

You ask, we answer!



**SECOND EDITION**  
10/03/2025

# From the editors

## WHO WE ARE

Hi everyone! We're a group of students at Sevenoaks School with a passion for the sciences. We want to share our passion and interest with everyone!

## OUR VISION

We want to expose younger students to the world of science by introducing them to simplified scientific literacy, providing long awaited answers to your exciting questions!

## (A THANK YOU)

We would like to thank our teacher, Ms. Butte, for helping us to organise this. Thank you to every person on our team for dedicating their time and energy to this. Thank you to you, our readers, for being interested in science and reading our journal. But most of all, thank you to science for being so cool!

## Meet the editors....

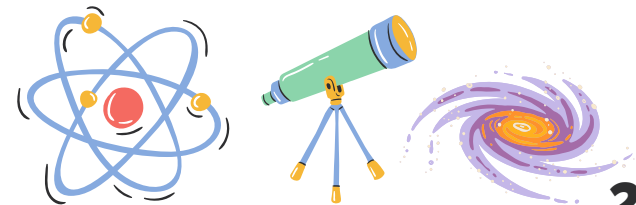
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- Maia C.
- Jaxon P.
- Savir A. K.
- Luella P.
- Alina D.
- Christopher C.
- Cynthia C.
- Jaden C.



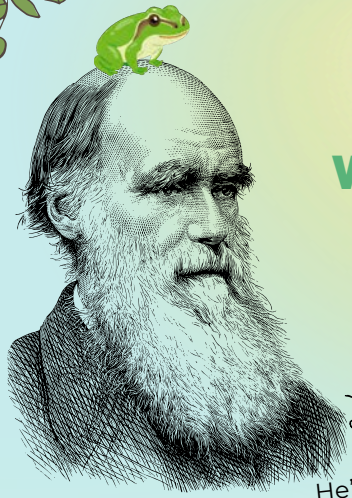
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# SCIENTIST SPOTLIGHT: Charles Darwin



## Who was Charles Darwin?

Charles Darwin was an English Biologist and Geologist who lived between 1809 and 1882. He studied medicine initially before moving his interest to natural history. In 1831, he joined the HMS Beagle on a five year trip around the world to study plants, animals and fossils

He's pretty old

## What cool things did he do?

He came up with the **Theory of Natural Selection!**

This Theory tells us that **all living things struggle to survive**, and the characteristics that allow them to live longer are passed down to their offspring. But this Theory wasn't well accepted at the time...



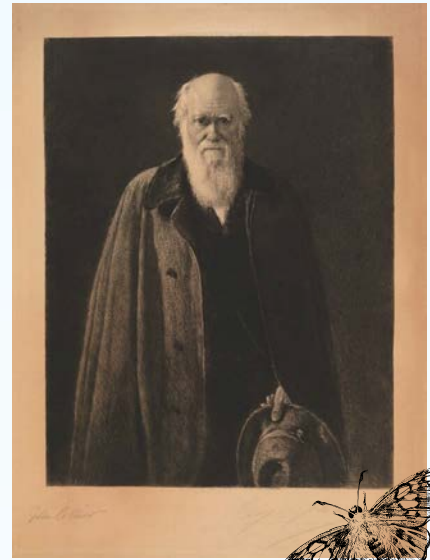
Imagine there is a group of birds with different beak sizes. Unfortunately, there are only large and hard seeds in their natural habitat, so **only the birds with large beaks that can crunch the seeds can eat them.**

**Since the big beak allows birds to eat the big seeds, big beaks will be passed on to the bird's children.**



## What we can learn from him:

- Be curious and creative!
- Always question everything!
- Nature is very beautiful and powerful
- We are all connected to each other!
- Be patient and explore all your options!



## Fun Facts!!!!

DID YOU KNOW?

- February 12<sup>th</sup> is recognised as Charles Darwin Day
- The Church of England apologised to Darwin 126 years after his death about not accepting his Theory of Evolution at first
- He ate lots of exotic foods at the Glutton Club in Cambridge, such as hawk and puma





# BIOLUMINESCENCE

Have you ever wondered how some animals are able to glow in the dark? Are you interested in understanding why animals would want to glow? Well then, this article is perfect for you!

## What is **bioluminescence**?

Living organisms that naturally emit light are called **bioluminescent**. But what does this mean?

Means: "living" **Bio-luminescence** Means: "light"

**Secret:** (Scientists are really just calling them 'living light' beings)

## How does **bioluminescence** work?

In most organisms **bioluminescence** is created because of chemical reactions that occur in their cells.

Some have special parts of their body where tiny bacteria live and produce light for them!



## What creatures can glow?

Organisms that can be **bioluminescent** include: fungi, marine animals, some insects, and a few bacteria. They are all able to carry out this incredible chemistry and glow!



