

# Newsletter

Dear Parents, Carers and Students

It has been wonderful seeing the students return to school this week. Despite the dramatic change to the weather, spirits are high! The test centre is running like a well-oiled machine now, with 400 tests per day being carried out. One more week of this Lateral Flow Testing and we can open up the Sports Centre to the PE department for their lessons. One of the challenges at the moment is the additional space COVID secure measures require. Our staffing and rooming are being pushed to their capacity.

This week I shared with Year 11 and Year 13 students our plans to gather evidence for the GCSE and A Level grading process. I intend to write and explain to parents next week and share the 'evidence gather' points per subject.

We take Science at BFS very seriously. It is one of the most popular subjects to study at A level and our students always seem fascinated to learn about the world around them. To commemorate Science Week, the Science Department has been allowed to have a newsletter takeover. I would like to thank Mr Hamilton and his team for being so enthusiastic about their subject.

Now school is open we will revert to our Red Week shorter news bulletin and our larger Blue Week newsletter. Courtney Billing has done an amazing job during lockdown editing the newsletter which has grown in thickness over the weeks. I hope you appreciate it as a sign of our positivity and enthusiasm to keep our school community connected during lockdown.

During lockdown, students attending onsite have really helped to maintain good relationships with the community through their behaviour as they arrive at school and leave at the end of the day. We would ask you to remind your son/daughter to show respect for our neighbours in the houses and shops close to our school. I would also like to remind parents to please be considerate of residents and other road users when parking on Concorde Drive whilst dropping off and collecting students.

Finally, I would like to thank parents and carers for supporting our uniform policy. I need to remind students that facial piercings or headphones are not allowed to be worn in school. We will ask students to remove these. Please see the uniform specification here: <https://www.bristolfreeschool.org.uk/uniform.php>

I hope everyone enjoys their well-deserved weekend and we look forward to starting a normal school week on Monday.



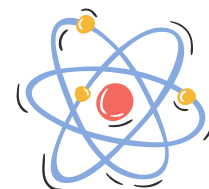
Mrs S King, Headteacher

Key Dates	
Sunday 14 March	National Pi Day
Monday 15 March	2nd Lateral Flow Test for Years 7 and 8
Tuesday 16 March	3rd Lateral Flow Test for Years 11, 12 and 13
Wednesday 17 March	3rd Lateral Flow Test for Years 9 and 10
Thursday 18 March	3rd Lateral Flow Test for Years 7 and 8
Sunday 21 March	World Poetry Day

## Message from Greenway Vaccination Centre

**It has been reported that some students are walking through the queue of patients in the Greenway car park waiting for their vaccine. If students use this as their route to and from school they are asked to please keep away from the queue and observe the 2m social distancing rule.**

# BFS BRITISH SCIENCE WEEK



MR HAMILTON,  
HEAD OF SCIENCE

In a year when Science has been at the forefront of national news, it is ironic that many students have had less chance than normal to explore the fascinating world of Science. However, Science Week is here to change all that and reintroduce students of all ages to the discovery of how the world around them works. This year there is also a focus on smashing stereotypes in Science and at BFS we are proud to buck the national trend and have more female students than males studying Science at KS5, thanks in part to our very own STEMInist champions Ms Board and Mrs Yahaya. So whoever you are, please join us in taking part in this year's National Science Week.

#BSW2021

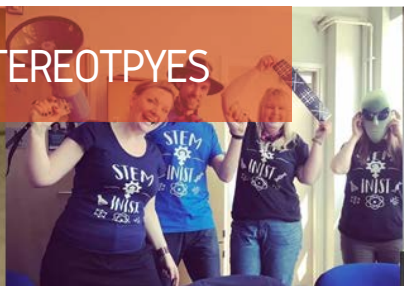


## WE SUPPORT THIS YEAR'S THEME

The Science, Technology, Engineering and Maths (STEM) sectors are much more diverse than this stereotype suggests. There are people working in labs, at universities, in innovation centres, in businesses and out on construction sites, who come from so many different backgrounds, and who have taken lots of different routes into their career.

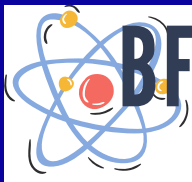


MS BOARD #SMASHINGSTEREOTYPES



Since joining BFS in 2013, I have been on many adventures through STEM and especially as a passionate STEMInist! I am so proud that we have such incredible numbers of girls studying STEM subjects at A Level - well above the national average.

I have worked on projects with CASIO, Industrial Cadets and STEMettes on increasing diversity in STEM, presenting at European conferences about my experiences and those of our students. I was really excited to be nominated for STEM Technician of the Year 2019 for my advocacy work for girls in STEM and am super excited and honoured to be a UN delegate for the Commission on the Status of Women in March 2021.



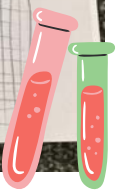
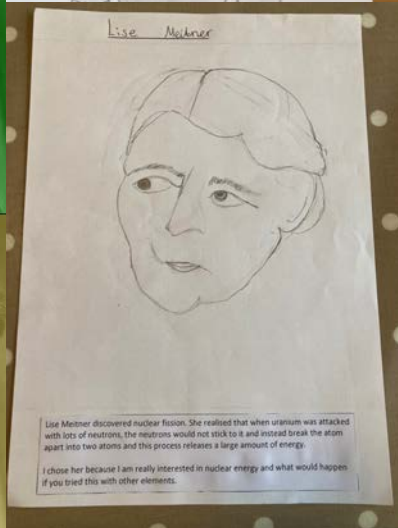
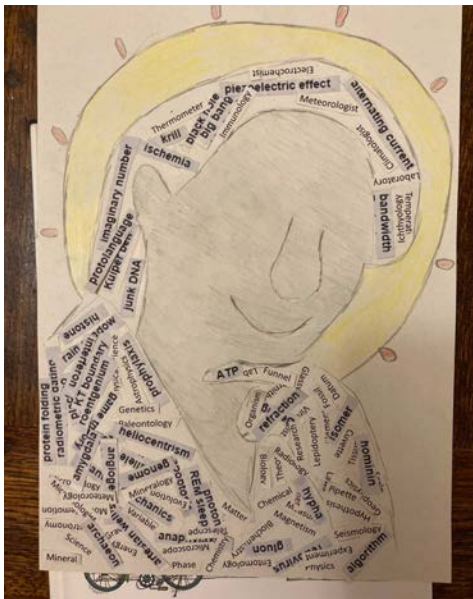
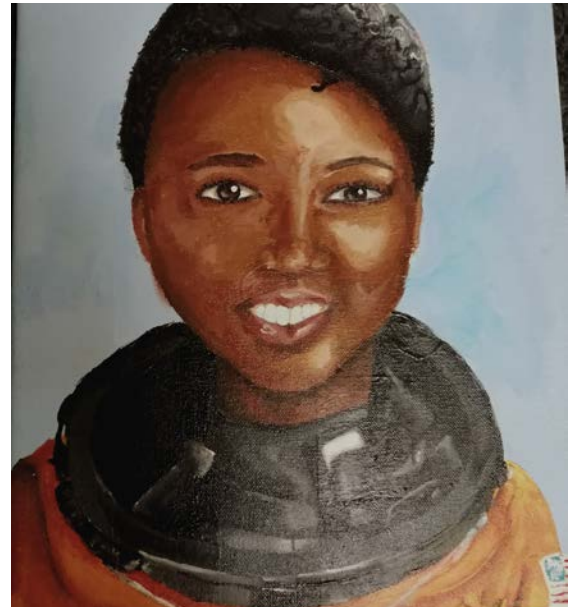
# BFS CELEBRATED INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE

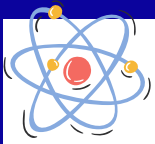
11 February was the International Day of Women and Girls in Science.

At BFS, students were asked to consider some of the inspirational female pioneers in science. They were then asked to choose one that inspired them the most and create a portrait to celebrate the woman of their choice.

Students engaged well with the challenge. Putting on their artistic wizardry, they produced amazing portraits about the women who inspire them. Along with creating their portrait, students also explained why the women have inspired them.

We are proud at BFS that we have many female students doing Sciences and Mathematics at A level.





# CAREERS IN SCIENCE

## BIOLOGY

Careers in Biology are diverse. Biologists are involved in many different sectors from healthcare and pharmaceutical drug development through to environmental science and astrobiology. Biology itself encompasses many different disciplines such as genetics, forensics, ecology, ornithology and oceanography and there are opportunities to gain qualifications and employment within each! During years 7-13 students study a flavour of all these sub disciplines. Most students would then go on to study a degree or apprenticeship narrowing down on to the specific aspect of biology that interests them. From here many people will progress further into post graduate qualifications. Biology is complemented by other subjects such as Chemistry, Physics, Maths, Computer Science and Geography.

### Healthcare and Pharmaceutical Companies - An Introduction to the big 3!

**GSK** - 'We have three global businesses that research, develop and manufacture innovative pharmaceutical medicines, vaccines and consumer healthcare products. Every day, we help improve the health of millions of people around the world.'

Find out more: <https://www.gsk.com/en-gb/about-us/>

- They also have an excellent apprenticeship programme: <https://uk.gsk.com/en-gb/careers/apprenticeships/>

**Pfizer** - 'Here in the UK, and around the world, we strive to set the standard for quality, safety, and value in the discovery, development, and manufacture of medicines and vaccines that have the potential to save lives, prevent illness and improve health and wellbeing.'

Find out more: <https://www.pfizer.co.uk/pfizer-uk>

**Astra Zeneca** - 'A global pharmaceutical company with a major UK presence. Our purpose is to push the boundaries of science to deliver life-changing medicines. The best way we can help patients is to be science-led and share this passion with the scientific, healthcare and business communities of the UK.'

Find out more: <https://www.astrazeneca.co.uk/about-us.html>

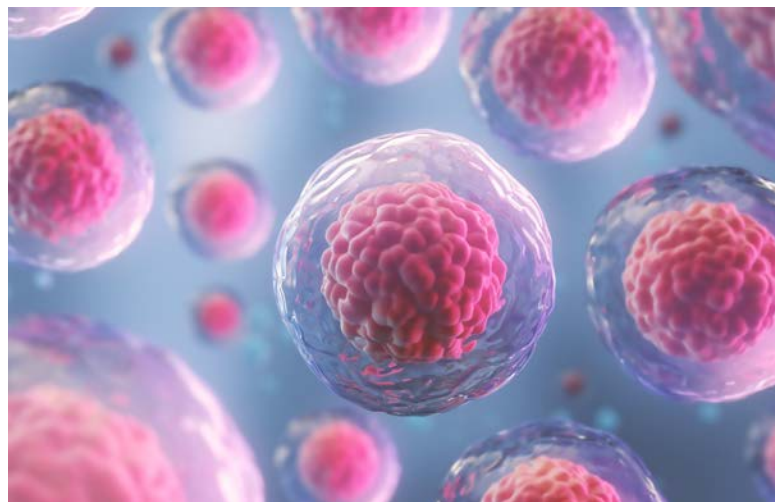
### Biotechnology Companies - These are smaller but growing fast! The way of the future?

**Immunocore** - Immunocore is a pioneering, clinical-stage T cell receptor biotechnology company working to develop and commercialize a new generation of transformative medicines to address unmet needs in cancer, infection and autoimmune disease

Find out more: <https://www.immunocore.com/>

**Moderna** - We are pioneering a new class of medicines made of messenger RNA, or mRNA. The potential implications of using mRNA as a drug are significant and far-reaching and could meaningfully improve how medicines are discovered, developed and manufactured.

Find out more: <https://www.modernatx.com/about-us>



## Ecology Companies

**Avon Wildlife Trust** - Avon Wildlife Trust is committed to enabling wildlife to survive and thrive across the region.

Find out more: <https://www.avonwildlifetrust.org.uk/>

**Bristol Zoo** - Bristol Zoological Society is a conservation and education charity, which runs and operates Bristol Zoo Gardens and the Wild Place Project

Find out more: <https://bristolzoo.org.uk/>

**BSG ecology** - 'We provide a complete ecology service, from fieldwork and baseline survey to impact assessment, biodiversity management, project design and expert witness advice. Our key work sectors include residential and commercial development, mineral extraction, infrastructure, renewable energy and the public sector'

Find out more: <https://www.bsg-ecology.com/>



**Avon**  
Wildlife Trust

**BSG** | ecology

## Other Biological Opportunities

**Astrobiology**- The UK centre for astrobiology is located in the University of Edinburgh. People interested in this area can end up working for the European Space Agency or NASA.

