

Godolphin & Latymer

Pulsar

Science Magazine

Features:

The school science magazine for inquisitive young minds (8-12 year olds) written by young(ish) minds

An interview with Jocelyn Bell Burnell

Surviving in Space

Star Scientist: Dr Gladys West

Planets and Ancient Mythology

Space Food

+ MORE

**TO INFINITY AND
BEYOND!**

THE SPACE ISSUE

MESSAGE
FROM THE

EDITORS



pulsar

/ˈpʌlsɑː/

noun ASTRONOMY

a celestial object, thought to be a rapidly rotating neutron star, that emits regular pulses of radio waves and other electromagnetic radiation at rates of up to one thousand pulses per second.



Welcome to the first EVER edition of Pulsar - a magazine for inquisitive young minds about science. I remember that when I was younger science was slightly pushed aside, it was never given the hours and hours that Maths and English got, yet it is super fundamental in explaining everything going on in the universe... So with that in mind we created a magazine that opens a few more doors into the world of science. Don't worry if some of it is a bit complicated, ask your teachers, parents, older siblings and google (lots of it you will learn when much older!).

The first edition is Space themed because it is such an exciting frontier, and this is an area with an endless number of new developments to follow up. Within this issue you can learn about the White Dwarfs of the universe (Not from Snow White) in the article on page 6, a star scientist Dr Gladys West page 10 and food in Space on page 9.

Pulsar will aim to be distributed London wide in order to reach a large number of children. Each edition of Pulsar will be available online in order to reduce the impact of this magazine on our planet.

And we hope you are inspired to write an article for our upcoming edition on the Ocean - please send it to our email: pulsarmagazine@yahoo.com by the 15th April.

Finally (and most importantly) an enormous thank you to the many contributors across Godolphin whose enthusiasm was infectious and without whom you would not even be reading this magazine!

Most of all I hope you enjoy reading it!

SOPHIE PRICE Founder and Senior Editor

MADDY CHIN Senior Editor

Students of Godolphin & Latymer School

Questions?

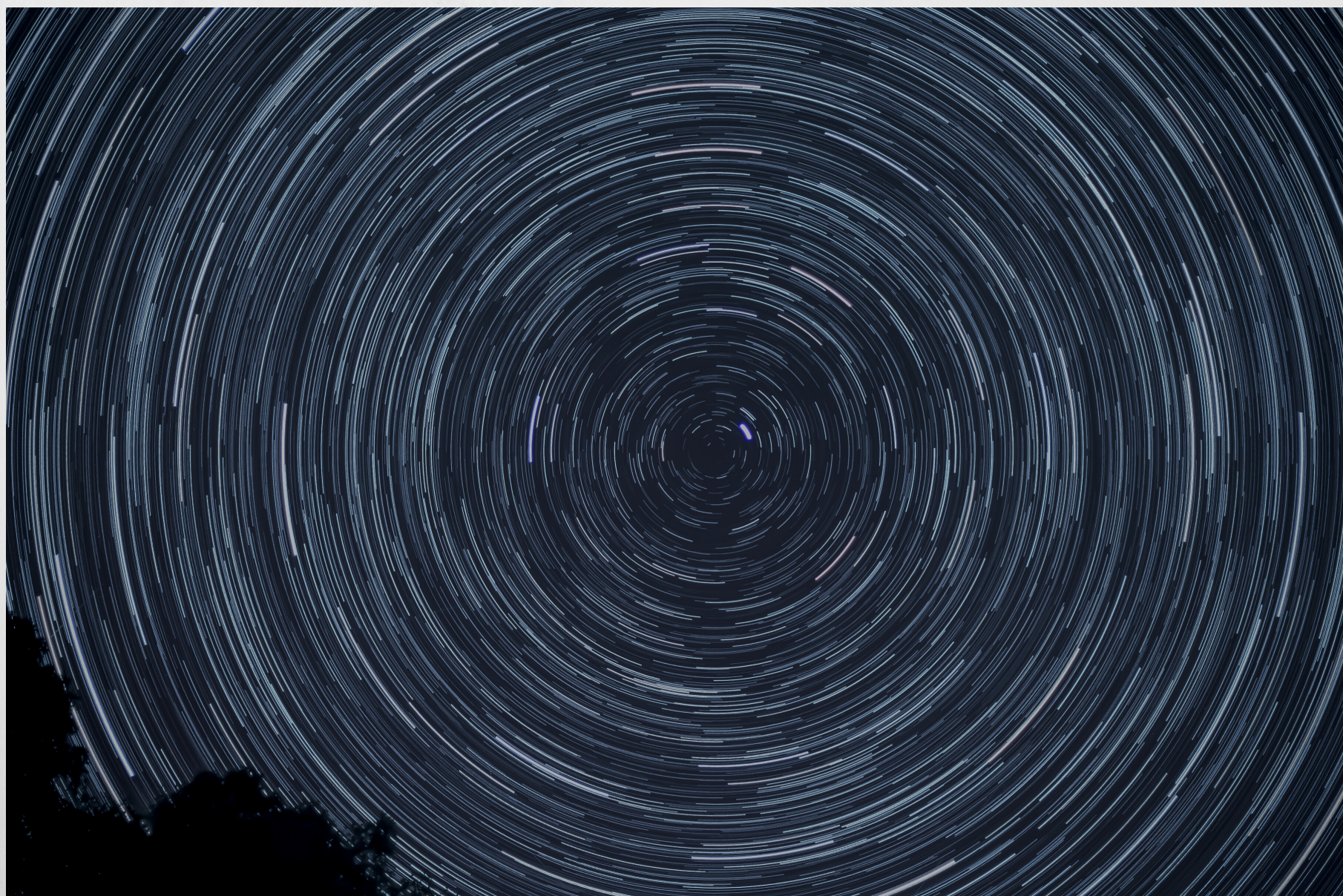
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Interview with Jocelyn Bell Burnell, Discoverer of the Pulsar

By Charlotte Byron-Ghosh



What is a pulsar?

A pulsar is a dead star that is spinning and gives out radiation at its poles. People detecting pulsars will pick up a beeping sound when they find one. This is because of the rotating star is quite like a lighthouse who appears to flash to boats far away.

It was first discovered in 1967 by Jocelyn Bell Burnell, a Cambridge university student in her mid-twenties, working under Antony Hewish. In the 1960's, early computers translated signals the telescope detected from outer space onto a chart. Bell Burnell, who had to analyse several miles of chart paper, was the first to discover some interesting readings. In 1974 Antony Hewish and some of her male colleagues received a Nobel Prize for her discovery. It was only until 2018 that she won a Breakthrough Prize and recognition for it. But she didn't spend the £2.3 million prize money on herself. She used all of it to create a fund to help under-represented ethnic minority and refugee students to get into physics.

When I asked why, Professor Bell Burnell said 'When I was a graduate student I was working very, very hard. I felt like an outsider. I thought everybody was much more clever than me. And I thought I was going to get thrown out because I wasn't clever enough. So I thought that if I can help others who think that they aren't clever enough or shouldn't be there, maybe they too would work very hard to come up with things in a slightly different way and make discoveries.'

But why is it harder for minorities to get a job?

"When you appoint somebody to a studentship or a job, you've got a whole range of people in front of you, you tend to go for who you are most comfortable with," she told me.

"And that's somebody who looks like you. And since it's often men doing the recruiting, females and people who are not white have to be exceptionally clever to get the job."

I then asked Professor Bell Burnell what she would say to young girls who want to get into physics.

She said "I know some people who will say that girls can't do physics. It's not actually true. They can as long as they are not put off by those people."