## Why would a creature want to glow in the dark?

Some organisms use **bioluminescence** to attract prey. Angler fish are particularly well known for this. They house **bioluminescent** bacteria in their bulbs and use the light to attract curious fish!

There are more than 200 species of anglerfish, but the most well known species is the Black Seadevil Anglerfish – the star of the show. Here are some *Highlights*:



**Size:** Maximum total length of 30cm

**Lifespan:** around 23 years

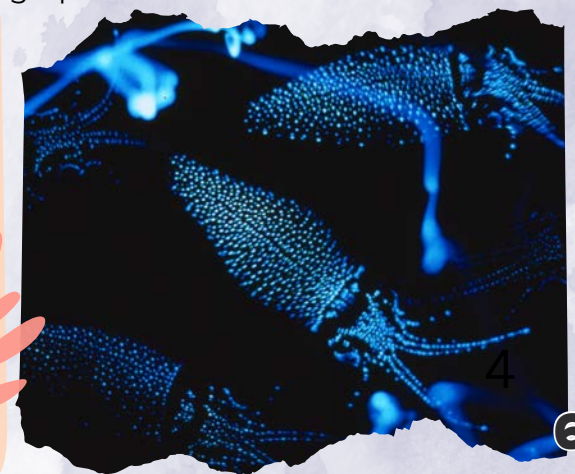
**Habitat:** Tropical parts of the Atlantic, Pacific and Indian oceans at depths between 100 and 4,500 meters

**Bioluminescence** may also help some animals blend in with their surroundings. For example, the firefly squid which uses **bioluminescence** to blend in with stars in the night sky to become invisible to predators looking up from below!

**Size:** Maximum total length of 30cm

**Lifespan:** 1 year

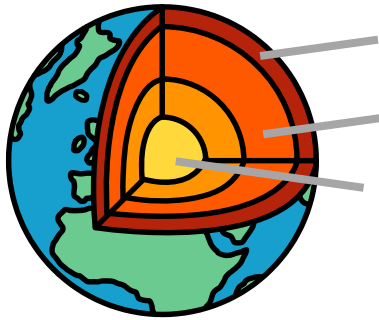
**Habitat:** Tropical and subtropical oceans all over the world – usually at depths of around 600 to 900 meters.





# How do Earthquakes happen?

## Let's learn about the Earth's structure first!



The Earth's **crust** is a solid rocky area where animals and plants live

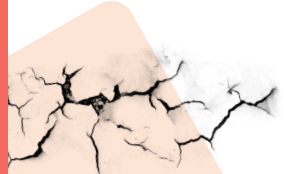
The Earth's **mantle** is mainly solid but has areas made up of molten rock!

The Earth's **core** is at the centre, and it is mostly made up of metals such as nickel and Iron

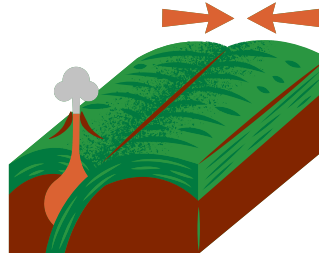
## How do Earthquakes happen?

Imagine the world is made up of giant puzzle pieces called plates, floating on molten mixture of rocks, a bit like crackers on a thick soup!

These plates move very slowly over time because the molten rocks move slowly under the Earth's crust since hotter molten rocks move up and colder ones go down in the Mantle.



Sometimes the plates can get caught on each other and while they are still trying to move, they keep pushing and pushing on each other. So, the pressure begins to build up, like pulling a rubber band apart but still holding it tight.

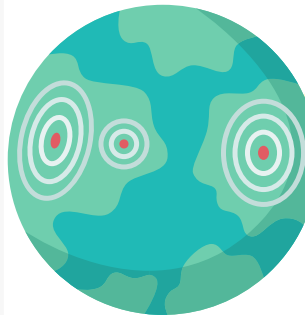


After a lot of pressure has accumulated, the plates can't hold the pressure anymore, and they snap!



The snap of the plates releases a lot of energy and makes the ground shake.

So, Earthquakes happen because the Earth's plates are constantly moving!



## Fun Facts!

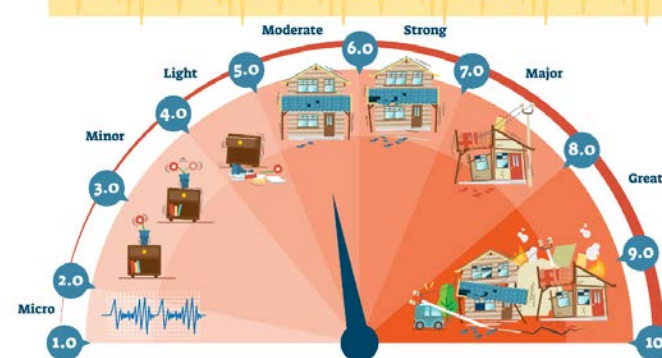
Earthquakes can happen both on land and on water. If they happen under the ocean floor, a tsunami occurs!

