bees and frogs.

Have a go at colouring in the animals on this page.

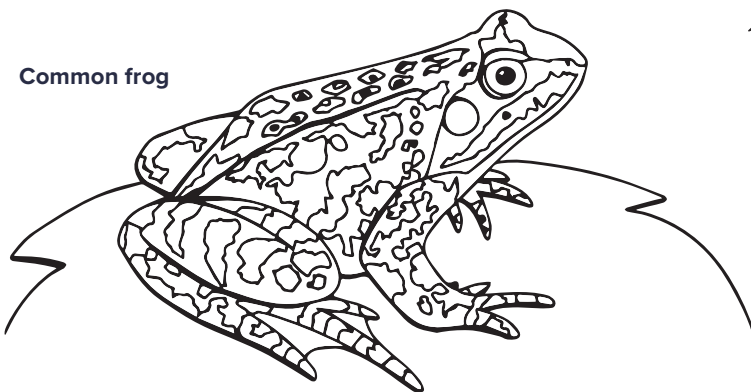


House Sparrow

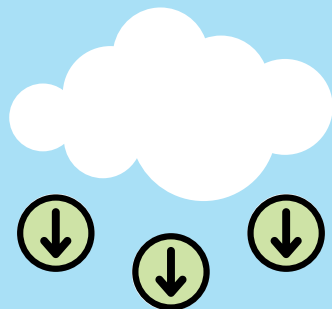


Early Bumblebee

Common frog



Wee forests help to pull CO<sub>2</sub>, a greenhouse gas, out of the atmosphere which helps us fight climate change and keep our air clean!



## Healthy Competition

With so many trees and shrubs sharing such a small space, these plants must compete against each other for water and sunlight.

The result of this competition is a very fast-growing forest.

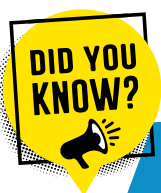
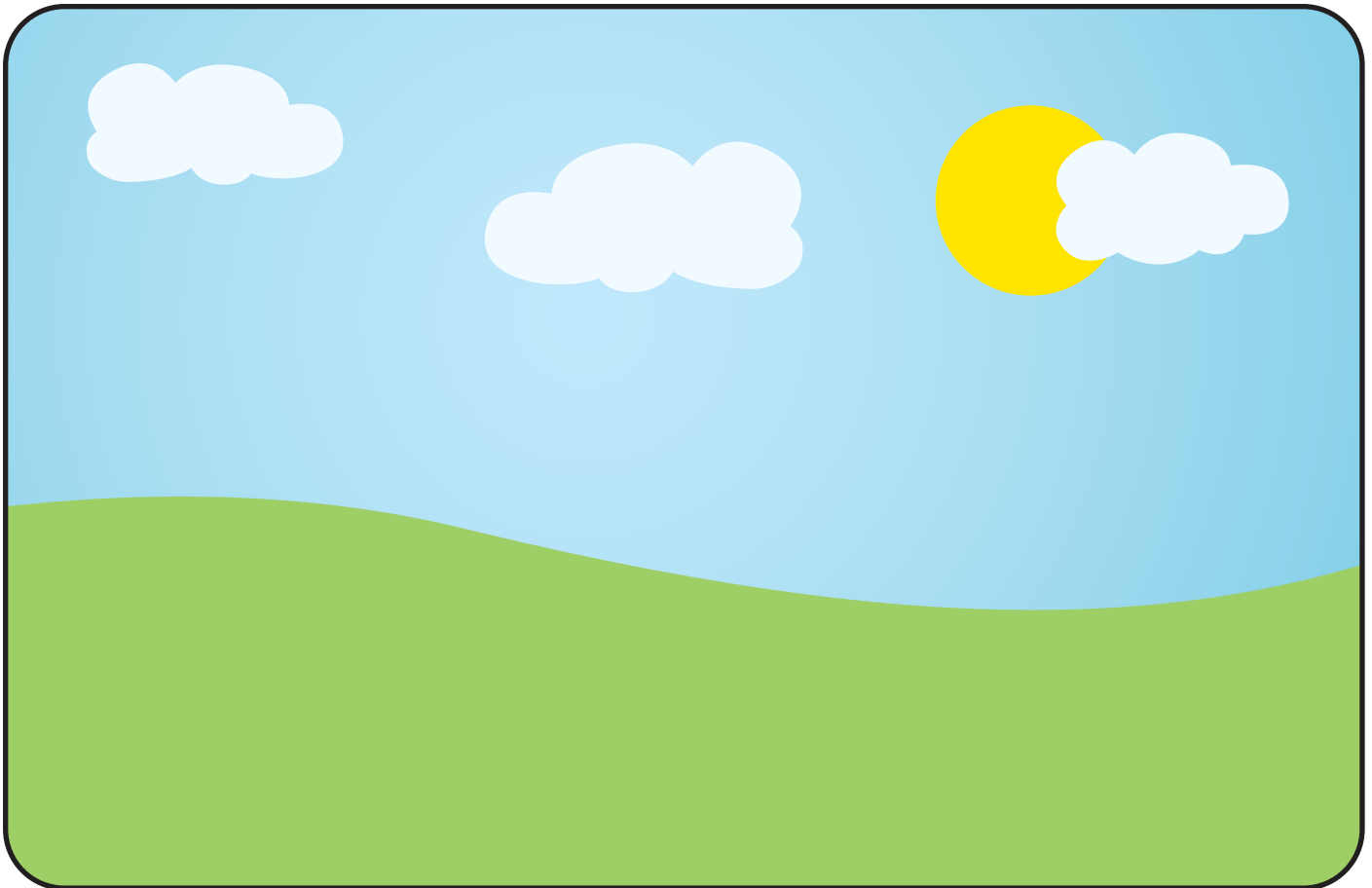
A Wee Forest can reach maturity in just 20-30 years which is much quicker than other forests which can take as long as 200 years to mature.