SURVIVING IN SPACE

By Thalia King

The realities of life in the International Space Station



Sleeping in the International Space Station



Tim Peake running the London Marathon in the International Space Station

Surviving in space is obviously very different to surviving down here on Earth - the conditions in space are very different from down here on earth! There are many ways and tactics in which astronauts manage to survive in such a hostile environment. For example, all foods and liquids are in plastic containers. Water can be added to foods to change the consistency of the food or foods can be heated up in an oven. Straws are used to drink liquids in order to avoid damage or spillages.

In addition, in terms of clothing, the astronauts dress as they would do on Earth. They bring their own clothes as washing and laundry can't be done in Space. In the International Space Station (ISS), there are special machines that make sure that the atmosphere and humidity are to a comfortable level so the astronauts can relax. However, when the astronauts are exploring the Moon or Space, they wear special space suits which are designed to protect the astronauts from a different and harsher environment.

Toilets in the ISS station are different to our toilets on Earth. There is only one toilet and astronauts fasten themselves to the toilet so they don't float away. The astronauts' wastes are then sucked away and vacuum dried. This is similar to how astronauts sleep, they loosely strap their bodies to a bed and sleep for 6 hours, which is their allocation.

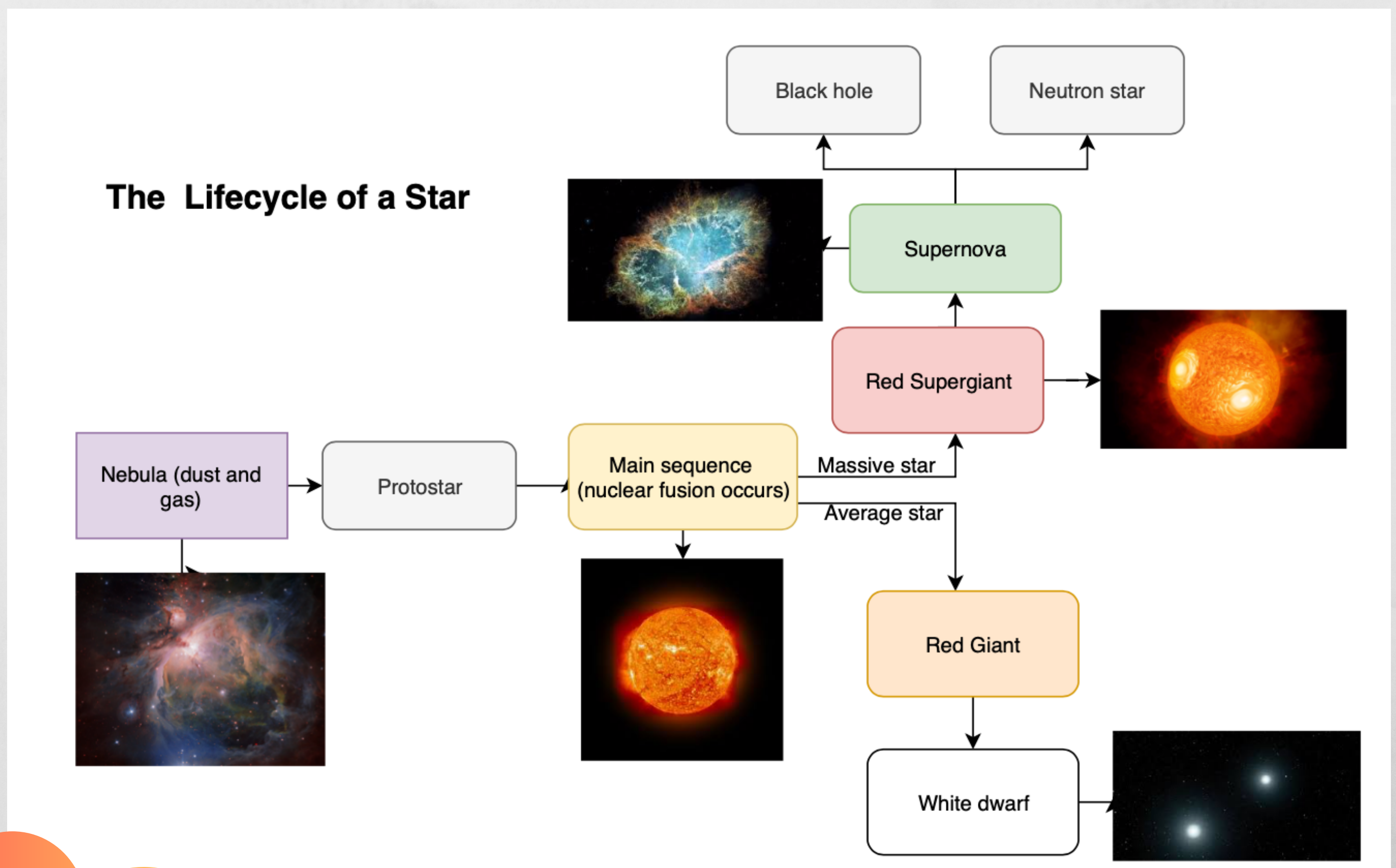
Astronauts spend their free time listening to music, watching DVDs or reading books but they spend most of their time enjoying the beautiful views of Space. It is also possible to contact people on Earth by radio waves. These days it's also possible to contact Earth by email or twitter!

A Universe of Red Giants and White Dwarfs

By Sophie Price

When looking at the stars, it is difficult to see using the naked eye but the 1,000,000,000,000,000,000,000 (1 billion trillion stars in the universe) are different ages, temperatures, and have different brightnesses. Though perhaps most interesting of all is the lifecycle or stage the star is in. You can follow this using the diagram below:

- The star starts off as a ball of dust and gas, also known as nebula
- The star heats up and nuclear fusion begins (Hydrogen is converted to Helium and energy is released)
- The star enters the most stable period of its life: the main sequence. Our sun is currently in this stage. Stars can spend roughly 10 billion years in this phase!
- If the star is massive it then becomes a supergiant.
- This red supergiant can then explode in a supernova. During a supernova heavier elements like iron are formed.
- From here very dense neutron stars or black holes can be formed.
- If the star is average size (like our sun) it expands to become a red giant
- Red giants eventually cool to form a white dwarf