The largest Earthquake ever recorded was the Valdivia Earthquake which happened in 1960, which a scale of 9.5! \*



*\*Check the Earthquake Magnitude scale!*

## EARTHQUAKE MAGNITUDE SCALE



# Why We Breathe Without Thinking!

Many of the things we do requires us to think and focus, such as walking, playing sports, doing homework, the list goes on! Then how is it that with breathing, we seem to be able to do so subconsciously, even doing so while we're sleeping?

Why do we feel that we HAVE to breathe, and will eventually start breathing again no matter how hard we try not to?



Let's start from the beginning. Breathing is important as we need it for our body to function and work. Oxygen, which is in the air, is what we want to take in when breathing. Oxygen acts as a fuel for our body.

When we breathe in, oxygen is taken in and moved to different cells in our bodies to undergo something called aerobic respiration, which produces energy for the body to use. When we breathe out, we release carbon dioxide, which is the waste that our bodies don't need.



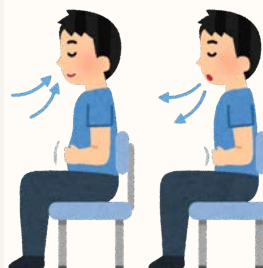
Thanks to our brains, we don't have to remind ourselves to breathe constantly! The brainstem acts as the monitor for this function, sending nerve signals to the lungs and heart to keep working, taking in oxygen and transporting them through the blood to different parts of the body even when we don't think about it.



Think about breathing like the autopilot on an airplane – the plane can fly itself in the sky even without a pilot controlling it the entire time!



Then how come we can control our breathing sometimes?



Well, we can control it sometimes when needing more air for a short amount of time, like when swimming or running as fast as you can. Once that's done, the brain signals the body to breathe normally again automatically.



## Fun Facts!!

- The average person breathes about 22,000 times a day
- Your left and right lungs are not the exact same size
- Babies breathe 3 times faster than adults
- Your breathing goes from ~15 per minute to 40-60 when exercising



# Why do we get dizzy when we spin?

dizzy

Do you enjoy spinning around on the playground roundabout? If so, you have probably noticed how the world continues spinning even after you've gotten off. This feeling is called dizziness! Well, blame it on your ear.

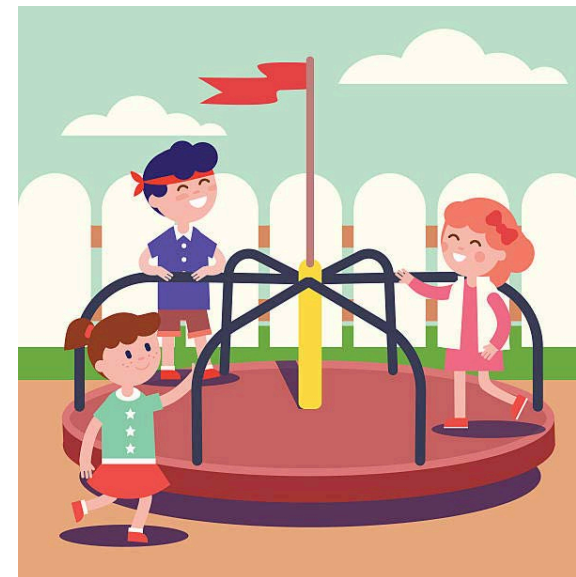


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You see, there is a part deep inside your ear is called your inner ear. Inside, there are three curved little tubes filled with liquid. Picture them as small water slides. As you spin repeatedly, the liquid moves too. Sensors in your ear notice the liquid moving and use this to tell the brain that you are spinning.



**TIP:** If you want to stop the feeling of dizziness quickly, stare at just one thing, stop moving, and breathe in, and out, slowly.



When you stop spinning, the liquid in your ear still moves for a bit. This means the sensors are still telling your brain that you are spinning, even though you aren't! But your eyes and feet know that you are just standing still, so they tell your brain the opposite of what your ears are!

Because of this, your brain gets all muddled up, it doesn't know which one to listen to, the ears or the eyes and feet – that's where the feeling of dizziness comes from! The confusion of your brain makes you dizzy until the liquid calms down, which always happens after a few seconds or minutes – so it's completely normal to get dizzy if you spin.



# Can anything live forever?

Have you ever wondered if it's possible to live forever?

Well, for two kinds of animals, it theoretically is.

The **Hydra** and the **Immortal Jellyfish** (aka Turritopsis) are two **biologically immortal animals**. This means that if they were left in perfect conditions, they would **theoretically** be able to live forever.

But how do they do this?

## The Hydra

The Hydra is an invertebrate - an animal with no spine - found in freshwater. They're only 3cm long and can have between 4 and 25 tentacles. These guys have special kinds of cells which continuously multiply to fix injuries. Because of these cells, they also don't get older.