## ACTIVITY

### Design your own Wee Forest

What plants would you have? What animals do you think would visit?



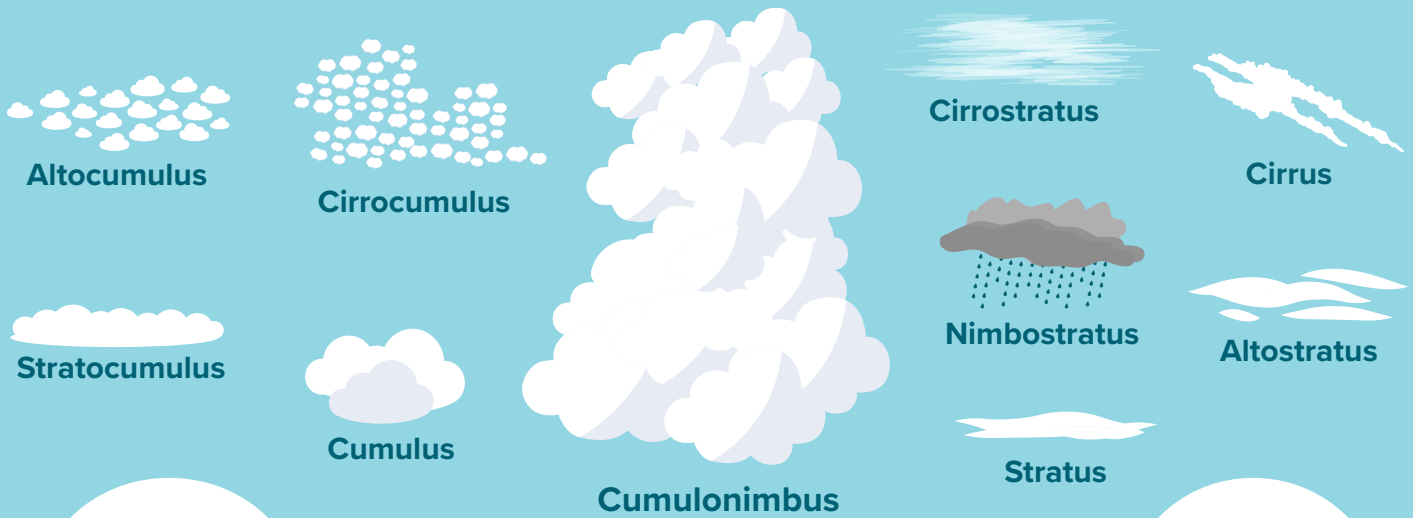
Forests around the world are home to 80% of our world's land animals and plant species.



Colouring images by Earthwatch Europe

# What are clouds?

How are they made and how can you identify different types?



## Cloud Facts

Clouds are formed from **water vapour**, tiny droplets of water in the air. As the **water vapour rises** in the sky, it cools and starts to collect around bits of dust and ice or salt, and **forms a cloud**.

Clouds can form into many **different types**, depending on the **wind and temperature**, and get their name from their shape and **position in the sky**.

