

What was Avogadro's favorite sport?

# THE LAB REPORT



## How the brain stores memories!

The brain stores memories using specialised nerve cells called neurones. Your brain has around 86 billion neurones and each neurone can connect to thousands of others! These connections form a huge network that allows information to move around the brain.

Neurones don't touch each other; there is a very tiny gap between them called a synapse. When a signal reaches the end of one neurone, it releases small chemical messengers called neurotransmitters. These chemicals diffuse across the synapse and attach to receptors on the next neurone. This triggers a new electrical signal in that cell allowing the message to continue travelling through the brain.

When we learn something or repeat an activity, these pathways are reused. Over time, the connections between certain neurones become stronger. This allows the signal to travel faster and easier, which helps the brain remember information!

For example, when revising for an exam the same neural pathways are used repetitively. The stronger those connections become, the easier it is to recall the skill or information later.

**-Sara Sehgal & Nkemdirim Uliem**



**BIOLOGY**



## The invisible science behind sunscreen

With summer approaching, one of the most crucial things that we all need is sunscreen, but that little tube filled with shielding properties is more interesting than you would think. To understand how it works, we must look at the electromagnetic spectrum. The sun sends out ultraviolet (UV) rays that have so much energy they can break apart the atoms in our DNA, leading to painful sunburns or even long-term skin damage.

Sunscreens use two clever methods to stop this. Chemical sunscreens contain special organic molecules that act like tiny sponges which soak up UV photons and turn that dangerous energy into harmless heat through a process called photo-excitation. On the other hand, physical sunscreens use natural minerals like zinc oxide, which act like millions of microscopic mirrors that reflect and scatter the light away before it even touches your cells.

A fun way to analyse these products is by investigating their emulsion stability which is how good a mixture is at staying mixed instead of splitting up. As sunscreens contain both oily UV filters and water-based moisturizers, they require specific emulsifiers which are special molecules that have one water-attracting end and one water-repelling end to keep the mixture from separating.

A sunscreen that stays smooth and repels water is much more likely to provide a tough, even barrier against the sun's rays. Understanding these simple ideas such as how ingredients stay mixed or how they block out moisture shows that chemistry is part of the invisible science that lets us stay outside longer while keeping our skin safe.

**-Kinus Krishnamoorthy & Obinna Uliem**



**CHEMISTRY**



## Stars and the Physics behind them

Stars are huge spheres of hot gas that release energy through nuclear fusion. They form in large clouds of gas and dust called nebulae. Gravity pulls this material together and as it collapses the temperature and pressure in the centre increase. When the core becomes hot enough, hydrogen atoms fuse to form helium and release large amounts of energy as light and heat.

A star stays stable because two forces balance each other. Gravity pulls the gas inward while the energy from fusion pushes outward. This balance allows stars to shine for millions or even billions of years. The mass of a star affects how bright it is and how long it will live. Large stars burn their fuel quickly while smaller stars use their fuel more slowly.

As a star ages it begins to change. Smaller stars expand into red giants and later lose their outer layers leaving a white dwarf. Massive stars end their lives in powerful explosions called supernovae. These explosions can leave behind neutron stars or black holes.

Studying stars helps scientists understand how energy works in extreme conditions. It also explains where many of the elements in the universe come from because heavier elements are formed inside stars and spread through space when they die.



**-Varshini Ganesh & Aminah Hossain**

## Four, the magic number

There is a strangely satisfying claim that every number, when you count its letters in its name, eventually becomes four. It sounds impossible, but it isn't. It's an example of how language and maths can interact in unexpected ways.

For example, take the number 6. The word six has 3 letters, the word three has 5 letters and the word five has 4 letters.

As a second example, 19. The word nineteen has 8 letters, the word eight has 5 letters and the word five has 4 letters.

Let's try something bigger, 5347. This number has 37 letters, the word thirty-seven has 11 letters, the word eleven has 6 letters. And as we saw from the first example, the number six collapses down to 4.

Any given positive integer in the English language collapses down to the same number - four. This phenomenon has nothing to do with prime numbers or any mathematical theory. Instead, it is a linguistic property.

However, this phenomenon isn't universally true. It only applies to numbers in the English language because of the way the English numbers are structured. No matter how far you go with numbers, you always end up back at four.

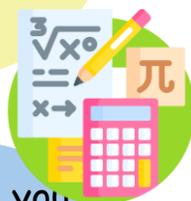
**-Louisa O'Neill & Juanita Jabson**

### Did you know?

The number four is the smallest composite number. A composite number is a positive number that is the result of multiplying two numbers that are lower than themselves. In this case, two times two gives us the number four.

### SPACEFACT

The highest mountain known to man is on an asteroid called Vesta: Measuring a whopping 22km in height, it is three times as tall as Mount Everest!.



# Volcanologist

A specialized geologist who studies the formation, structure and eruptive activity of volcanoes to predict eruptions and mitigate hazards. They analyse volcanic rocks, gases and ash, often working in both laboratory settings and in the field at active sites. These scientists use tools like seismographs and satellites to monitor ground deformation and volcanic activity.



## Salary:

- Starter: £24,000; experienced: £50,000
- Typical hours range from 37 to 42 per week and occasionally you may work late evenings and weekends.

## Entry requirements:

You'll usually need:

- 5 GCSEs at grades 9 to 4 (A\* to C), or equivalent, including English, maths and science
- 2 or 3 A levels, or equivalent, including a science, for a degree. A good idea would be our new geology A-level course, where you study physical geology such as tectonics and volcanoes!
- A degree in a relevant subject for postgraduate study

-Isabelle Donoghue



## Revision tips

Good revision for GCSEs and A-Levels requires organised study techniques that help students understand, remember and apply information across different subjects. One important method is active recall, where students regularly test themselves instead of rereading notes, as this strengthens your neural pathways, improving memory and highlights areas that need improvement. Spaced revision is also useful because revisiting topics at regular intervals helps move knowledge into long-term memory. Practising past exam questions from boards such as AQA, OCR or Edexcel allows students to become familiar with exam formats, command words and mark schemes. Creating summary notes, diagrams, mind maps and flashcards can help organise complex information, particularly in subjects like Biology, Chemistry and Physics, where processes and systems need to be understood clearly.

For essay-based subjects, practising structured answers and analysing past questions can improve writing skills and argument development.

In Maths, regular problem solving and working through different question types is essential for building confidence and accuracy.

Studying in short, focused sessions with regular breaks can help maintain concentration and prevent fatigue

-Injila Bilal



Today's joke

Golf, he always got a mole-in-one!

**Thanks for reading!**  
**If you have any questions or articles for  
future issues, please email us at  
TheLabReport@ccgrammarschool.co.uk**

**That's all from us , see you in our next issue !**

-Isabelle Donoghue, Poppy Williams, Juanita Jabson,  
Varshini Ganesh, Aminah Hossain, Nkemdirim Uliem,  
Sara Sehgal, Obinna Uliem, Lousia O'Neill, Kinus  
Krishnamoorthy, Injila Bilal, Joseph Hobley



Edited by Joseph Hobley