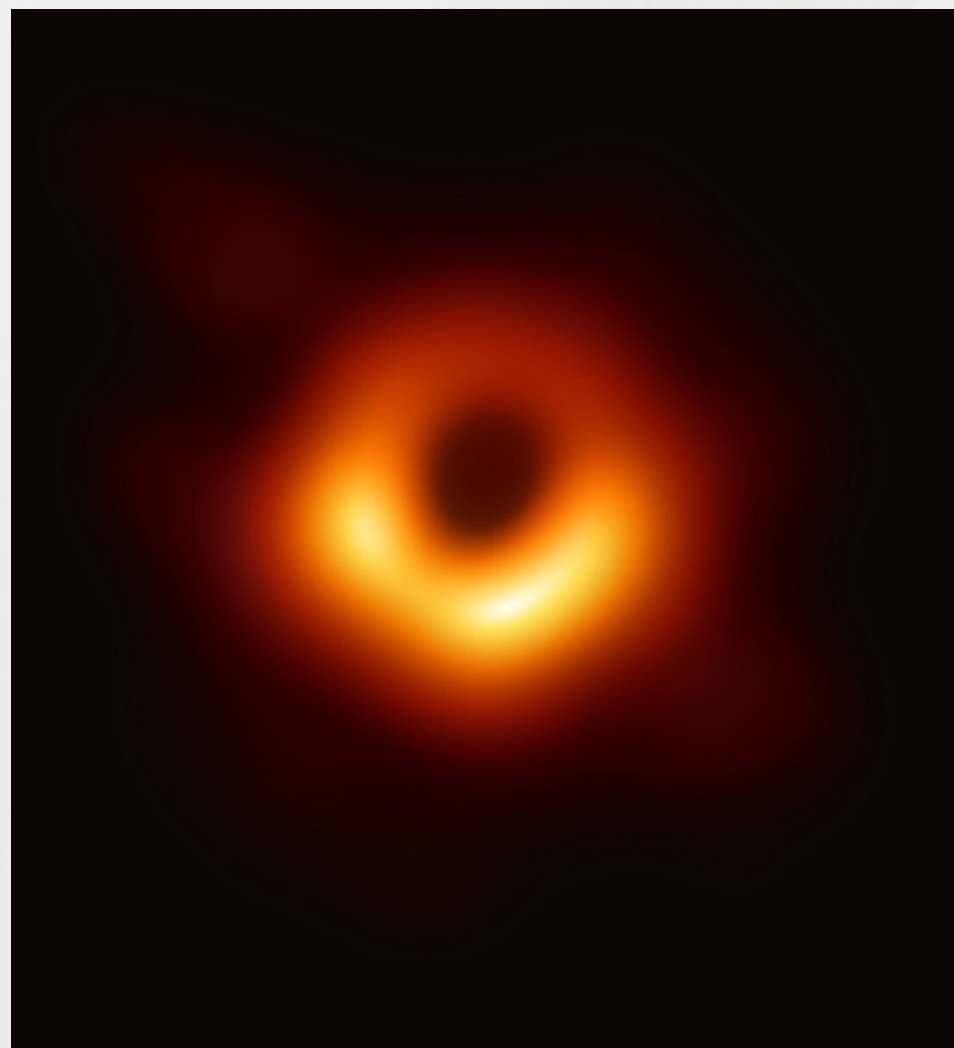
**FUN
FACT**

All elements are formed in stars, therefore you are made up of what was once in a star!

Black Holes

By Victoria Amore

An Introduction



What are Black Holes?

You're probably wondering what black holes are...

Well, for those of you who don't know, they are single points in space which weigh a lot. This might sound strange as it is quite impossible for a hole to have weight, however when it starts sucking up objects and stars, they weigh much more than you think. That's right, they slurp things up just like you would slurp up water with a straw, but these holes suck things up at a vigorous speed with vicious power, using gravity!

Gravity, on Earth, is the invisible force that and stops us floating away, but gravity in a black hole is far more intense and dangerous. In fact, it is so strong, it tears apart the material which a star is made out of. Luckily, there are no black holes near the Earth that we could get sucked into. It might seem fun being taken by a beautiful hole, but the damage that it causes to objects is frightening. Would you like to be stretched until you blow up? Another interesting fact about black holes is that they bend light. So astronomers might be miscalculating how far away stars actually are if starlight is bent in odd directions when it passes close to a rotating hole.

Henrietta Swan Levitt: Looking to the Stars

By Carys Siddle

Henrietta was an American scientist born on July 4th 1868. She graduated from Radcliffe College in 1892, she then went on to become one of the women 'computers' at Harvard, analysing data. Leavitt was assigned Cepheid variables. Cepheid variables are stars that change in brightness, continuously, at the same rate. She realised that the brighter the cepheid variables, the longer it took them to cycle through their variability in brightness. This led her to realise that stars that had longer periods but didn't appear brighter must be further away. Until her we could only measure the distance of stars in our galaxy using parallax, this method could not be used to work out how far away stars outside our galaxy were. Edwin Hubble (another famous scientist - you may have heard of the Hubble Telescope!) used her work to show how large the universe was.

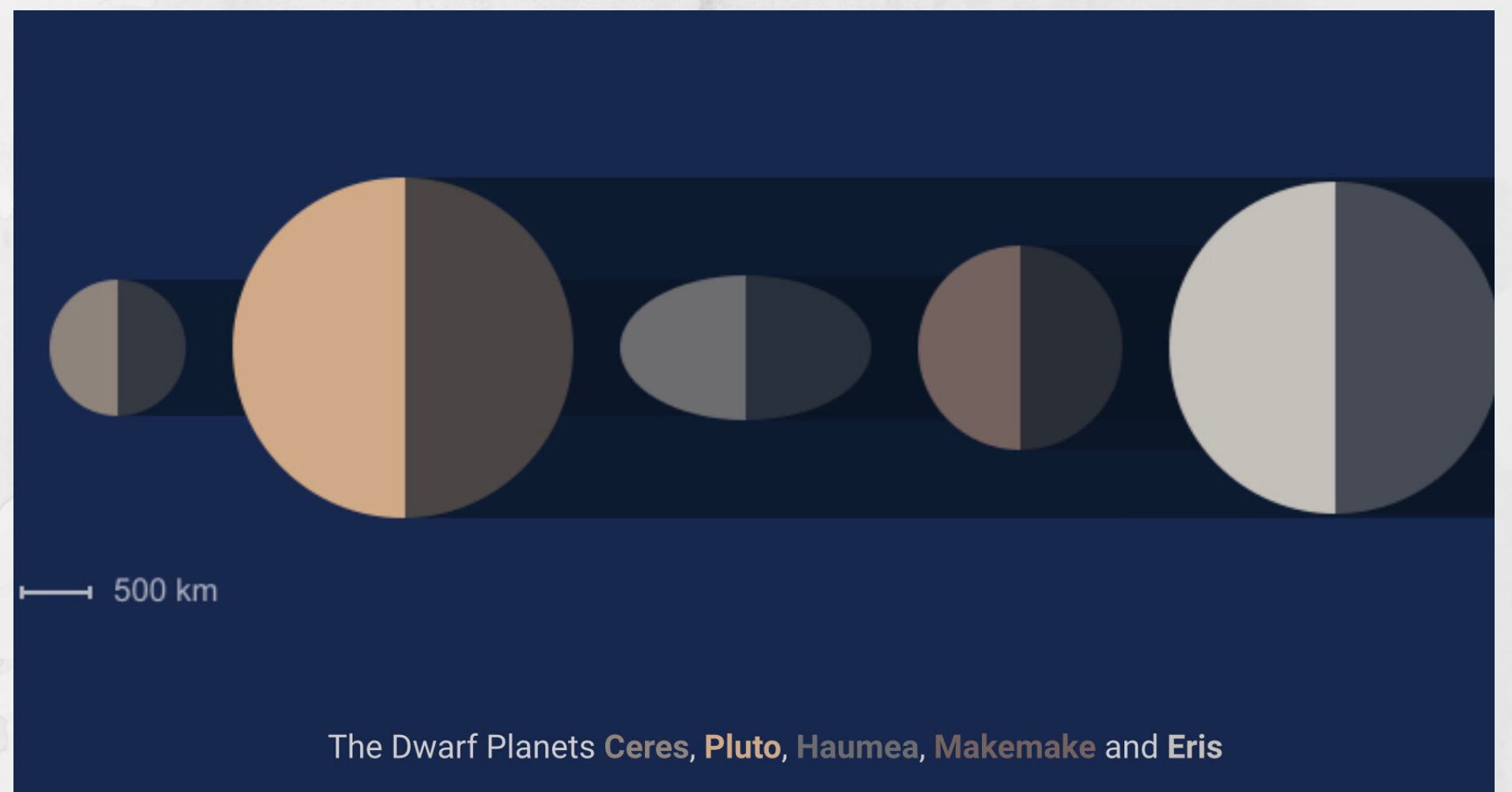
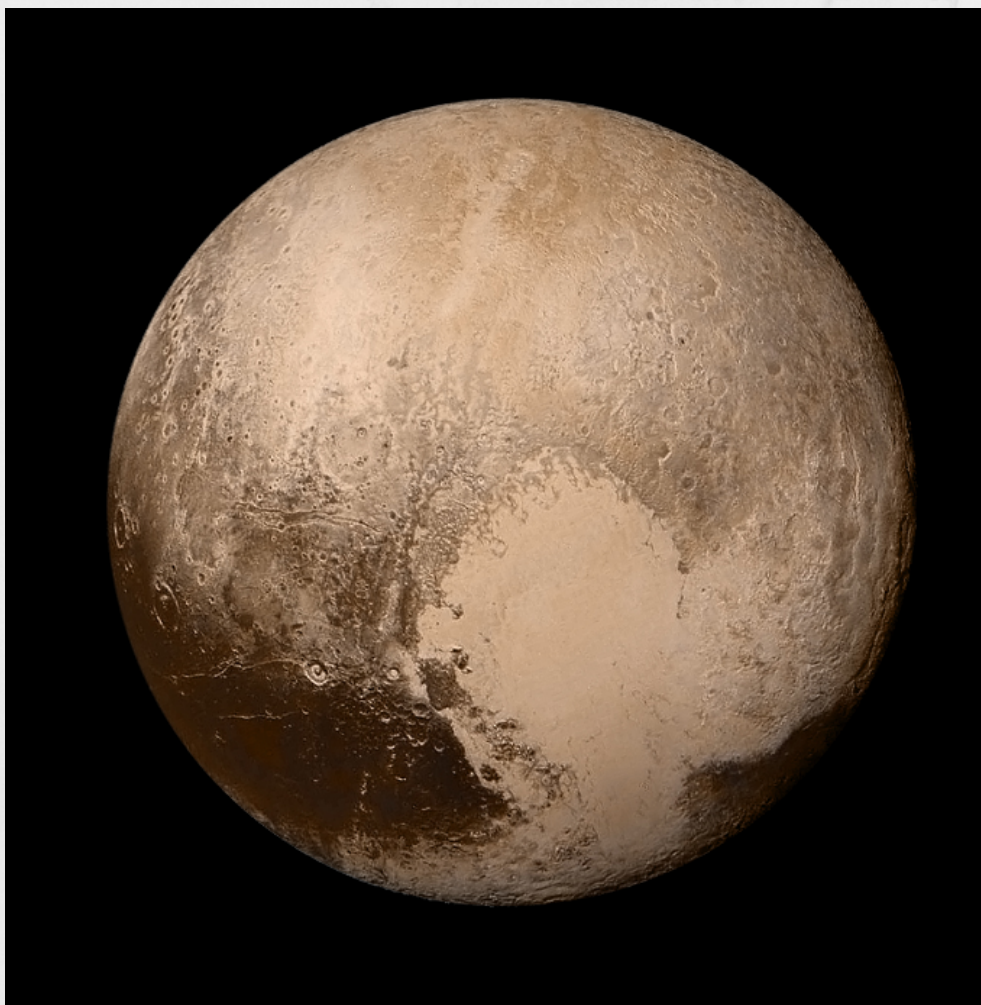