Find out more: <https://www.astrobiology.ac.uk/>

**Healthcare** - There are many and varied roles in this sector ranging from lab technician to doctor/dentist. The NHS website below has over 350 roles for you to explore!

Sometimes you can even get sponsored degrees or apprenticeships in these areas.

Find out more: <https://www.healthcareers.nhs.uk/explore-roles>

**Ornithology**- Ornithology is the study of birds. There are many careers in this ranging from veterinary science, conservation and research.

Find out more:

<https://www.bbc.co.uk/bitesize/articles/zkcxxyc>



# CHEMISTRY

Play this game and find out what life changing career suits you!

- <https://edu.rsc.org/future-in-chemistry/game>

How will you make a difference in the world?

Follow the link to a Tik Tok channel:

[https://www.tiktok.com/@royalsocietyofchemistry?](https://www.tiktok.com/@royalsocietyofchemistry?utm_source=house-)

[utm\\_source=house-](https://www.tiktok.com/@royalsocietyofchemistry?utm_source=house-)

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KS4 and Post 16

Are you still deciding whether an apprentice or university is for you?

**Earn While You Learn**

- <https://edu.rsc.org/future-in-chemistry/study-options/earn-while-you-learn>

**University**

- <https://edu.rsc.org/future-in-chemistry/study-options/going-to-university>

# SIXTH FORM STUDY OPTIONS: INTRODUCING... BTEC APPLIED SCIENCE

Are you thinking about Science in Sixth Form, but not sure which one to pick? Do you enjoy the practical side of science and want a careers-focused course at KS5? Would you prefer more coursework and less final exam?

Yes?

Then you should consider our Applied Science BTEC Course



At BFS we offer the Level 3 extended certificate which is equivalent to 1 A-level

## What will I study?

All 3 sciences to greater depth, with a strong emphasis on practicals. Plus, coursework that is relevant and helpful to future jobs in science.



## What have previous Applied Science students gone on to do?

Currently, we have Year 13 students with UNCONDITIONAL UNIVERSITY OFFERS for:

- PE and coaching & environmental science

We have students with offers for:

- Business and management, criminology, computer science, health foundation courses, occupational therapy, mental health nursing foundation, urban planning, sports rehabilitation

We have students with apprenticeships lined up in:

- Dental nursing, army engineering & cyber security

At university or apprenticeship level (including degree apprenticeships) you could study.....

Where will it lead me?



Transport planning and management



Computer science



Design and engineering



Music technology and art



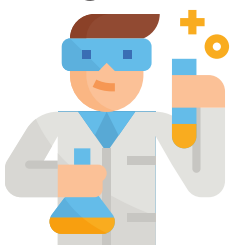
Environmental and Earth sciences



Foundation health courses and lab technicians



And many more.....



# SUCCESS FOR APPLIED SCIENCE STUDENTS

As it is Science Week, I thought I would write a celebratory piece about some extraordinary BFS science news! This week, four students in the Year 13 BTEC Applied Science class (namely Jacob, Dan, Charlie and Saber) have been nominated for the national BTEC Science Student of the Year. This is a prestigious award that recognises the knowledge, skills and behaviours of outstanding BTEC students studying science based courses who always go the extra mile in their learning, by recognising inspirational, hard working students who are role models to others. The winners for these competitions will be announced later on in this academic year at an awards ceremony either online or in London (COVID depending).

**BTEC  
AWARDS  
2021**

Nominate your  
BTEC stars today!



## WHAT EXPERIEMENTS DID YOU DO AT HOME?



ASBTON



BLAISE



CANFORD



DURHAM



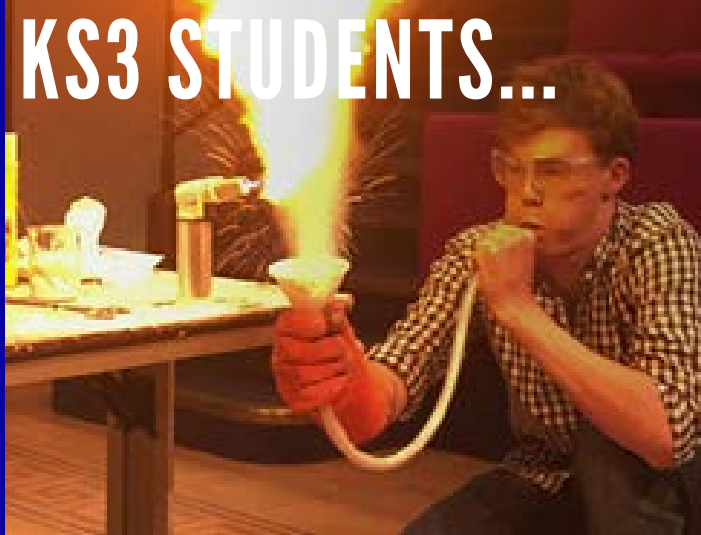
BRISTOL  
FREE SCHOOL

**House Competition for  
Science Week**

**What science  
experiments can  
you do at home?**



# KS3 STUDENTS...



The Royal Institution will be coming to BFS to deliver their exciting show 'Energy Live!'

Date and timings TBC

More details can be found here:

<https://www.rigb.org/education/science-in-your-school>



## GRAVITY IS NOT WHAT YOU THINK IT IS

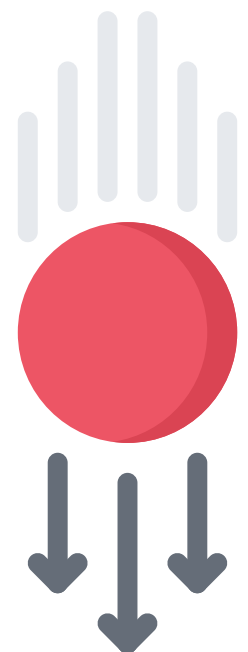
Reality is not what it seems. Contrary to what our naïve eyes fool us into believing, the universe is not simply confined to the three x, y and z spatial dimensions, but in fact contains a fourth, as malleable and intertwined as the others: time. This fourth dimension fuses inseparably with the spatial dimensions to form what is the fabric of our universe: space-time.

