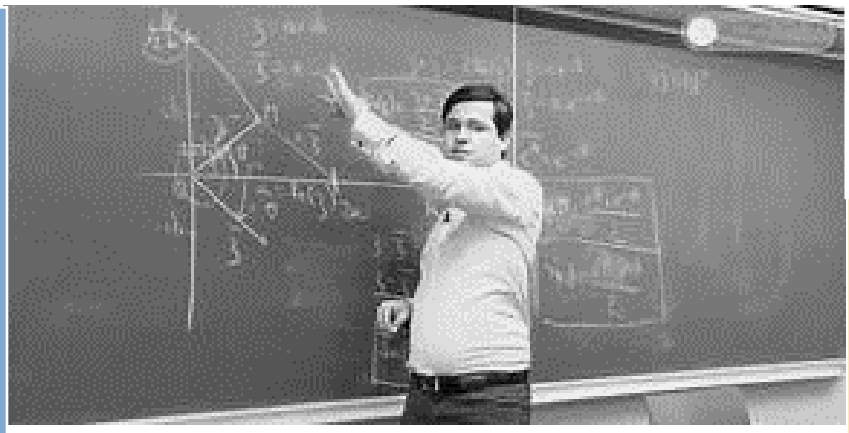
Stoke College

STOKE-BY-CLARE, SUFFOLK

Patrick Bond and Osian Gold as STEM prefects

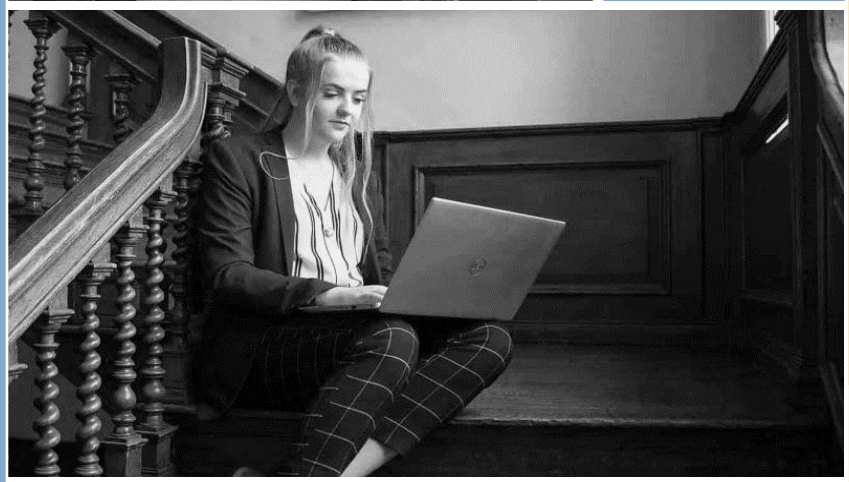
STOKE COLLEGE STEM JOURNAL

- Edition 1



Interested in STEM?

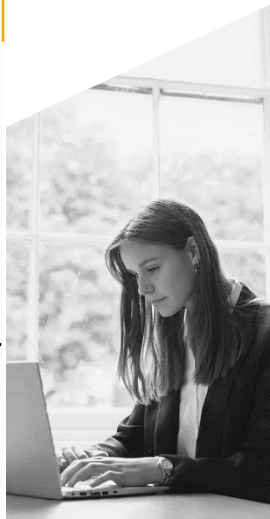
Science, Technology, Engineering, and Mathematics



Try out the questions near the end!

First person to submit their correct answers wins!

The STEM Journal is a super-curricular blog, written by the STEM prefects. It can and will include areas from Science, Technology, Engineering and Mathematics. The STEM Journal will be published every half term. If anyone wishes to contribute a page or idea to the following additions, email either Patrick or Osian.



About Isaac Newton (1643-1727)

The now famed scientist was born prematurely on a Christmas morning, on the same year that Galileo died. He was so underdeveloped as an infant; he was said to have been able to fit in a quart-size mug.

During his study at Cambridge University, the black death was ravaging England; and so, the university temporarily closed down.