Dwarf Planets

By Niki Yeang

What are dwarf planets? They are planets that orbit the sun, just like our planet Earth, but they are too small to be considered proper ones, and too large to fit into smaller categories such as moons. A proper definition of the difference between planets and dwarf planets from the *International Astronomical Union* states that a planet clears objects around its orbit (the path it takes around the Sun) while a dwarf planet will not. Essentially, a planet would have enough gravity to attract or push away these smaller objects that would obstruct its orbit, whereas a dwarf planet's gravity would not have enough.

There are 5 officially recognised dwarf planets in our solar system, but there may be as many 10,000. The largest of these dwarf planets is Pluto (with a diameter of 2372km), followed by Eris, Makemake, Haumea and the smallest - Ceres - with a diameter of 950km. The order of dwarf planets from closest to furthest from the Sun is Ceres, Pluto, Haumea, Makemake, and Eris. As an orbit is the path an object takes around a star, planet or moon, and a year is the time the object takes to complete one full orbit, in the same order, the lengths of each of the planets' years increase. One year on Ceres is 4.6 Earth years, whilst one year on Eris is 560.9 Earth years!

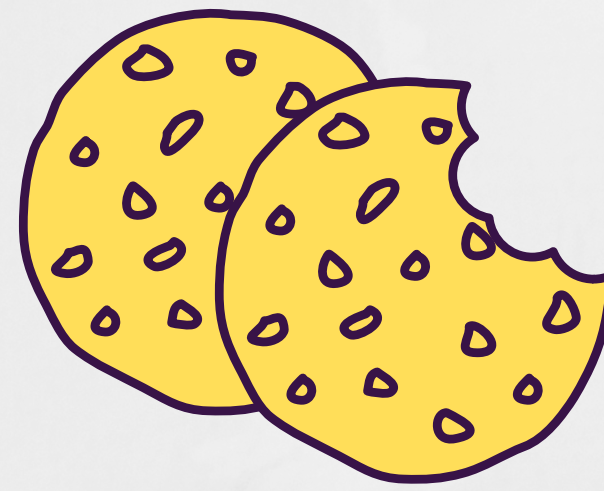


Pluto is arguably one of the most famous examples of a dwarf planet, because at one point, it was classified as the ninth planet in the Solar system. In 2006, Pluto was reclassified from a planet to a dwarf planet once the International Astronomical Union came up with the definition of a planet. Pluto is one third water - which comes in the form of ice - but still, there is three times as much water on Pluto as there is in all of the Earth's oceans! The remaining two thirds are rock - Pluto's surface is covered with several mountain ranges, light and dark regions and a lot of craters.

Fun fact - Pluto is named after the Roman god of the underworld of the same name! This name was suggested by Venetia Burney, an eleven year old schoolgirl from Oxford, England, when it was discovered in 1930. Maybe when we discover more planets, dwarf planets or moons you could be naming one of these in the near future!

Space Food

By Sophie Price



WHAT DO ASTRONAUTS EAT IN SPACE?

Astronauts eat three meals a day in space just like they do on planet earth: breakfast, lunch and dinner. On the international space station they often stay for about six months so they need a good variety of nutritional food.

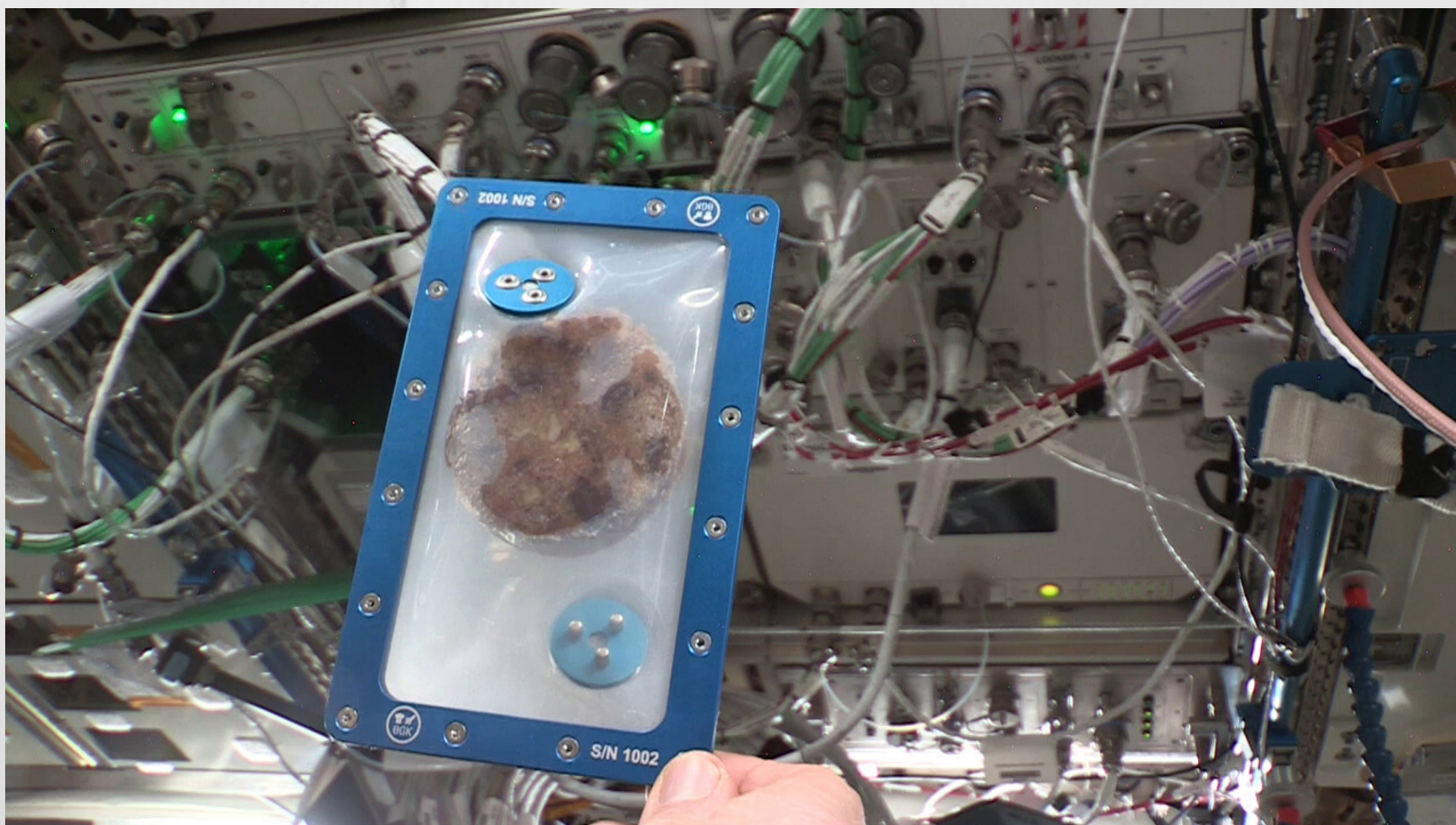
Due to microgravity food floats in space, so salt and pepper cannot be sprinkled on food as it would float away around the space craft so it is provided in liquid form.