Actual picture of a hydra



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## The Immortal Jellyfish (Turritopsis)

The immortal Jellyfish is also an invertebrate - an animal with no spine - but this time it lives in saltwater, like seas and oceans.

They grow to about 4.5 millimetres (less than half a centimetre), meaning they're probably smaller than your fingertips. Try measuring how small a hydra is next to your hand!

Immortal Jellyfish also have a special ability - they can return to being babies again.

They can do this if they are too old. But they can also do it when they are stressed or hungry.

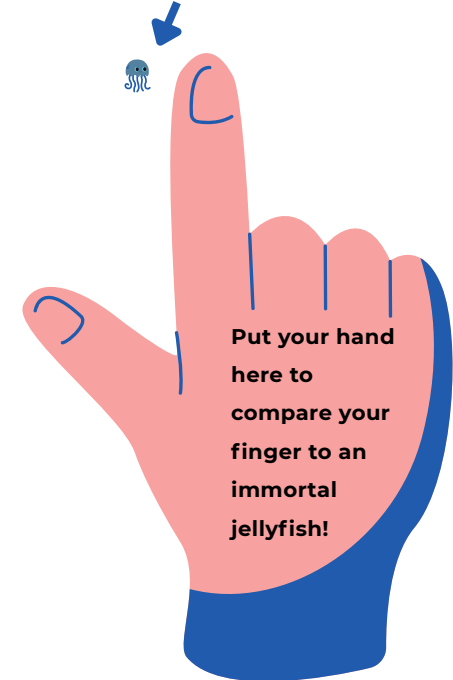
This allows them to save energy and **theoretically** live forever.

Actual picture of an immortal jellyfish



So, does this mean that they're invincible? Sadly no. They can still be eaten, get sick or become too hungry meaning **they're not truly immortal**. Still, these guys are pretty cool!

Immortal jellyfish real size



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# What is Sound?

● **Sound is a physical wave**, which means that for sound to reach your friend across the room, it needs *something* to travel through. This could be air or water or even the wall, but in outer space where there is nothing, the sound cannot travel.

**Sound is just air or other matter that vibrates.**

For example, when somebody speaks, all they are really doing is using their throat to push air out, which makes the air vibrate in a way that we understand as words. The same thing happens when you drop something: the cup bounces against the floor, causing vibrations in the ground and the air around it.

## Is sound different in Water?

**Yes! Sounds are faster, louder, and travel longer in water.**

**This is because sound changes when it travels through different mediums.** Some mediums are denser than others - they are more tightly packed, which means that there is more of it in the same space. Think of a snowball - a loosely packed snowball is flakey and full of air. Making a second snowball of the same size, but this time squeezing the snow together more tightly pushes the air out and makes it much more solid. In the second snowball, though it is of the same size, there is more snow in it because the snow is more tightly packed together.

**Fun Fact:** Sound travels nearly 4 times faster in water than in air!



## But why is it different?

Water is more tightly packed than air, which means there would be more water than air in the same amount of space. Think of water as the tightly packed snowball and air as the loose flakey one. In water there is more matter for vibrations to travel through, so they travel faster and longer. It is like following a group of people to class. If there are not enough people to follow, you might get lost. It is the same for sound: if there are not enough things for vibrations to travel through, the noise will get lost and won't make it to your ears.

# How Do Planes

# Fly?

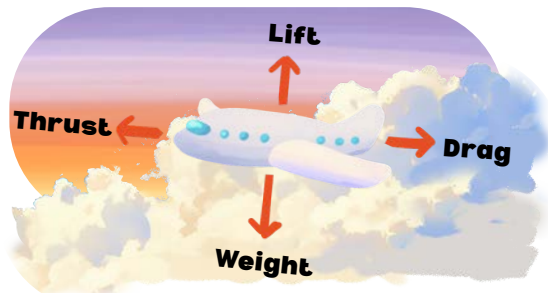


Have you ever looked out of a plane window and seen the little flaps on the wings moving up and down? Those flaps, along with the shape of the wings, help create a force called lift. Lift is what lets planes rise up and stay in the sky.

But what exactly is a force? A force is just a push or a pull in a certain direction. For example, if you push a swing, that's a force.

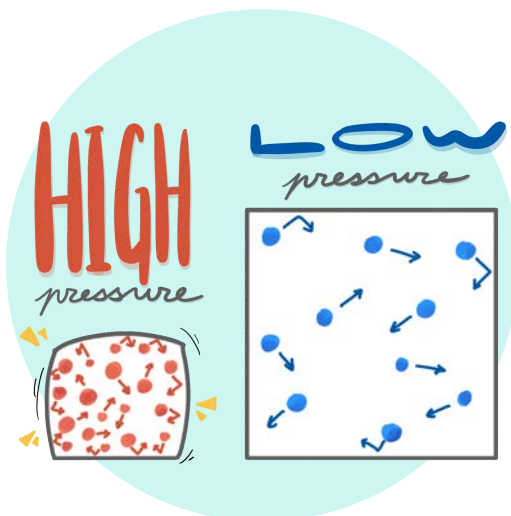
## Planes use four main forces to fly:

- THRUST** pushes the plane forward (from the engines).
- DRAG** pushes back on the plane, like wind in your face.
- WEIGHT** pulls the plane down because of gravity.
- LIFT** pushes the plane up.