All bodies in the universe 'travel' on a path through, what I will simplify to, the 'two-dimensional plane' of space-time by travelling on the shortest possible line between two points. This is called a 'geodesic'. From the classical perspective of time being a constant rate in the universe, it would be presumed that a body would therefore travel in a straight line through space-time as a body's position in space changes but the rate at which time passes does not. However, as Einstein discovered, time does not pass at a constant rate everywhere in the universe. A massive body of mass in fact, like Earth, curves space and time around it, creating what is analogous to a crater or "well" in space-time around it, with itself at the bottom (or middle from a more accurate, three-dimensional perspective). So, when a body comes in sufficient range of the massive body, its geodesic, shortest path, through space-time becomes a curve, down towards the 'bottom' of the crater- the centre of the massive body.

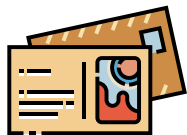
But how does this all relate to gravity? If we look at Earth, the body's curved geodesic through space-time towards the Earth is what we perceive as 'gravity'- this is the body "falling" towards the Earth. So it turns out that gravity is not a force; Earth does not pull objects towards it, Earth just changes their natural path through space-time with the result that they "fall" towards it. Gravity is not what it seems.



**ADAM, YEAR 11**







# POSTCARDS FROM THE FUTURE

For Science Week 2021, Year 7 have been exploring the Ecological Emergency, with the help of the Avon Wildlife Trust. We listened to members of the Trust describing the emergency facing our community, the city, and the world. It shocked us to learn that species that were once common in Bristol, such as hedgehogs, starlings and linnets are now rarely seen. We looked at the causes of this emergency, such as climate change and pollution, the impacts - loss of biodiversity and potential food and medicine sources - and what can be done about it. We discovered that much can be achieved at home, school, and in the wider community to slow and indeed reverse the effects of the ecological emergency.

We then explored how the ecological emergency and the environment in general is approached by different groups of people, using the theory of intersectionality. Does the environmental movement reflect the many different identities of the people in our community and, if not, would it be better for our environment if it did?

The last aspect considered was the impact of coronavirus on our relationships with nature. We heard that most young people agreed that being outdoors has made us feel better, but research shows that young people between the ages of 8 and 15 years old have been half as likely as adults to go outdoors during lockdown. This was due to lack of opportunities to get out as well as worries about the virus. The research also showed that children from poorer families and BAME children spent significantly less time outdoors during the pandemic than other groups of children. We asked what might have caused these differences and what we might expect our Government to do to address them.

Finally, Year 7 imagined what our world would be like in a future where some or all of the issues looked at have been dealt with. Postcards were written from the future to the year 2021, describing the positive effects of actions taken now. The COVID generation was praised for its efforts to promote Nature, protect the environment and support biodiversity, for the benefit of all life on Earth.

## Environment

To make the environment healthy we can shop in bulk, making sure our wastes goes to the right place and bring a bag. Other important reasons that we can help the environment is to recycling, recycling helps the environment healthier because recycling can waste a huge negative impact on the environment and recycling helps to reduce the pollution caused by waste.

We can save our environment in future by save water, save electricity, educate, plant a tree....

In future our environment gonna effect of global climate change include more frequent wildfires and longer periods of drought in some regions and increase in the number. The global climate change has already been observable efforts on the environment.

The most important thing we can do to protect the environment is to reduce the destruction of eco-systems and we can also do air and water pollution, global warming, smog, acid rain, deforestation and wildfires.

These are just few environment issues that we are facing right now.



We can save our environment together.



Let's make the world a better place.

Hi 2021! I am writing from the year 2083

At the moment, climate change has really affected

us. The Earth is heated like it never has before. However, Scandinavia is thriving but the bad thing is that it doesn't snow anymore!

How awful! Some people in America have to wear oxygen masks because the pollution is too much. Other planets are getting inhabitable as well! SpaceX have terraformed Mars and it

now has a population of 3 million people and the moon has been taken over by around 25,000 people. They found life on Venus, but the

climate there is makes it impossible for humans to inhabit. I, however, am not brave enough to venture off. I have stayed in Iceland where

it is as warm as the Mediterranean was in your time!

Mars



However

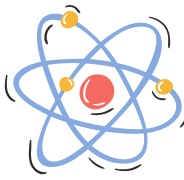
Surprisingly, the main causes of climate change were light pollution and air pollution, which were brought on by electricity.

SO GET NATURAL AND USE AS LITTLE ELECTRICITY AS POSSIBLE!

PANI, YEAR 7

NICHOLAS, YEAR 7

# YEAR 7 AND 8 SCIENCE POSTERS



## DOROTHY HODGKIN



**Inventor, electrical engineer, Mechanical engineer and futurist.**

**Over the course of his life, he created over 700 new things including the remote control, neon lamps, radio, lasers and a new type of motor.**

**In his laboratory, Nicola conducted strange and dangerous experiments.**

**He created an earthquake machine.**

**He harnessed the power of Niagara Falls and used it to illuminate entire cities.**

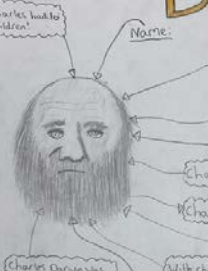
**He controlled jagged bolts of purple electricity with his hands**

**He was obsessed with the number 3, he would walk around a building 3 times before going into it.**

**Nicola Tesla**  
1856 - 1943  
"The present is theirs; the future, for which I really worked, is mine."

**He even tried to create a time machine**

## Charles Darwin



**Timeline**

- 1879 - Einstein born-Germany
- 1900-Graduates college
- 1900-gets job as patent office
- 1901- Daughter born
- 1903-Maria Mileva
- 1904-Son born
- 1905-Write Theory of Relativity
- 1913-3133- Director of the Kaiser Wilhelm Institute for Physics
- 1914- Visits United States
- 1921- Wins Nobel Prize
- 1946-Becomes U.S. citizen
- 1955-Dies at age 76

**Life In America**

In 1932 Einstein immigrated to the U.S. and got a job at Princeton, New Jersey. never went back to Europe.