Astronauts eat some food in their natural forms such as fruit and nuts. There aren't any refrigerators or freezers so food that would spoil needs to be preserved. Some of the food is freeze dried and requires water to rehydrate before it is eaten. They also have thermo-stabilised preserved food such as canned food but instead of cans they use flexible pouches. Additionally they have normal prepared foods such as cookies and other snacks but they are repackaged in individual servings to ensure a longer shelf life and to avoid crumbs spilling out. For drinks they have a straw that inserts into the packaged drinks with a valve to stop the drink coming out of the straw.

According to a NASA chef some of their favourite foods are spicy food such as hot sauces. One reason for this may be that in space there is a shift of fluids to the astronaut's head, similar to having a head cold, so their food taste sensation is reduced.

Astronauts have grown food such as lettuce in space but so far it hasn't been eaten as they want to check it is safe.

In January 2020 astronauts on the International Space Station baked cookies from raw ingredients for the first time. However as with the lettuce they weren't eaten onboard the shuttle and have been sent back to earth for testing.



The first cookies baked in Space - BBC News

Star scientist:

DR GLADYS WEST



By Sophie Price

Now used in sat navs in cars, military devices, telecommunications, public safety, disaster relief, aviation, tags on social media posts and even farming - the Global Positioning System (GPS) is truly one of the most versatile inventions of the twentieth century, and one that has shaped our modern day lives. Although Roger L. Easton, Ivan A. Getting and Bradford Parkinson are the more recognised inventors of the GPS, one rather incredible African American woman is also the genius behind this invention: Dr Gladys West.

Gladys West, was born in 1930, out in rural Virginia. A determined and intelligent young girl, she knew that her means to making a difference in the world would be through education. As a result, she worked extremely hard to graduate top in her high school class and earn a scholarship to Virginia State University where she majored in Maths, a class which very few other women took at the time.

After her time at university she chose to teach maths at Sussex County for two years, after which she became the second black woman to join the Virginia Naval Surface Warfare Centre. She rose through the ranks quickly from her initial position as a statistical mathematician. Her supervisor Ralph Neiman recommended her as a project manager for the Season radar altimetry project, and later commended her on her efforts. Later as a programmer in the Dahlgren division she collected location data from orbiting machines and input the data into giant supercomputers, while using early computer software to analyse surface elevations. Gladys West's contributions to the mathematical modelling of the shape of the Earth, and her work on the developments of geodesy models was instrumental in developing the mathematics behind GPS.

She worked there for an astonishing 42 years and retired in 1998. Her contributions to GPS were only later recognised when one of her sorority, Alpha Kappa Alpha read her biography for an alumni function. Even now Dr Gladys West is still not widely known as the 'pioneer of GPS' and is very much overlooked.

Despite her retirement in 1998, retirement was no rest for Gladys West. She returned to education, working towards a PhD, but unfortunately suffered a stroke. Not only did the stroke affect her hearing, vision, balance and mobility but it also left her feeling miserable and useless. However she rose above these challenges and achieved her PhD in Public Administration from Virginia Tech. At her current age of eighty nine she has also dealt with breast cancer diagnosis and other personal challenges but still retains the determination and drive that she has had since a child.

Her determination is testament here. "When you're working every day, you're not thinking 'What impact is this going to have on the world?'- you're thinking I've got to get this right."

Dr Gladys West's contributions to the mathematical modelling of the shape of the Earth, was instrumental in developing the mathematics behind GPS. We would be truly lost without her.

The Mars Rover

The Mars Rover is a vehicle that is designed to travel across the surface of Mars

There are many ups and downs to sending rovers not people into Mars One positive is that there are less risks about survival

Like will there be enough food? Enough oxygen?

However a downside is that a robot may not do as good a job

As a human will and can malfunction.

Did you know that no less than six Mars Rovers have already

Be taken to Mars!!! The rovers main mission was to

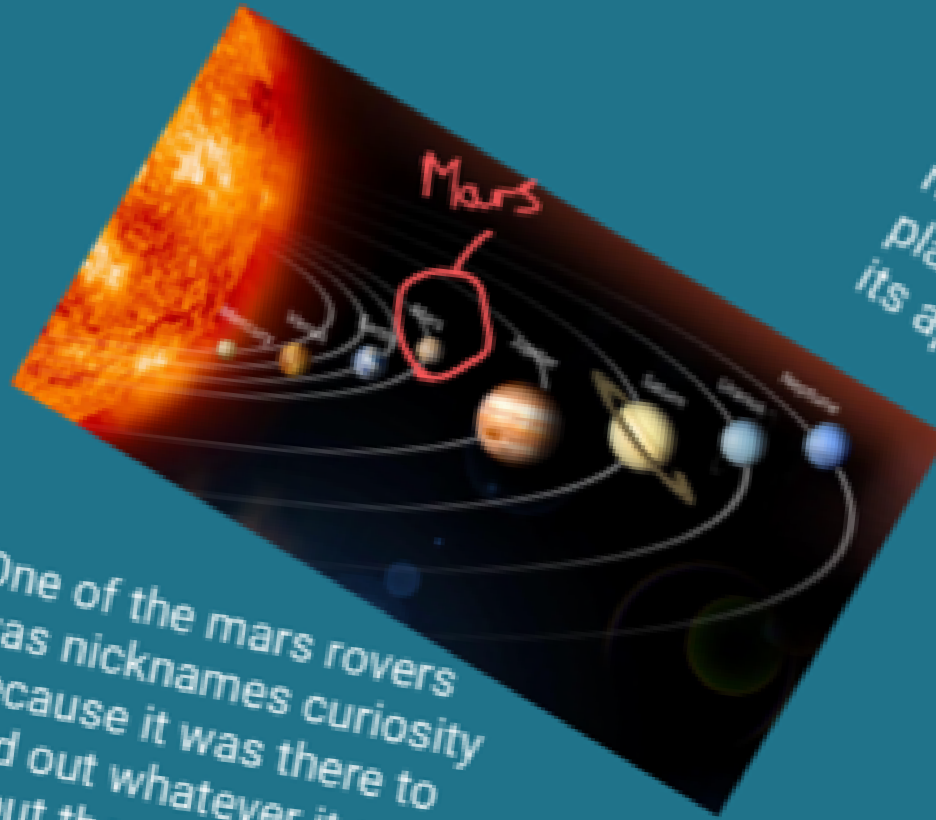
Search for evidence on how habitable/liveable on Mars is.