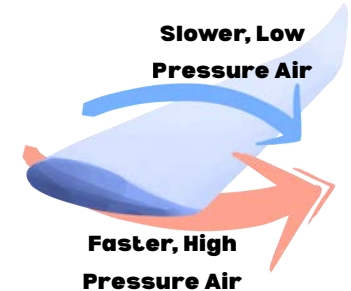


Air is made up of lots of tiny, invisible particles that can push on things. Imagine 2 boxes - 1 is small, filled with many air particles that are moving rapidly in the box. This box has high pressure, and the larger box with few air particles moving slowly has low pressure. Air always tries to move from high pressure to low pressure to balance it out across the whole area.

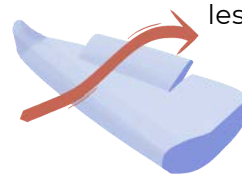
This means, for both boxes, their air particles eventually will all be evenly spaced, moving at the same speeds



When you picture an airplane wing, you'd see that the top of the wing is curved, and the bottom is flatter. As the plane moves forward, some air goes above and below the wings. The air on the bottom goes faster, which means it has higher pressure. The air on top moves slower (since the curved wing shape means it takes longer for the air to travel across) so it has lower pressure. Since air wants to move from high to low pressure, the air underneath pushes the wing upward. This upward push is lift. If the lift is stronger than the weight, the plane rises. If it's weaker, the plane goes down. If they're equal strength, the plane stays level.



When a plane takes off, the engines create a lot of thrust to push it forward. As it speeds up, more air flows over the wings, and the lift force becomes greater than the plane's weight (since the difference in pressure increases the strength of the lift). That's when the plane leaves the ground. When landing, the flaps on the wings come down. This makes increases drag and slows down the plane. Since it's moving slower, there's also less lift, so the weight is greater and the plane starts going down.



Flying is really about balance. Thrust fights drag. Lift fights weight. By adjusting speed, wing shape, and flaps, pilots can control the plane to go up, down, or stay level. So, the next time you're on a plane, look at those little flaps. They're not just moving randomly—they're helping balance the forces that keep you safely flying through the sky!



# What is DNA?



Have you ever wondered what humans are made of or why people look different? Well, there is a fundamental code for each person that determines their appearances, actions, and even illnesses. While people's codes are very similar to each other, the differences are what makes all of us unique. This code to life is known as the DNA.

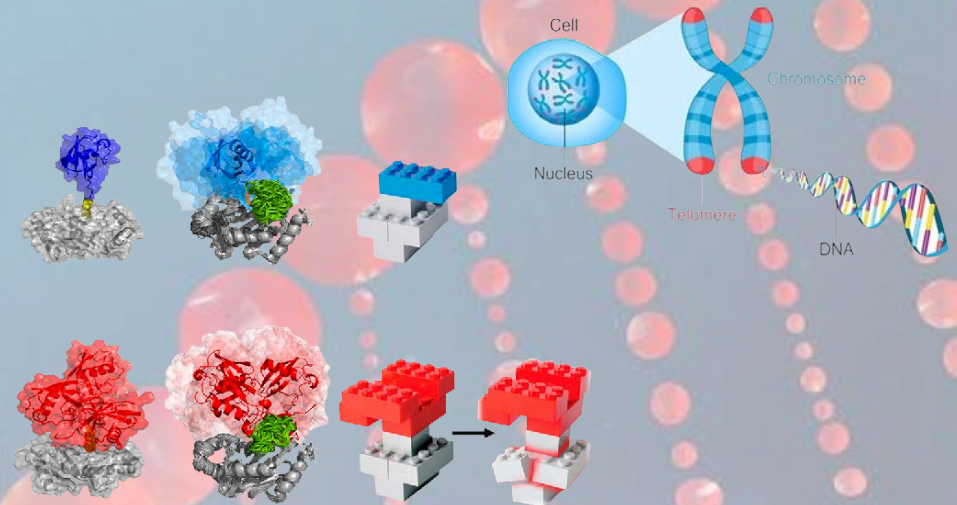
## Basic Intro

DNA, aka deoxyribonucleic acid, is a double stranded code that exists in every cell of humans. They are made of nucleotides which are basic units of DNA that join together to create the whole strand of DNA. These nucleotides are made of three smaller components: a deoxyribose sugar, a nitrogenous base, and a phosphate group. Every person is made of similar but slightly different DNA, that is, different combinations of the smaller units, that result in the different appearance of every person in the world.