Cumulonimbus is known as the **king of clouds** - they can grow **very high** and are the only ones that produce **thunder and lightning**.

Clouds are droplets of water or ice floating in the sky at different heights.

## ACTIVITY - Cloud in a jar experiment

Make sure you have adult supervision before starting.

### What will you need?

A glass jar with a lid, a cup of very hot water, blue food colouring, aerosol hairspray and 3-5 cubes of ice.

1. Add a few drops of food colouring to the bottom of the jar.
2. Pour the cup of hot water into the jar.
3. Quickly spray hairspray into the jar.
4. Immediately put the lid on the jar.
5. Place the ice cubes on top of the lid.
6. Watch the space at the top of jar. What's happening?

### How it works

1. The hot water heats the air inside the jar. Some of the water evaporates, turning into water vapour.
2. The water vapour rises to the top of the jar where the air is cooler because of the ice cubes.
3. The water vapour in the cooling air condenses around the particles of hairspray and forms a cloud in the jar!



## ACTIVITY - Make a rain gauge

Make sure you have adult supervision before starting.

### What will you need?

A 2L plastic bottle, scissors, small stones, a permanent marker, a ruler and sticky tape.

1. Cut off the top part of the bottle. You can use sticky tape to cover any sharp edges left on the bottle.
2. Insert a few stones into the bottom part of the bottle. This will help it stay upright in windy weather.
3. Take the top part of the bottle and insert it into the bottom part, with the neck pointing down. Use tape to secure this. This will act as a funnel to direct rain into the rain gauge.
4. Draw a scale on the side of your bottle. Using your ruler, line up the zero point with the bottom of the bottle. Using your marker pen, make a mark for every centimetre all the way to the top of the gauge.
5. Find a suitable spot outside to place your rain gauge.
6. Check your rain gauge every day for a week, at the same time each day. Make a note of the height of the water in the gauge before you empty the water out and place it back in its position.



What clouds were in the sky while it was raining?

Could you predict if it was going to be a rainy day or not depending on what clouds you saw?

What was the greatest amount of water you recorded?

Could you make a graph of your results?

## I'M A... METEOROLOGIST

### Meet Hazel Bremner

**Hazel is a meteorologist who works for the Met Office and forecasts the weather for lots of different customers - from military aircraft and ships to radio forecasts.**

I was always interested in the world around me. This inspired me to find out how the natural world worked. I wanted to understand what was happening outside my window from the landscape to the weather. I went to university and studied meteorology and climate science. To be a meteorologist at the Met Office you need a degree in maths, science or geography and then you get taught the meteorology by teachers at the Met Office. Meteorology isn't just what you see on the television, there are lots of different aspects, from the physics of the atmosphere to the coding that goes into weather and climate models that are run by our supercomputer.

**My favourite thing about my job is there is something new to look at every day! The weather never stops, and you have to keep on top of the latest forecasts so you can provide good advice to the customers. I have been able to travel to different countries to forecast the weather and am currently working in the Falkland Islands, which is on the other side of the world, and they have penguins!**





# What is Climate change?

**Climate change** refers to a long-term change in the planet's weather and temperatures on a huge scale. This includes the steady increase of the planet's average temperature, sometimes referred to as global warming.

## How have humans contributed to rising temperatures?

Since the 1800s, and a period known as the Industrial Revolution, humans have relied on the burning of fossil fuels for energy to power homes and manufacturing. Burning fossil fuels results in gases such as carbon dioxide (CO<sub>2</sub>) and methane being released into our atmosphere. This leads to something called the greenhouse effect.



## What is the greenhouse effect?

In a greenhouse, the heat from the sun travels in through the glass but it can't escape. This causes the air inside to heat up.

Just like the glass in a greenhouse, greenhouse gases create a layer around our planet, meaning the heat gets trapped and the Earth is slowly heating up. This hasn't always been a bad thing. Our greenhouse effect has kept Earth at a habitable temperature. The problem now is Earth is getting too hot and this is starting to have a negative effect on our environment.

## What can be done to stop it?

We can all do our bit to lessen our impact on the planet by reducing what we buy and consume, reusing items to reduce the need for single use plastics and recycling as much as possible to reduce our need for new raw materials.

One way to make large scale change is for governments and large corporations to agree to sustainable changes and emissions goals. That's where COP26 comes in!