The rover did this by looking at the fossils that it found There.

Did you know that the first Mars rover exploration was on July 4th 1997



Mars is nicknamed the red planet because of its appearance



One of the Mars rovers was nicknamed Curiosity because it was there to find out whatever it could about the planet

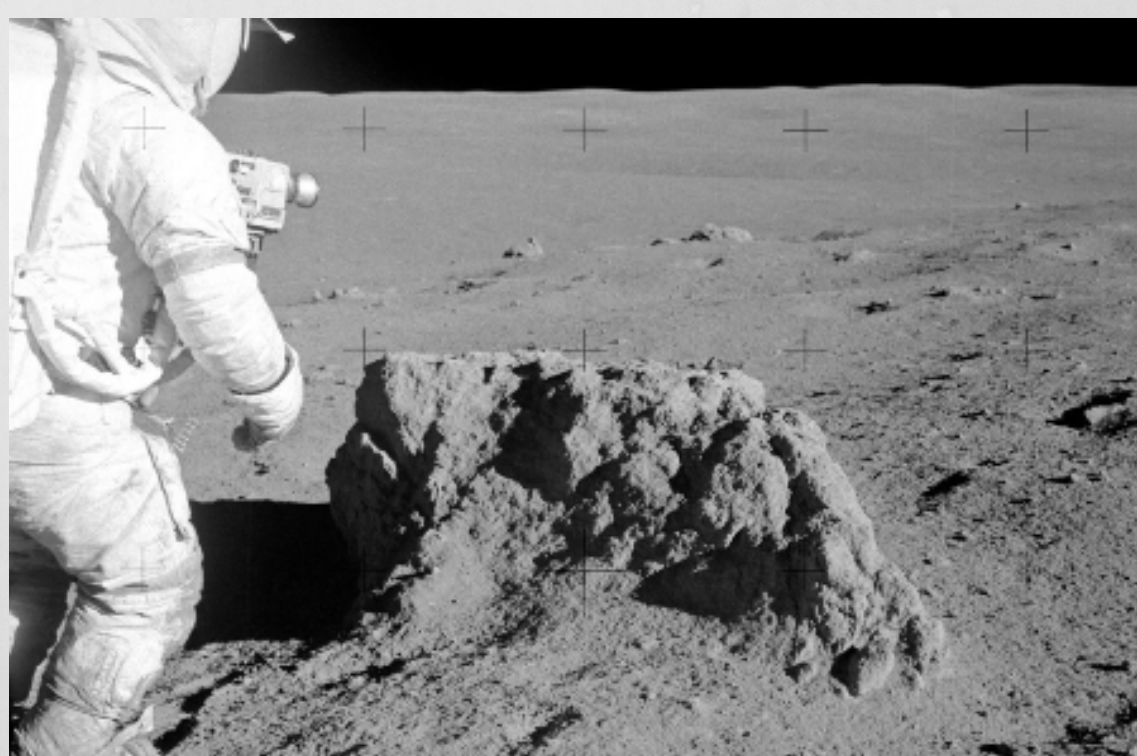
Mars is the second smallest planet

By Matilda Hinton

MOON DUST

BY Maddy Chin

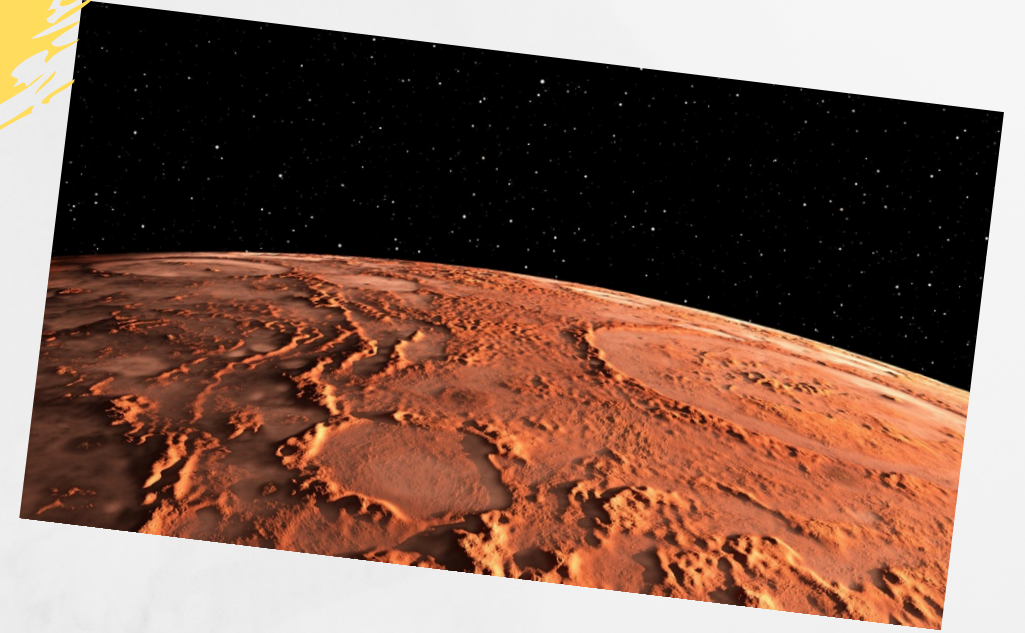
Moon dust, or more commonly known as lunar soil is made up of very fine particles of silicon dioxide glass, plus iron, calcium and magnesium, as well as other trace minerals. How is it formed? Well, it is formed when meteorites crash on the moon's surface, heating and crushing rock, which contains the minerals. The harmful properties are not well known but it is suspected that moon dust will result in great risk to health, whether that be direct exposure or indirect exposure. Moon dust is worth a lot more than any other minerals in the world and it is expected to trade at over \$614 million per ounce. Moon dust is also being studied to see whether it can act as an energy source. In space, energy typically comes via solar panels that provide almost instantaneous electricity when the Sun shines on them. But inhabitants of the Moon could expect to spend up to 16 days in darkness during the lunar night. Finding a sustainable energy solution that collects sunlight during the long lunar days and stores it for use at night is essential to ensure survival. Moon dust can potentially offer a way of storing daytime solar energy so that electricity can be produced at night which would be very important for any humans living and working on the Moon. Stored heat could also be released directly for robots to function, therefore this is not only a solution for humans but also for robots.



Seven Sizzling Science Facts

MARS

By Sophie Price



Why is Mars called the Red Planet?

Mars is often referred to as the Red Planet because of its reddish colour. It gets this colour because of a mineral found on its surface called iron oxide. Iron oxide is also found here on Earth and was sometimes used by early humans to make cave paintings. Whilst 70% of the Earth's surface is covered by water, Mars is covered with rock and dust and with no water on its surface.

How big is the planet Mars?

Mars has a radius of 3,389.5 km (which equals a diameter of 6,790 kms) and is about half the size of Earth. It is also about 140 million miles away from Earth.

Can humans breath on Mars?

It does have an atmosphere but it is about 100 times thinner than Earth's atmosphere. It is mainly carbon dioxide (95%) with very little oxygen so humans could not breath without using a spacesuit with oxygen.

Does Mars have a moon like Earth?

Mars actually has two moons Phobos and Deimos, named after the horses that pulled the chariot of Ares, the Greek god of war. Mars is also named after a god of war but the Roman one.

How long is a year on Mars?