During this time, Newton reportedly couldn't understand his school textbooks; so instead, started studying the world's unsolved mysteries. He would complete vital works on the properties of light, calculus, and motion of celestial bodies. Only after this did he receive his master's degree.

Newton absolutely hated criticism. A fellow scientist once critiqued his work and Newton responded by going into complete isolation for 6 years!

Unsurprisingly, he was very secretive about his work. It is therefore no surprise that it was only recently discovered that he had wrote more papers about religion and alchemy than he did on science.

He even stated that his greatest achievement was never his scientific discoveries, but rather his devotion to celibacy! (not performing in any 'physical' relationships)

Despite his great mind, he wasn't too good at investing. He once lost £70 000 investing in the South Sea Company (roughly £3 million in today's money!). After this tragedy, he forbade anyone from mentioning 'South Sea' in his presence.

After he died, his tooth was sold for £3600 and is still the most valuable tooth today!

Quite an interesting fellow, wouldn't you say?

STEM In The World

The impact of cigarette butts on the environment!

Cigarette butts take several years to degrade because of the plastic they are made of and are a major cause of forest fires. They cause 90,000 fires in America every year. They are often eaten by animals and the nicotine and ethylphenol are toxic to marine life.
Read the full article here:
https://www.sciencefocus.com/planet-earth/whats-the-environmental-impact-of-cigarette-butts/

What happens to your vision when you get a concussion?

When you are concussed from a blow to the head, your vision may be damaged as a lot of the nerves in the brain are related to vision, and you may have damaged your optic nerve. This can cause blurring, light sensitivity, blindness, or double vision.

What is watermelon snow?

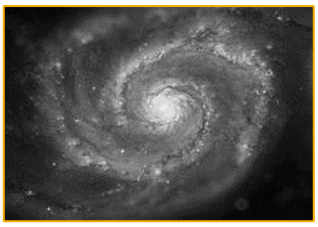
Watermelon snow is slightly pink/red in colour. This is due to algae called Chlamydomonas nivalis, which protects itself in summertime from the Sun's rays by producing a red pigment, which dyes the snow, causing it to be a 'watermelon' colour.

Imagine it is pink

The Space Space

What is the Oort Cloud?

The Oort cloud is a cloud of rocks, comets, and space objects about 30 trillion kilometres away from the Sun, on the edge of its influence. It has an inner cloud and an outer cloud.



Fun space facts!

- If you are interested in spotting the International Space Station, there are lots of apps that can be used to track it!
- One million Earths could fit inside the Sun!
- Jupiter, Saturn, Uranus and Neptune don't have solid surfaces so people would be unable to walk on them.
- The highest known mountain is on an asteroid. It is 3 times as tall as Mount Everest, at 22km!

TedEd videos to watch:

- How far would you have to go to escape gravity? https://youtu.be/YlxKh4oCKhw
- How small are we in the scale of the universe? https://youtu.be/WYQ3O8U6SMY
- Could we survive prolonged space travel? https://youtu.be/upp9-w6GPhU

Careers In STEM

There are many careers in the STEM field. Here are this edition's chosen four, and some information about them:

Civil engineering - a civil engineer would build bridges, airports, and roads. To study civil engineering at university, you would likely need to take Maths and Physics at A Level.

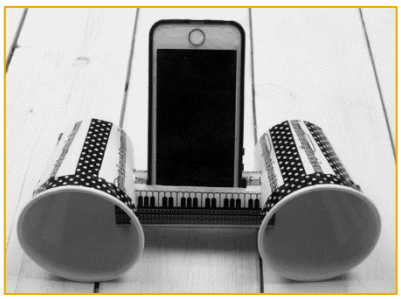
Forensic scientist - a forensic scientist would analyse samples of evidence, such as from crime scenes. To study forensic science at university, you would likely need Biology and Chemistry. Maths and Computer Science are also good options.

Electrician - an electrician fixes electrical circuits, often things in houses like a light switch. To study electrical engineering at university you would likely need Maths, Computer Science and Physics. You can also do an apprenticeship.