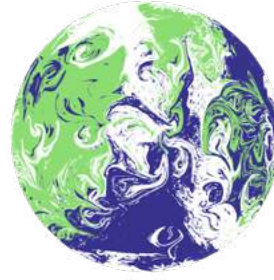
## Impacts of climate change

We are already seeing the impacts of climate change with more extreme weather events such as wildfires, flooding, the oceans becoming more acidic and melting polar icecaps.



## What is COP?

COP or "Conference of Parties" is the annual United Nations Climate Change Conference where parties made up of world leaders and climate experts officially meet to discuss, negotiate and agree on a coordinated plan to tackle climate change. It is also a time to highlight climate science, showcase community climate action and to share knowledge and experiences.



**UN CLIMATE  
CHANGE  
CONFERENCE  
UK 2021**

IN PARTNERSHIP WITH ITALY

## What does COP aim to achieve?

In 2015, every country signed the Paris Agreement; an agreement to work together to tackle climate change on a global scale and limit global warming to below 2°C.

**COP26** will be the year that they meet with their updated plans which detail their goals and ambitions for the future including:

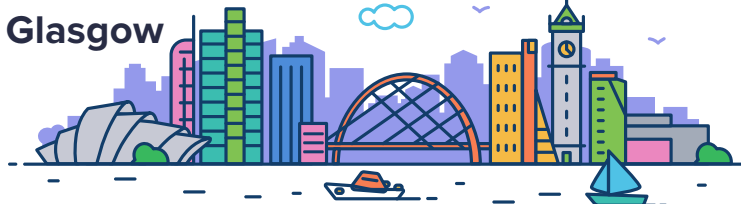
- **Ambitious reductions in CO<sub>2</sub> emissions.**
- **Protecting communities, habitats and ecosystems.**
- **Making funds available in order to achieve goals.**



## When and where does COP take place?

COP has met annually since 1995 and takes place in a different city each year. This year's conference will take place from 1 - 12 November in Glasgow.

The main area for officials will be at the Scottish Event Campus (SEC).



## Who attends COP?

Over 30,000 people representing 197 countries, will be involved in negotiations at this year's conference. That's the same as the entire population of the British Virgin Islands!

In addition, there will be thousands of negotiators, businesses and experts. There may even be a few famous faces such as Sir David Attenborough!

## How can you get involved?

Glasgow Science Centre will form part of the Green Zone and will showcase exhibitions, workshops and promote discussion around climate change for public and schools to engage in.

You can get involved in the conversation online and on social media and find out how you can help make a difference. Check out the **Our World Our Impact** programme on the GSC website: [glasgowsciencecentre.org/discover/our-world-our-impact](https://glasgowsciencecentre.org/discover/our-world-our-impact)



## ACTIVITY

# Arctic and Antarctic Ice Investigation!

## What will you do?

In this experiment you will investigate the difference between Arctic and Antarctic ice and its effect on rising sea levels.

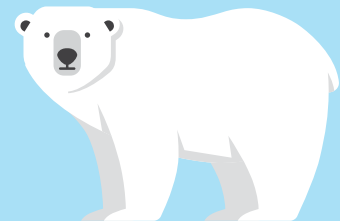
**Make sure you have adult supervision before starting.**

## What will you need?

Two unopened cans of food, two clear containers (slightly wider and taller than the cans of food), a tray of ice cubes, a marker pen, scissors, a ruler and a pen

## Arctic Ocean Model

In the Arctic Ocean, ice floats in massive icebergs on the surface of the water. This model represents ice in water.



**DID YOU KNOW?**



The coldest temperature ever recorded happened in **1983** in Antarctica. It was **-89 degrees celsius!**



**Place one can of food in a clear container.**



**Crush 3 ice cubes into small chunks and mix with water.**



**Pour your ice and water mixture into one of the containers, until it comes to about 1cm below the top of the can.**



# Antarctic Ocean Model

Antarctic ice exists as huge sheets of ice that covers the land of the continent. This model represents ice on land.



Place the other can of food into the other clear container.



Pour water into the container until it comes to about 1cm below the top of the can.



Place 3 ice cubes on top of the can.

Label the containers 'Arctic' or 'Antarctic' and mark a line at the water level.

Check on each model once the ice has melted.

What changes can you see in the water level?

How do the two containers compare to each other?



You may have noticed that the water level in the Antarctic model has risen whilst the Arctic model has not. This means that the melting of Antarctic ice would have a much more dramatic effect on sea levels around the globe than Arctic ice. However, the Arctic also provides a habitat for animals like polar bears and walrus. With a warming planet we risk the extinction of those animals.