A year is defined as the time it takes a planet to complete one orbit of the Sun. Here on earth a year is 365 days long because it takes this amount of time to make one orbit around the Sun.

A year on Mars it almost twice as long (687 days) because it is much further away from the Sun (so has a bigger orbit to travel) and also travels a bit more slowly than Earth (24 km/sec compared to 29.8km/sec).

Does Mars have gravity?

Yes, the planet Mars has gravity however it is only a third of the Earth's so you could jump three times higher on Mars.

Is man planning on visiting Mars anytime soon?

The USA/s space agency NASA, with support from the UK Space Agency, already has a robot on Mars sending interesting information about the planet back to Earth. Just recently on 24th of February 2020 the UK Space Agency reported that a number of silicon sensors that were developed in the UK have detected hundreds of Marsquakes (similar to Earthquakes but on Mars!). If you want to find out more search for "UK Space Agency Marsquakes" on the internet and go to the www.gov.uk link.

Turn your page around to discover all about Planets and Ancient Mythology

The PLANETS

Did you know that if you kept walking for a very, very long time in a straight line you would end up in the same place as you started? This is because the Earth is round, and so are the rest of the planets next to the Earth. Imagine yourself as this person:

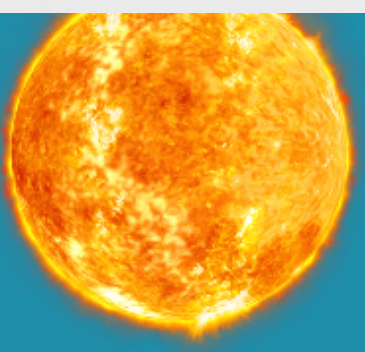


Now imagine flying up higher than the clouds and outside the barrier between Earth and Space (the atmosphere, a big ball of air inside of which the Earth is in, and is filled with many different layers of area filled with air).



This is what you would see. Now, fly even further back, and you will see the SOLAR SYSTEM. This is a system which consists of the SUN ☀️ in the middle, and around it, lots of different PLANETS 🪐 will be spinning. They would be in the order which is shown below. The further away the planet is from the sun, the longer it takes it to complete a full circle (or orbit) around the sun.

The planets & Gods



Mercury

Mercury was, in Roman mythology, god of shopkeepers and merchants, travelers and transporters of goods, and thieves and tricksters. He is commonly identified with the Greek Hermes, the fleet-footed messenger of the gods.
Mercury is the smallest planet; it is the planet closest to the sun.



Venus

In Roman mythology, Venus was the goddess of love, beauty, and fertility. She was the Roman equal to the Greek Aphrodite. However, Roman Venus had many abilities beyond the Greek Aphrodite; she was a goddess of victory, love and fertility. Venus is the second brightest object in the sky.
It is sometimes referred to as Earth's sister planet. A day on Venus is longer than a year on Earth.



Earth (Terra)

In ancient Roman religion and myth, Tellus Mater or Terra Mater ("Mother Earth") is a goddess of the earth. Although Tellus and Terra are hardly distinguishable during the Imperial era, Tellus was the name of the original earth goddess in the religious practices of the Republic or earlier.
Earth is a rocky planet, meaning that it is made out of rocks, soil and other solids as oppose to gasses. Earth is where we live!
Earth isn't actually named after the goddess Terra, the goddess was said to be the protector and founder of Earth.



Mars

In Roman mythology, the Roman God Mars was the bringer of war. He was seen as the protector of the Roman army.
Mars is RED because of the oxidised iron it contains.
It is the furthest rocky planet from the sun.



JUPITER

Roman God Mars was the bringer of war. He was seen as the protector of the Roman army.
Mars is RED because of the oxidised iron it contains.
It is the furthest rocky planet from the sun.
It has around the same landmass as Earth.
Jupiter was believed to be the most powerful God - or the KING OF GODS 🌟 (which seems like a very cool title) and was the god of thunder and the sky.
JUPITER is the BIGGEST planet in the SOLAR SYSTEM.
Jupiter is made out of GAS and since it's so big, it's called a GAS GIANT!
Jupiter has 67 moons. These are all named after the different women Jupiter (the God) fell in love with.



Saturn

Saturn was described as a god of generation, dissolution (or dissolving after death), plenty, wealth, agriculture, periodic renewal and liberation. He was married to Ops, Goddess of plenty, and Lua, Goddess of destruction. In Greek mythology, he was the 'bringer of old age and death'.
Saturn is a planets with 7 rings made out of ice and a little bit of rocks.
Saturn is made out of gas.
Saturn has 62 moons.



Uranus

The Latin form of Uranus, Uranus was the grandfather of Jupiter, the father of Cronus (Saturn), and the king of the Titans in Greek mythology, but that's not Roman mythology. As it was discovered beyond the orbits of Jupiter and Saturn, the name seemed highly appropriate.
Uranus is referred to as the 'ice giant'.
Uranus has the coldest temperatures out of any other planet in the solar system.
Uranus has 27 moons.



Neptune

Neptune was the Roman god of water and the sea, and very similar to the Ancient Greek god Poseidon. He had two brothers: Jupiter, the god of the sky and chief of the Roman gods, and Pluto, the Roman god of the dead. Neptune was often shown carrying a trident, a three-pronged spear used for catching fish.
It takes Neptune 164.8 Earth years to orbit around the Sun.
Neptune is the 4th largest planet.
Neptune has 14 moons. The largest is Triton, which was believed to be Neptune's son.

Planets & Ancient Mythology

By Carla Lubin

The ROMANS

The ancient ROMANS were people who were alive in 27BC and their empire finished in 1453. The ancient Romans believed in many Gods and Goddesses.

Thinking time!

Share orally! Discuss your thoughts!

Can you guess why Jupiter was the planet named after the most powerful God (Jupiter)? (Note: Jupiter was discovered before Uranus).

Why do you think Uranus is referred to as an 'ice giant'?

Without looking, can you name the planets in order? (Tip: try inventing a mnemonic!)



? - There is one more planet, in fact, but this planet is no longer considered part of the Solar system. It is called Pluto. After much time of debate, Pluto was finally considered a 'dwarf planet', which means that it is too small to be considered a regular planet like the rest in the Solar System.

Newton's Laws

by Maddy Chin



Isaac Newton is one of the most famous scientists of all time and I can probably assume nearly all of you have heard of him... He is a key figure of science and he revolutionised it, causing a paradigm shift (sounds cool doesn't it? - it basically means his discovery changed a lot of other concepts as well). Now, what did he discover you may ask? Well, he discovered the revolutionary three laws of motion which are fundamental principles in Physics and of course **GRAVITY** - the sole reason you are not falling right now. Well... you could be but I certainly hope not!