**During WWII he helped the U.S. Navy evaluate designs for future weapons systems.**

In 1952 David Ben-Gurion, Israel's president, asked Einstein to become Israel's president. He said no.

In 1955 Einstein died of abdominal aortic aneurysm.

**Lasting Impact**

Albert Einstein's Theory of Relativity helps scientists and mathematicians figure out how objects move in space and time in relation to each other. One way we use it everyday is with GPS.

**Accomplishments**

- Emigrated from Swiss Federal technical School 1900
- Nobel prize-1922
- Professor at The Institute for Advanced Study at Princeton in math, english and science.
- Wrote a letter to President Roosevelt warning him of the atomic bomb.

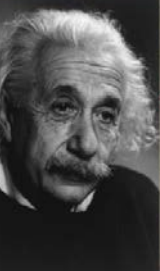
**Video**

Light must be the same speed for observers even though it is affected by gravity, this means that gravity must also affect the rate at which time flows.

**Citations**

- Answers.com
- Bio.com
- Softpedia.com
- Big Head Biography: Who Was Albert Einstein
- YouTube.com

## Sir Isaac Newton



**PHILOSOPHIAE NATURALIS PRINCIPIA MATHEMATICA**

His biggest prize he had received was being knighted for his works.

He apparently thought of the theory of gravity when an apple hit him on the head when he was sitting under an apple tree.

Many people didn't believe what he said at the time as it went against the religious teachings they believed, especially those about how the Earth is not at the centre of the universe.




**Marie Curie**

**Marie Curie is remembered for her discovery of radium and polonium, and her huge contribution to finding treatments for cancer. She also helped in the making of the x-ray.**

Born in Warsaw, Poland on the 7th November 1867 in Warsaw, Poland, she was the youngest of five children. After her mother died and her father could no longer support her, she became a governess reading and studying in her own time.

She came from very humble beginnings and desperately wanted to become a teacher. However, it was unfortunately not a possibility because their lack of money meant that she couldn't afford to get a formal education. Then in 1881 her sister offered her lodgings in Paris and the opportunity to go to university. She gladly took it. She immediately entered Sorbonne University in Paris where she studied physics and mathematics where she had the first won the Nobel Peace Prize in 1903 for her extraordinary work in radioactivity. In 1906 Marie's life was struck by tragedy when Pierre was killed in an accident after being knocked down by a horse and cart. Her persevering spirit, however, kept her working and she went on to succeed him in his Chair as Professor at the Sorbonne, as well as carrying on lecturing where he had left off. Her determination led to a second Nobel Prize in 1911, this time in chemistry for creating a means of measuring radioactivity.

## The Wright Brothers

**Wilbur Wright** (born April 16, 1867 - died 30, 1912)

**Orville Wright** (born August 19, 1871 - died January 30, 1948)

The Wright brothers were two American aviation pioneers generally credited with inventing, building, and flying the world's first successful motor-powered airplane. They made the first controlled, sustained flight of a powered, heavier-than-air aircraft with the Wright Flyer on December 17, 1903, 4 mi (6 km) south of Kitty Hawk, North Carolina. In 1904-05, the brothers developed their flying machine to make longer-running and more aerodynamic flights with the Wright Flyer II, followed by the first truly practical fixed-wing aircraft, the Wright Flyer III. The Wright brothers were also the first to invent aircraft controls that made fixed-wing powered flight possible.

The brothers gained the mechanical skills essential to their success by working for years in their Dayton, Ohio-based shop with printing presses, bicycles, motors, and other machinery. Their work with bicycles influenced their belief that an unstable vehicle such as a flying machine could be controlled and balanced with practice. From 1900 until their first powered flights in late 1903, they conducted extensive glider tests that also developed their skills as pilots.

## MARIE CURIE

**Brief History**

- She was born in Warsaw, Poland on November 7th 1867
- Her mum died of tuberculosis when she was 11 year old.
- She left Poland at 17 years of age to pursue a career of Science in France
- She married Pierre Curie before he died in 1906. Marie also died in 1935.

**Most Famous For**

Marie Curie was the first woman to win a Nobel Prize. She is one of the few people to win multiple Nobel prizes and the only person to win 2 prizes in different categories, physics in 1903 and chemistry in 1911. For a woman to achieve this in the early 20th century was groundbreaking.

**Uses of her Discoveries**

Polonium and Radium are not still widely used due to the progress of alternate (better and safer) substitutes.

However, the discovery of Polonium and Radium has led to major progress in Science and the understanding of radioactivity. This has brought huge positives (nuclear energy) as well as negatives (nuclear weapons) to society.

**3 Interesting Facts**

- Curium, an element named after her and her husband (is the 96th element on the periodic table.
- They have named a unit of a reactivity after her (Curies)
- During WWI, she organised a fleet of x-ray machines to help the doctors in the frontlines.

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# PERSEVERANCE



**MR INNES**

On 18th February 2021, NASA's latest rover, Perseverance, successfully landed on Mars. The rover is on a mission to look for signs of ancient life on the planet. A rover is a motorised vehicle which has been carefully designed to roam across the surface of a planet or a moon. Perseverance was launched on 30th July 2020 and travelled 471 million kilometres for 203 days to reach Mars.



Perseverance, which has been nicknamed Percy, is NASA's fifth and largest rover to land on the red planet. Perseverance is different to previous rovers in that it is part of a "sample return" mission. This means that the rover will collect various samples of rock and soil and will store them.

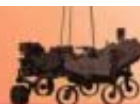
NASA and the European Space Agency will send future spacecraft in the 2030s to collect these samples. Scientists will then analyse these samples to see if they contain any signs of life and help us learn about the climate, weather patterns and geology of the planet.

Scientists are particularly looking for traces of ancient microbes. Microbes are microscopic living organisms which may have been preserved as fossils in the rocks and soil. The rover landed in a flat area called the Jezero Crater, just north of the planet's equator. The crater is believed to be the site of an ancient lake and river delta and so it could be good place to explore for fossils of these microbes. If these traces are found, then this will be hard evidence for Martian life.

Perseverance is different from the other rovers in a few other ways. It has already sent back the first colour pictures transmitted directly from Mars. All previous images from Mars were black and white before being enhanced to show the correct colours.