DID YOU KNOW?

**Polar ice caps** help keep our planet cool. The bright, white ice reflects **excess heat** from the sun back into space.

## ABOUT US

Glasgow Science Centre is a 5-star visitor attraction located beside the River Clyde. We are home to hundreds of interactive exhibits where you can discover how the world works.

Glasgow Science Centre is a registered Scottish charity SC030809.

For more information and bookings, visit: [glasgowsciencecentre.org](http://glasgowsciencecentre.org)

## QUIZ ANSWERS



**Q1.** C - 5,000 years old. It is a bristlecone pine tree in the White Mountains of California. The exact location is kept secret to protect it from damage and trampling.

**Q2.** Coal was formed millions of years ago from the remains of dead trees and other plant materials.

**Q3.** B - Colombia, which gets anywhere between 1,000 and 1,800 mm of rain on average every year! Much more than even Scotland!

**Q4.** Antarctica. While Antarctica is the coldest place on earth it is also the driest, making it a desert.

**Q5.** Venus. Scientists believe that Venus may have had an ocean billions of years ago.

**Q6.** Clouds are made of water droplets or ice crystals which are so light they are able to stay in the sky.

**Q7.** A - A producer is an organism that can make its own food.

**Q8.** Photosynthesis is the process plants use to make food from the sun.

**Q9.** Loch Morar, Scotland, is the deepest lake in the UK, at 310 m. It's even supposed to have its own monster named Morag!

**Q10.** The water vapour in storm clouds is clumping together to create raindrops, meaning less light is reflected.

**Q11.** It's called a moonbow or lunar rainbow. Unlike rainbows, which appear as 7 colours, moonbows appear as white.

**Q12.** A - the name of a scientist that studies the weather is a meteorologist.

**Q14.** C - 80,000 species of edible plants.

**Q15.** B - 70% comes from plants in the sea.

**Q16.** CO<sub>2</sub> is Carbon Dioxide.

**Q17.** True. The fashion industry accounts for about 10% of worldwide carbon emissions.

**Q18.** 9,000 tonnes. This is enough to offset the estimated annual carbon emissions by Glasgow cars!

**Q19.** B - The first COP took place in 1995 in Berlin, Germany.

**Q20.** A - The Paris Agreement.

## OUTDOOR SPACE

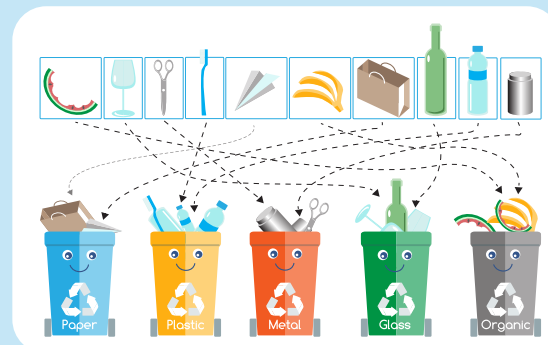
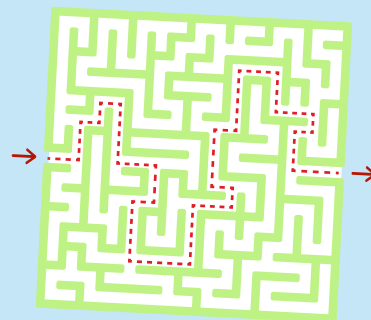


**Unravel the mysteries of nature in Glasgow Science Centre's Outer Space.** This outdoor discovery area at our Pacific Quay home has over 10 interactive experiences – all available without a ticket.

Wander through our charming wetland, step inside a kaleidoscope and even create a whirlpool. The world is a source of wonder so nurture your inner scientist and learn to make discoveries in your surroundings.

Look out for our online festival, Curious About: Our Planet, which focuses on climate change and how you can get involved in building a more sustainable future. **Live sessions run from 29 Sept - 1 Oct 2021. Explore the website now: [curiousabout.glasgowsciencecentre.org](http://curiousabout.glasgowsciencecentre.org)**

## PUZZLE SOLUTIONS



### WE WANT YOUR FEEDBACK



#### We would love to hear what you think!

We hope you liked this issue, but if you didn't, what could we change? What other things would you like to see? What topics are you most interested in?

You can send feedback and pictures to [CLDteam@GSC.org.uk](mailto:CLDteam@GSC.org.uk) or message us on Twitter @TheBothyGSC

### KEEP IN TOUCH



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CENTRE!**

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