## Functions

The most common known usage of DNA is that they code for protein production. To understand what this means, think of a Lego model that you've built before, perhaps a truck, an animal, or even a house. DNA is the instruction manual for the Lego pieces that decides which Lego piece to use and what they look like. Proteins are the Lego pieces themselves that make up that house. Together, the DNA instruction manual and the Protein Lego pieces help shape what you look and act like.

# How does it work?



## Mechanism

When one of our cells splits into two cells, the DNA is copied to the new cell and works the same. They will continue to function as the instructions or specification of how our bodies should function.

## Genome

The whole special combination of the DNA of a human is known as their genome. It is a super long strand that is coiled tightly inside the human cells. If you stretch out the human DNA, it can expand to about 2 meters long!

# HOW DOES SUGAR DISSOLVE IN

Everyone loves a cup of tea! Simple and delicious, it's hard to hate. But of course, tea without any sugar tastes horrible.

How, then, does sugar get into tea? You drop a piece of sugar into a cup, and the next moment it's gone. POOF! Just like that. It's not magic, it's science!



Everything is made up of teeny tiny little particles called **molecules**. So, sugar is made of sugar molecules, water is made of water molecules, cheese is made of cheese molecules, and so on. These molecules can interact with each other in many exciting ways!

Both sugar and water molecules are **POLAR**. Polar molecules are basically little magnets. One side is positive, and the other side is negative. Like magnets, opposites attract: positives and negatives tug on each other.



When a piece of sugar is put into tea, which is mainly water, the water molecules tug on the sugar molecules. They pull and pull until the sugar molecule pops out of the sugar cube, and into the water.

This happens quickly for all sugar molecules in the sugar cube, and it dissolves. After a few seconds it's gone and you have a sweet, delicious cup of tea.

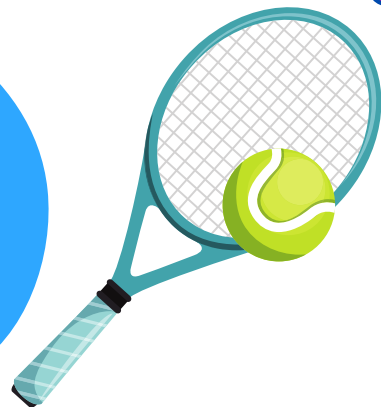
*Yum!*



# RIDDLES!

1

Bill and Claudia were playing tennis. They played five sets, and both of them won three sets each. How did they do this?

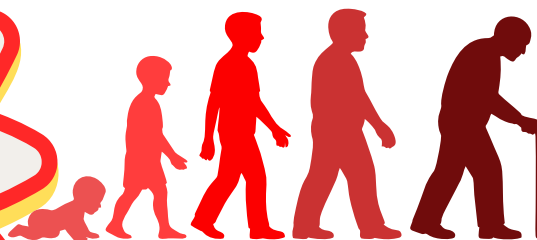


William's father is older than his grandfather. How can this happen?

2

3

Ben was 20 years old in 1980 but only 15 years old in 1985. How?



4

Prove that among 13 people, there are two born in the same month

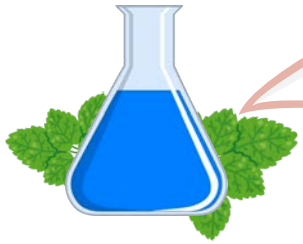


Challenge: there are  $n$  people in a room. Prove that among them there are two people who have the same number of acquaintances in the room

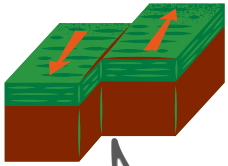


HOW MANY DID YOU GET?  
(Answers on pg. 31)

# JOKES!



How do scientists freshen their breath?  
With experi-mints!



What did one tectonic plate say to the other?  
"Sorry-my fault!"

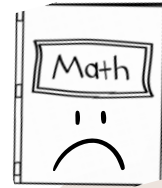
What goes zzub, zzub?  
A bee flying backwards.



How do you organize a space party?  
You planet!



Why can't you trust an atom?  
Because they make up everything!



Why did the math book look sad?  
Because it had so many problems.



Why did the moon skip dinner?  
Because it was full!



Why is the ocean so salty?  
Because the land never waves back!



What did the tree wear to the pool party?  
Swimming trunks.



What do you get when you cross a caterpillar and a talking parrot?  
A walky talkie.



# GLOSSARY!

## How do Earthquakes happen?



*Magnitude scale* Scale which measures the intensity of an earthquake. The larger the number, the stronger it is.