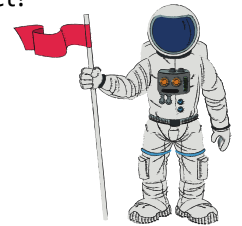
The rover also has two microphones, and so we can hear sounds directly from Mars for the first time.

Perseverance is also carrying a small aircraft, called Ingenuity. Ingenuity is the first device that can fly across another planet's surface. NASA is primarily using this for scouting missions. Any message transmitted from the rover will take eleven minutes to travel to Earth. For example, a "live" recording is happening eleven minutes earlier. What would happen if things you said to someone else were delayed by eleven minutes?





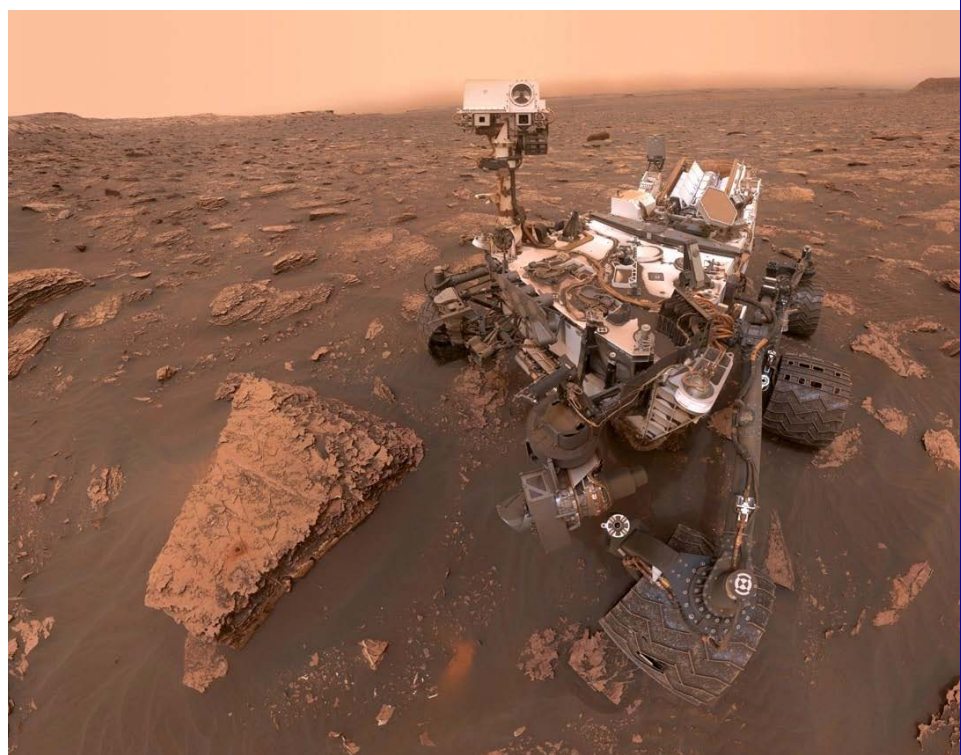
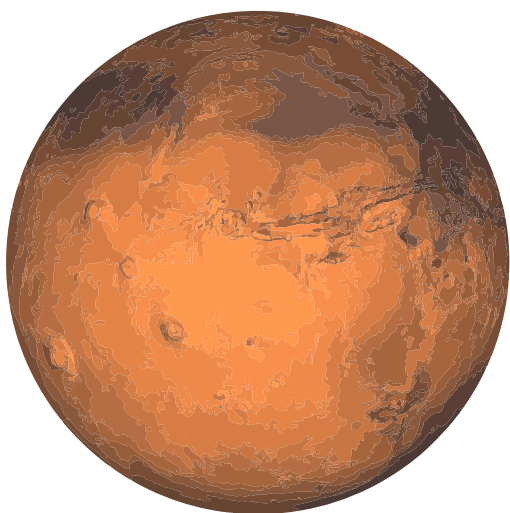
As the air on Mars is mostly carbon dioxide, NASA have also sent a device that will try to convert carbon dioxide into oxygen. If successful, these devices may be used in future space exploration involving human travel. Large versions of this device could allow humans to live and work on Mars. Do you think humans will live on Mars in your lifetime? Would you like to visit the red planet?



Perseverance has the ability to achieve something despite difficulties, past failures and/or opposition. This is aptly named as NASA has had a long and difficult history of space exploration. For every successful project they have had many more failures, some deadly. However, through reflective learning, problem-solving, creative design, meticulous planning, teamwork, increasing communication with other world-leading scientists to share ideas, and of course, perseverance, scientists have achieved a fantastic and significant milestone in space exploration. If we can apply these values to the ethos of our learning then we can grow and achieve our goals, even in these trying times.

As part of Science Week, KS3 pupils may have a lesson on exploration on Mars and we will consider the different rovers and investigate how successful their respective missions have been.

We may be closer than ever to answer the age-old question: "Is there life on Mars?"



# CAN WE MAKE AN AEROPLANE OUT OF SEAWEED?



**DR MARTIN**

Making aircraft from seaweed! The De Havilland Mosquito was one of the most successful combat aircraft of the Second World War. Originally designed as a bomber fast enough to outpace enemy fighters, it was also used as a fighter and night fighter. Nearly 8000 were built.

The Mosquito (shown in the black and white picture) was unusual in that it was built largely of wood. This was for lightness (hence its high speed) but also because metal (mostly aluminium) for aircraft construction was in short supply. The reason for this was that aluminium ores had to be imported from overseas by ships that were liable to be sunk by German submarines. In fact there was an organisation responsible for locating shot-down aircraft, both Allied and German, and salvaging the aluminium to make new aircraft. Aluminium was also collected from homes, so that many British aircraft were made of metal that had once been part of an enemy plane or a British saucepan. Some of the wood used in the Mosquito was balsa (as used to make model planes) and this did have to be imported - from South America.