Marine biologist - a marine biologist would study marine organisms and act as researchers and conservationists. To do this, you would need Biology and Chemistry at A Level, with Geography, Computer Science, Maths or Psychology also being good options.

Be A Scientist (experiments)

Make a smartphone speaker



Get some toilet paper tubes and paper cups and voila, you have your own speaker.

Yeah, it's a bit rudimental, but maybe in the next edition we can move on to how actual speakers work. You need to know it for GCSE physics anyway.

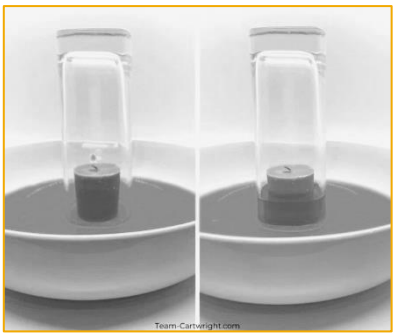
Send teabags flying!

Get a teabag. Cut one end off. Pour the herbs out. Prop it up. Burn the top with a match. Watch it fly up in the air.

If you have a low ceiling, maybe do it outside.

https://www.youtube.com/watch?v=TKF3OKxwM8g

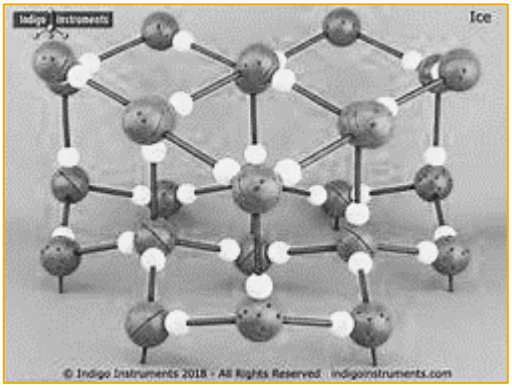
Watch water rise!



Place a lit candle in a bowl of water and then place an upside down glass over it. Watch the water rise up. This demonstrates Charles's Law.

Why Does Ice Float On Water?

We all know that ice is the solid version of water, and that substances in their solid state are more likely to be heavier or denser than they are in their liquid or gas state. If this is the case, then why does ice float on water?
The answer is quite simple. It's all to do with the structure of the water.



In order to melt or dissolve something, you need to break its bonds and intermolecular forces. One type of intermolecular force is called hydrogen bonding. In ice, the water molecules are arranged so that there are as many hydrogen bonds as possible. This forms a lattice structure. Because ice is a solid, the atoms are fixed in place and this structure 'wastes' a lot of space. When the ice starts to melt, some of the hydrogen bonds break and the lattice structure breaks down, which means that the liquid water molecules fit in the gaps.
This means that effectively, the liquid molecules are denser because there are more of them in the same space, so the liquid water is heavier than the ice, which is 'wasting' space so is less dense, meaning it floats on water!

Fun Facts!

- The distance of a straight line from the start of a river to the end of it, is pi/ π times shorter than the actual length, with all the meanders and bends!

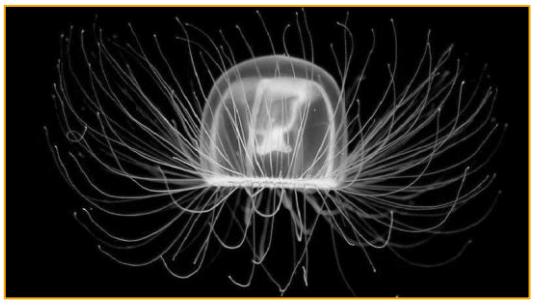
- The probability of 2 people sharing a birthday out of a group of 30, is an astounding 71%! However, out of a group of 50 people, the probability that 2 people share the same birthday is 97%. Almost a guarantee! *See how this is possible here:* *https://brownmath.com/stat/birthday.htm*

- You can turn on an LED light bulb by statically rubbing a balloon against your hair and putting it against the base of the bulb. It works best with the lights turned off!