## Why We Breathe Without Thinking!

*Aerobic Respiration* The process that produces Energy in our cells

*Oxygen* The gas essential for life, which we use for Aerobic respiration

*Carbon Dioxide* The gas that is expelled by the body through expiration, as a result of aerobic respiration

*Brain Stem* A structure in your brain that controls vital body functions like breathing and your heart rate

*Nerve Signals* Electrical signals our brain sends to the rest of our body to control movements and functions

## Can Anything Live Forever?

*Biologically immortal* Organisms that, because of their biology, could live forever if they were in perfect conditions - with enough food, the right temperatures, no predators and no illness, because they stop ageing.

*Theory* A really good scientific 'guess' based on good evidence but not proven to be true.

## WHAT IS SOUND?

*Matter*

Matter is the scientific word for any physical thing (AKA anything you can touch)

*Vibrations*

Vibrations are the rapid back and forth movement of an object or thing

*Density*

Density is the measure of how closely packed matter is - think of it as making a snowball. A loosely made snowball is flakey and has a lot of air in it, but when you squeeze it to make it more solid, what you are doing is pushing the air out so that the snow is more tightly packed together. This second snowball is denser.

*Mediums*

A medium is a type of material that something travels through, such as vibrations. This can be anything - the word medium just shows that something is traveling through it.

## How Do Planes Fly?

*Pressure*

A measure of how many particles there are in a place and how fast those particles are moving.

*Drag*

A resistive force which works against motion in air or liquids



# GLOSSARY!

## What is DNA?



Nucleotides

**Building blocks of DNA:** made up of a phosphate group, a nitrogenous base, and a deoxyribose sugar



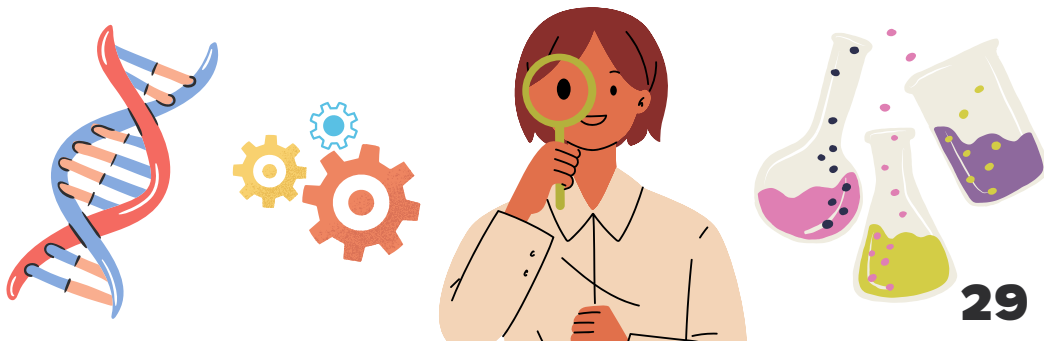
Genome

**The total genomic sequence of a person**



Proteins

**The building blocks of our body, essential for the function of cells**



## HOW DOES SUGAR DISSOLVE IN



### MOLECULE

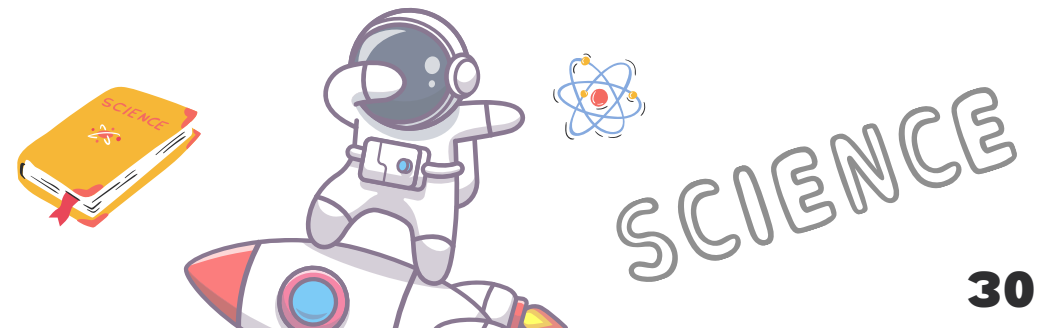
**The smallest unit of a substance with the same physical and chemical properties as the original substance**

### POLAR

**A molecule with positive and negative ends, like a tiny magnet**

### DISSOLVING

**When a substance enters solution. In water, it looks like it disappears.**



SCIENCE

# RIDDLES!

(ANSWERS)



1) Bill and Claudia were playing doubles together. They beat their opponents 3-2, meaning each of them won 3 sets.

2) William's mother is significantly younger than his father. His grandfather (from his mother's side) had his mother when he was very young, making his dad older than his grandfather.

3) The dates are in BC - the date moves from 1985 BC to 1980 BC, so Ben gets 5 years older in that time.