So the search was on for a substitute material which was as strong and light as balsa. One chemist, Dr Peter Plesch (now a retired professor at Keele University) recalls his work on this project. The idea was to make a foam using sodium alginate, which was readily available from seaweed. Sodium alginate is a long chain polymer and gives seaweed its strength in the same way that cellulose does for wood. Sodium alginate is soluble in water so, to make the foam solid, he reacted it with calcium chloride to make solid calcium alginate:  $2 \text{NaAlg}(\text{aq}) + \text{CaCl}_2(\text{aq}) \rightarrow \text{Ca}(\text{Alg})_2(\text{s}) + 2 \text{NaCl}(\text{aq})$



While sodium alginate is soluble, calcium alginate is almost insoluble. This is because the doubly charged  $\text{Ca}^{2+}$  ions link alginate chains together. The resulting foam could be set in moulds in the form of planks, 100 cm x 30 cm x 2-3 cm. However, the planks had to be washed to remove the soluble salts and then dried. Plesch recalls that 'The resulting fairly floppy slab of gel, still containing about 9 kg of water per kg of calcium alginate, could be dried in an air oven to a fairly rigid material resembling toast, provided the specimens were no larger than a sheet of A4 paper. Anything bigger, let alone an entire slab of gel, warped uncontrollably into bizarre saddle shapes.'



Eventually Plesch devised an entirely new method of drying. Paradoxically this took place under water. The method involved heating the gel electrically. The gel conducted electricity because of the ionic salts that it contained and so the gel could be heated from the inside. He comments that his method of doing it would not have met modern day Health and Safety legislation. 'I removed half of the water from the planks of gel by drying them under water. I fixed strips of galvanized iron sheet to serve as electrodes to the ends of the planks, sank them into running water in rubber-lined wooden vats, and connected the electrodes to the 220 volt mains. The heating from the current carried by the salts drove the water and the dissolved salts out through the surface into the cold running water. The process shut itself down when the removal of the salts cut off the current. The planks of foam, then containing only 50% water and free from salts, could be dried in a timber kiln to give hard, undistorted, non-hygroscopic planks of density around 0.1 g cm<sup>-3</sup>, which was what was needed.



The DeHavilland engineers made up a dummy fuselage and declared the planks of foamed calcium alginate fit for purpose, but by 1944 there was no more need for what would have been an expensive process, because the German U-boat threat had receded. One surviving plank, with its story, is in the Science Museum in London, another one is in Professor Plesch's office at Keele University, as hard as it was when it was made in 1944.

## A FOCUS ON GENETICS



Since early civilisation human beings have been fascinated with the idea of inheritance. In fact, ancient genetics can be traced back almost 6000 years to the Babylonian empire where ancient carvings of horse pedigrees can be found. Ancient Greeks such as Aristotle and Hippocrates also had many theories on the subject. However, the study of modern genetics is widely accepted to have begun in 1866 when Augustinian friar Gregor Johann Mendel published a paper on inheritance in pea plants (although some people would argue Charles Darwin's findings on the HMS Beagle in 1836 were the start). In the last 200 years the field of genetics has rapidly expanded, especially since the discovery of DNA in 1869 by Swiss researcher Friedrich Miescher. The structure of DNA was determined by James Watson and Francis Crick (and Rosalind Franklin?) in the 1950s. Since then the genetic revolution has kicked off and given rise to many more fields of biology such as synthetic biology, bioengineering and bioinformatics. If anything, during the last 12 months of the Covid pandemic, it has become increasingly apparent and awe-inspiring just how far this new technology has come. As such, it is only fitting that this relatively new field of biology has such a prominent place in the curriculum here at BFS. Our students have certainly risen to the challenge! It was very difficult to pick work for the newsletter. The quality has been superb from everyone!

# KS3—STUDENTS LEARN ABOUT THE STRUCTURE OF CELLS, DNA AND SIMPLE INHERITANCE.

## What is the Human Genome Project?

In 1953, Watson and Crick discovered the structure of DNA. Then late in 1977, a man named Fred Sanger invented the first DNA sequencing.

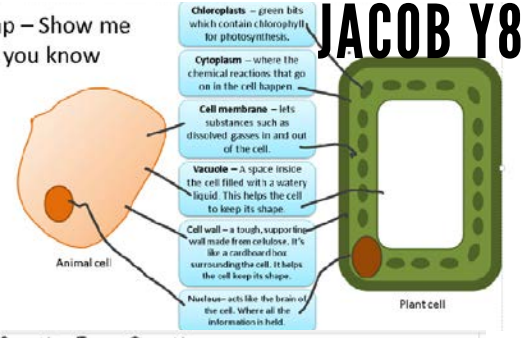
The Human Genome Project was started in 1986 with the USA and UK in partnership. From 1990-2003, 21000 genes were mapped, 1800 of those being linked to diseases.

The HGP has helped combat many diseases, and means we can make more advanced medicines.

With this new information, scientists can understand how life works and figure out how to cure diseases.

Alyssa, Year 8

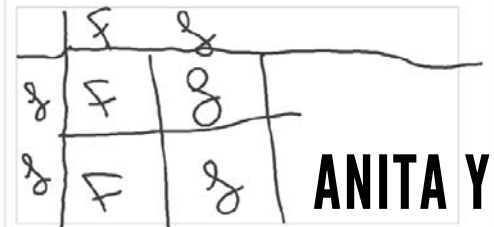
Re-cap – Show me what you know



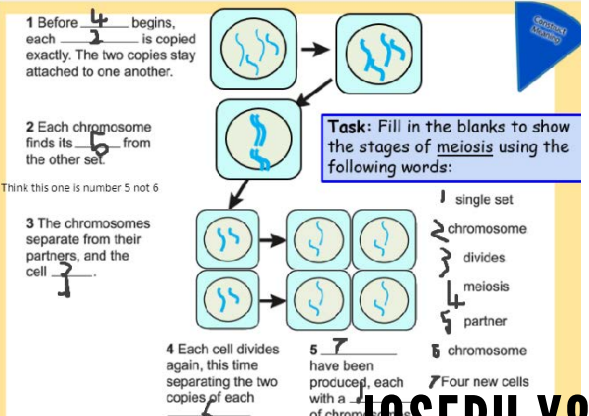
JACOB Y8

### Practice Exam Question

Use a Punnett square to calculate and explain the chance of a person inheriting freckles if their mother has alleles Ff and their father has ff. Freckles are the dominant characteristic (6 marks)