- The Eiffel Tower in Paris can 'grow' by up to six inches in summer due to the heat

- You have enough DNA in your body to, if fully unravelled, stretch from Pluto to the Sun – not just once, but a staggering 17 times

- A jellyfish which is 'immortal' has been discovered! The Turritopsis dohrnii jellyfish can technically live forever. The secret to its immortality is explained by the fact that upon reaching maturity, it can and does revert back to being a polyp. This cycle perpetuates its longevity!



Problem set (Quiz)

The following questions require little actual maths knowledge, but rather out the box thinking. The first one to email Patrick Bond or Osian Gold a correct answer will reward their house with 25 house points!

The correct answers will be published in the following edition of the journal.

Calculators are not required.

1. One of the three symbols +, -, × is inserted somewhere between the digits of 2016 to give a new number. For example, 20 – 16 = 4. How many of the following four numbers can be obtained in this way? 36 195 207 320

2. What is the last digit of the smallest positive integer whose digits add up to 2019?

3. what does C equal to? $C = 1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \cdots}}}}}$

4. A monkey has filled in a 3×3 grid with the numbers 1, 2, …, 9. A cat writes down the three numbers obtained by multiplying the numbers in each horizontal row. A dog writes down the three numbers obtained by multiplying the numbers in each vertical column. Show that the monkey can fill in the grid in such a way that the cat and dog obtain the same list of three numbers.

Knowledge of the quadratic formula is needed for qu. 3

The Meme Page

STEM Wordsearch

Y	O	X	Z	I	P	M	J	Z	P	D	S	Y	L	H	U	J	U	Q	R	F	M	O
H	R	P	D	Z	V	O	Q	U	X	R	H	O	E	F	U	D	I	G	L	E	Q	O
Z	N	T	C	Z	Q	L	U	V	L	L	O	L	Z	I	C	O	A	T	O	M	K	R
E	O	T	K	W	G	E	T	X	W	V	K	B	M	P	H	D	L	Y	P	D	N	T
L	T	V	S	N	V	C	H	H	J	B	T	M	A	P	P	A	L	J	C	W	T	H
X	W	N	A	R	O	U	X	U	N	F	O	X	H	B	L	B	W	Y	W	Q	R	G
G	E	R	F	N	C	L	W	B	R	T	H	E	R	Y	I	Q	I	K	Q	I	J	J
I	N	K	B	I	D	E	I	U	F	J	S	C	Q	Q	D	L	D	N	I	N	M	Y
T	O	Y	C	E	L	I	S	P	P	O	T	O	A	U	M	R	I	B	E	N	V	U
N	A	T	V	T	B	I	G	E	A	A	R	Q	L	L	A	F	O	T	D	H	G	L
R	U	I	V	S	H	X	Q	R	I	Z	L	C	R	A	C	T	S	G	Y	A	Y	N
G	S	V	G	N	B	D	R	U	A	T	L	K	E	G	R	U	I	Y	E	C	Z	B
J	M	A	R	I	Z	T	M	W	I	P	G	V	A	S	W	R	L	O	W	N	R	S
G	P	R	U	E	U	E	U	S	D	D	H	N	Y	L	Z	R	P	U	N	X	I	Z
S	M	G	L	G	S	K	E	L	E	T	O	N	M	K	I	U	B	I	S	N	K	B
M	Z	P	R	O	E	T	E	M	G	Z	W	Y	R	T	S	I	M	E	H	C	F	A

Find the following words in the puzzle.
Words are hidden ↑ ↓ → ← and ↘ .

PROBABILITY
VAN DI GRAPH
CHEMISTRY
EQUATION
SKELETON
HYDROGEN
EINSTEIN
CALCULUS
MOLECULE
HAWKING
GRAVITY
NEWTON
METEOR
FORCES
LIQUID
ALKALI
SOLAR
ATOM
OORT

END OF JOURNAL - PATRICK AND OSIAN

Notice:

During lunchtime (1:20) on Thursday 26th of this week, there will be a treasure hunt taking place in the chemistry, biology, and physics classrooms. You will have to search the room for letters written in invisible ink using ultraviolet light to detect them. There will be house points to win. Anyone may turn up.

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To contact either of the STEM prefects, email:

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