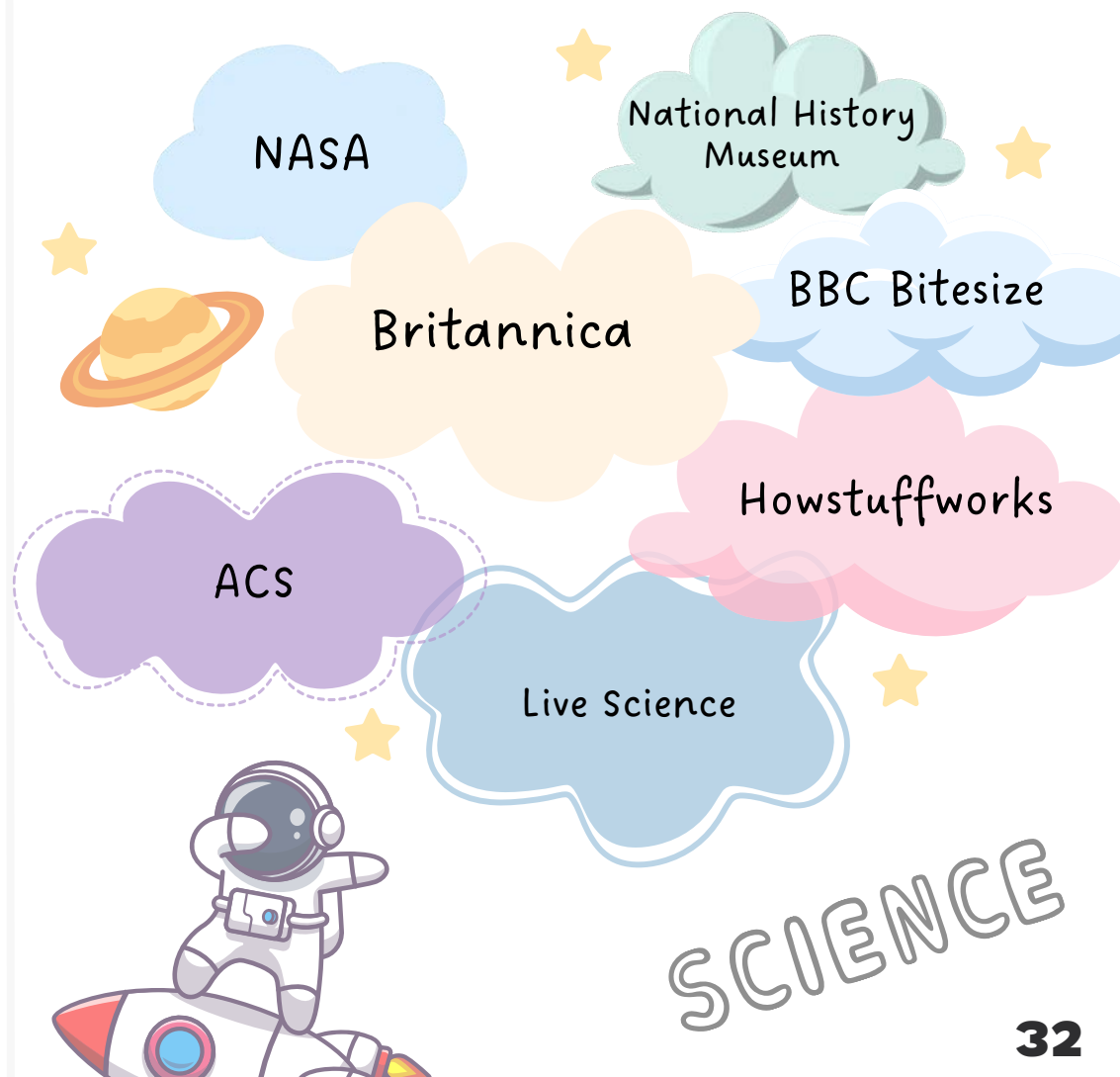
4) Each person can be born during any of the 12 months. Let's say the first 12 people are all born in different months. Then, the 13<sup>th</sup> person cannot be born on their own individual month - they would have to share their birthday month with at least one of the other 12.

Challenge) A more difficult version of Riddle 4. In a room of  $n$  people, each person can have from 0 to  $(n-1)$  acquaintances inclusive (since you can't be your own acquaintance. We can label everyone by the number of acquaintances they have. Then, for  $n$  people, there are also  $n$  different labels (for 3 people, you can have 0, 1 or 2 acquaintances). For  $n$  people, the only way that everyone has a different label is this: one person knows nobody, another knows one...all the way until the last person knows  $(n-1)$ . However, the person that knows  $(n-1)$  would have to be acquaintances with the person who knows nobody, so there cannot be someone who knows nobody, thus at least two people have the same label.

And finally....

# OUR SOURCES!

This is where we got most of our information from:



# REFERENCES

**Charles Darwin**

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## **Why do Earthquakes happen?**

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