ANITA Y8



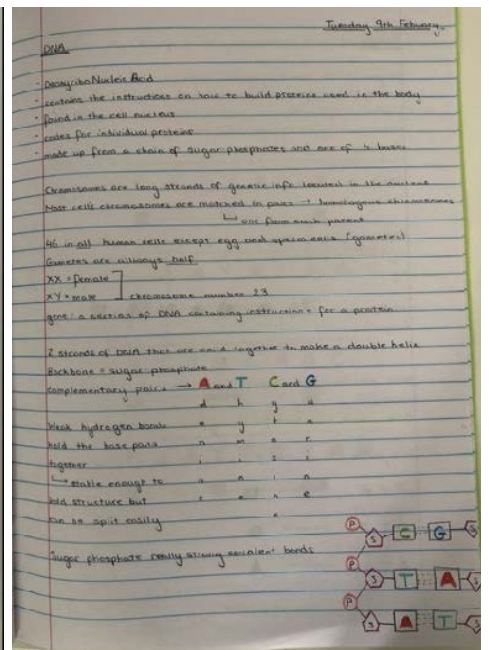
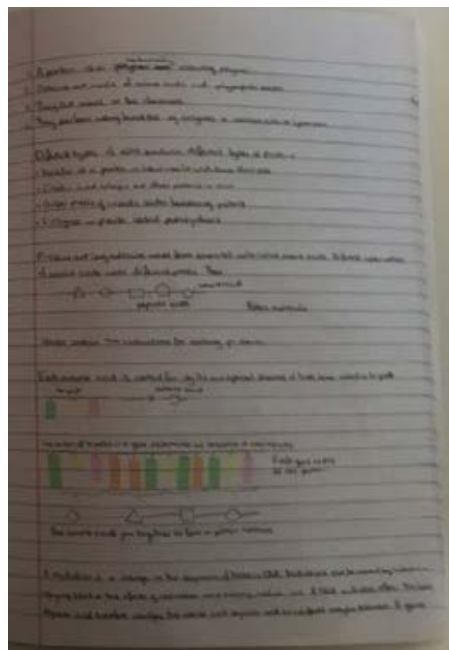
Task: Fill in the blanks to show the stages of meiosis using the following words:

JOSEPH Y8

# KS4 STUDENTS STUDY INHERITANCE

At KS4 students study inheritance in more detail alongside the work of prominent scientists such as Charles Darwin and Jean Baptise Lamarck. Those students who study Triple Science look at processes such as translation and transcription—the exact mechanisms for reading DNA and making proteins within our cells. Some students even managed to extract DNA from a kiwi before lockdown.

Well done Isabella and Gwen, Year 11

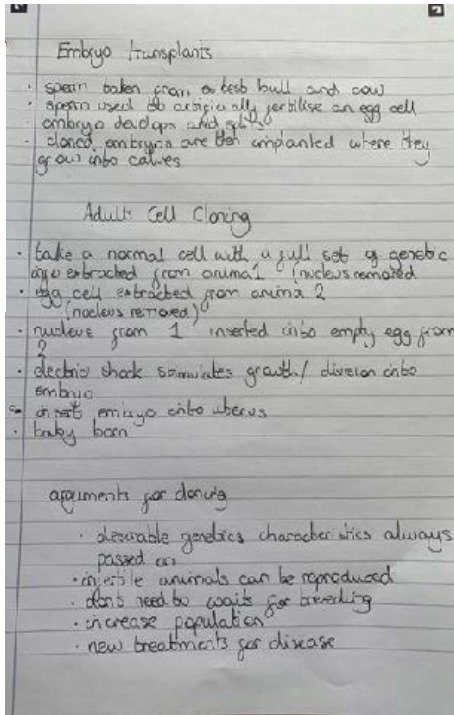


Well done Charlie, Lucy, Hugh and Mobina

Variation questions

Q1 – For each of these characteristics, say whether it depends on genes, the environment or both.

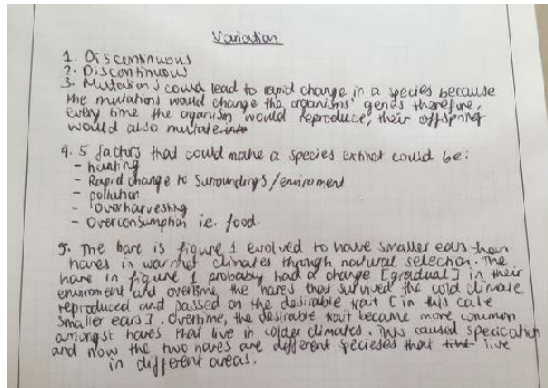
- a) A person's blood group **genes**
- b) Someone rolling their tongue **genes**
- c) Someone having Cystic Fibrosis **genes**
- d) Someone speaking Spanish **environmental**



1. What does DNA stand for?  
 deoxyribonucleic acid  
 ribonucleic acid  
 deoxyribonucleic acid ✓

2. Which molecules are often referred to as the 'building blocks of life'?  
 DNA nucleotides  
 proteins  
 cells  
 amino acids ✓

3. What are proteins made up of?  
 amino acids ✓  
 carbohydrates



# WHY NOT TRY AT HOME?

Try your own DNA extraction at home (remember to ask parental permission):

<https://www.thenakedscientists.com/get-naked/experiments/how-extract-dna-kiwi-fruit>



## Miss Board's fave Science things to do-Lockdown edition!

Love Science? Fan of fun stuff? Bored in lockdown? Here's a few of my favourite science things to do from the comfort of your sofa!

### Podcasts

- **Science(ish)-Uncover the peculiar science behind the movies.**
- **Science Shambles-Chatting about Science with comedians, scientists and commentators.**
- **See Jurassic Right-A podcast about Jurassic park!**

### Films

- Jurassic Park
- The Martian
- Hidden Figures
- The Immortal Life of Henrietta Lacks

### TV

- Mythbusters-Debunking popular science and life myths (often involving pyrotechnics!)
- Natural History Museum, World of Wonder-Behind the scenes of the greatest place on Earth!





# WE CELEBRATED GREAT WOMEN FOR INTERNATIONAL WOMEN'S DAY

International Women's Day  
#ChooseToChallenge

Monday, March 8, 2021