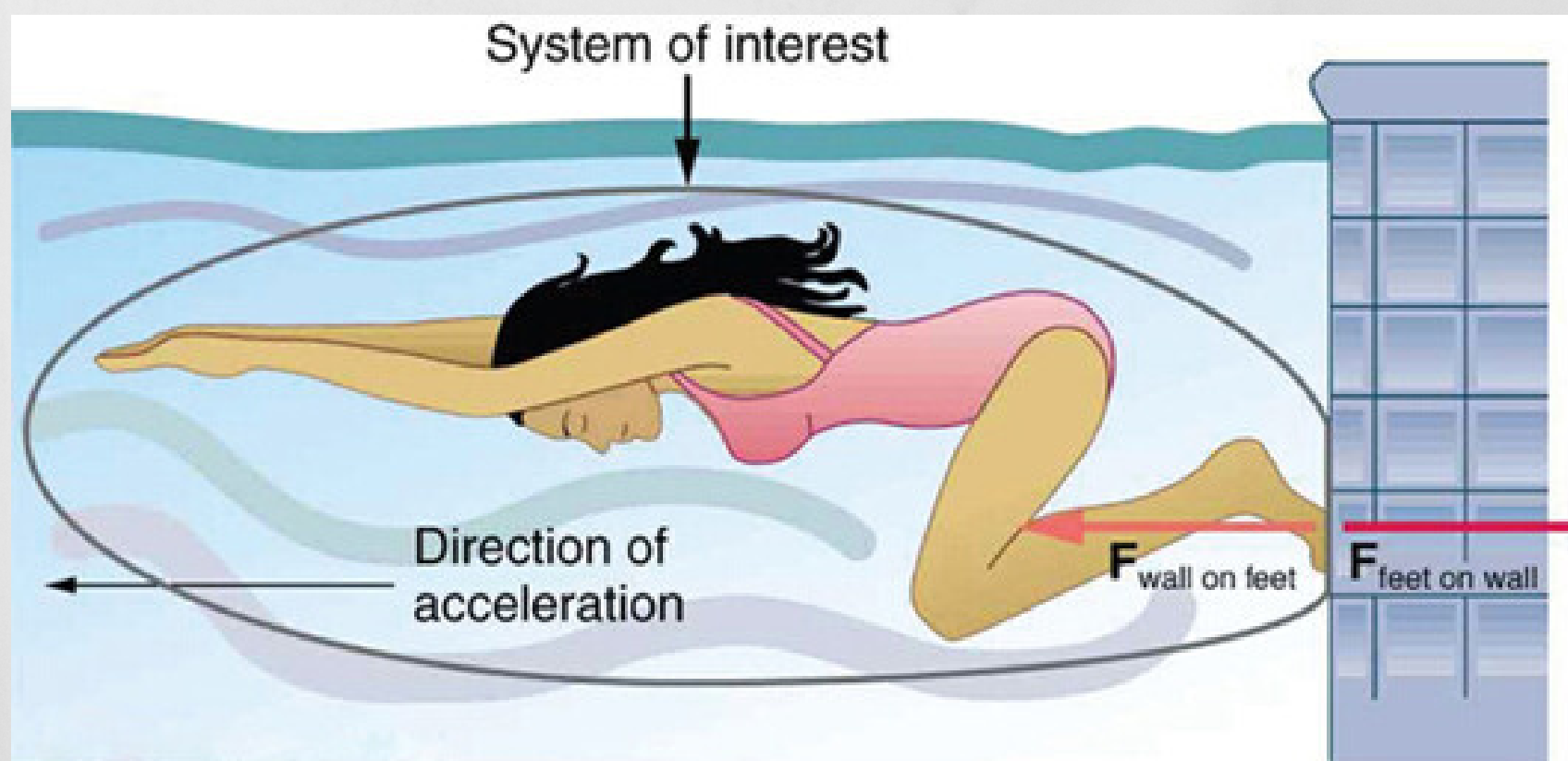
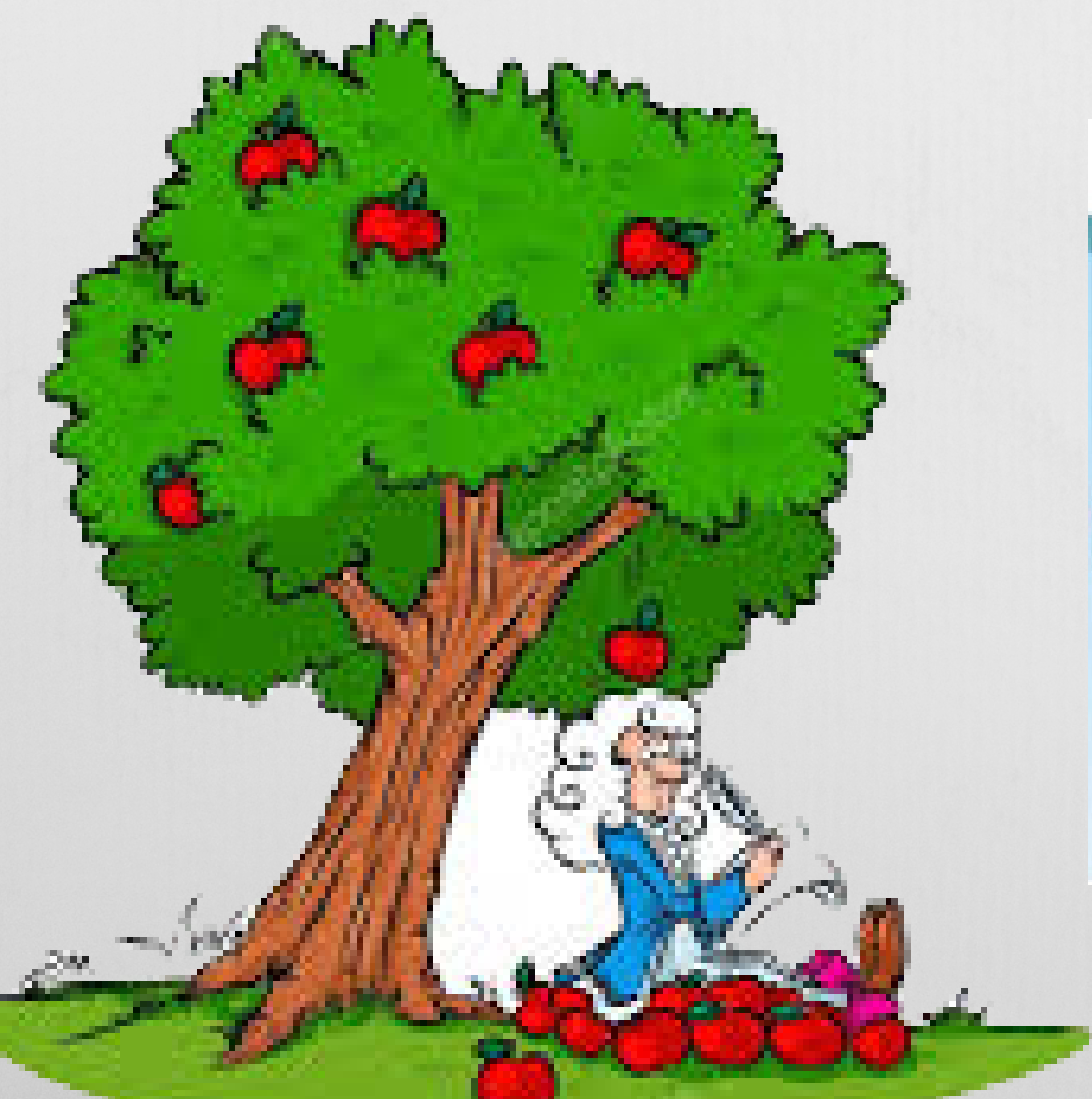
The **three** laws of Newton are as follows:

1) An object at rest will remain at rest unless acted on by a force. An object in motion continues in motion with the same speed and in the same direction unless acted upon by an unbalanced force. This makes sense because when you're sitting down and there is no force acting on you, you just remain still...

2) Acceleration is produced when a force acts on a mass, the greater the mass of the object, the greater the force required to accelerate it. To put this into a real life situation, you can think about how much more force will be required to push your parents than it would be to push you because they are obviously heavier.

3) The third and final law states that *"for every action, there is an equal but opposite reaction"*. Now, this one sounds a little funny but to put it into concept did you know that when you're sitting on a chair, you are pushing it downwards but the ground from under you is pushing upwards as well! Or when you swim you push the water back but you move forwards! This is what ensures you don't fall through the earth. Or try pushing a wall, although you are applying force to the wall the reason it is not crumbling, is because it is exerting an equal force on you... (and you don't have superhuman strength).

Newton came up with very significant discoveries about gravity and how gravity is the pulling force that keeps people on the ground rather than floating off. What inspired him funnily enough was watching an apple fall from a tree and wondering what made the apple fall. Continue to be curious inquirers and you might turn out to be the next Newton!





Godolphin & Latymer