THE LAB REPORT

09/11/26

Todays Joke

Why did the firefly get bad grades in school?

PHYSICS

By Ehsan Fahim

The magic effect

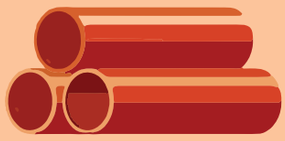


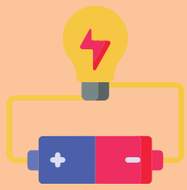
Picture dropping a small magnetic ball down a non-magnetic copper pipe. Since the pipe isn't a magnet, you would expect the ball to simply fall due to gravity. Instead, the ball gently floats downwards as if something is assisting its fall.

Why does this happen? As the magnet ball falls, it is influenced by gravity like any other object. However, the magnetic fields of the ball move in relation to the ball itself which causes the magnetic flux to change and induce small electrical currents into the copper pipe.

These currents in the pipe create their own magnetic fields, so the copper pipe which is non-magnetic is now an induced magnet.

The new magnetic forces of the pipe resist the falling motion of the ball, giving the appearance of floating downwards when in reality, principles of electromagnetism are working behind the scenes!





BIOLOGY

By Rose Young

Why do fireflies glow?



Ever seen a firefly and wondered why they glow?

Despite their name, fireflies are actually beetles, which get their glow through a process called bioluminescence. This process produces light through oxygen when it reacts with the chemical luciferin, with the help of an enzyme called luciferase. This chemical reaction produces light with very little heat alongside, making it a very efficient way to glow. Different species can have different flashing pattens, which helps them to communicate with each other, find mates and protect themselves from predators.

However, fireflies aren't the only creatures capable of bioluminescence. Certain jellyfish, fish and fungi can produce their own light, and scientists are also interested in the chemicals involved in bioluminescence because of their use in scientific research inside living cells.





MATHS

By Sara Seghal

Can maths predict human behaviour?

Stupid question right, how could maths predict human behaviour? Well game theory investigates how one makes a decision when the outcome is dependent on their choices, as well as the choices of others. A famous example of game theory is the prisoner's dilemma. Both suspects can remain silent or betray their partner by turning them in with evidence.

If both remain silent, they both receive one year in prison

If one betrays the other, they go free and the other spends 5 years

If both betray each other they both spend 3 years

This dilemma can be shown mathematically using a payoff matrix (-1,-1) meaning both receive one year and so on.

	Suspect B- silent	Suspect B-betrays
Suspect A-silent	(-1,-1)	(-5,0)
Suspect A-betrays	(0,-5)	(-3,-3)



Mathematically we see that betraying is the dominant strategy, this dominant strategy produces the best outcome to the individual regardless of what the other suspect picks.

In both suspects eyes, betraying the other means going free. Knowing the other person may betray you, they both betray each other to reduce the 5 years to 3. However, if they both remained silent, they would have one year each. Therefore, the individual rational outcome is worse for both suspects than the outcome they could have achieved if they cooperated with each other.

While maths cannot truly predict the suspects response due to the influence of external variables such as emotion and trust, maths gives a strong basis for predicting their likely behaviour.

CHEMISTRY

By Isabelle Donoghue

Tattoos with an On/Off Switch?





Imagine having a tattoo that you could switch on and off like a lightbulb! Scientists have developed an exciting new type of tattoo ink called PhotoTat, which uses special light-sensitive dyes to make tattoos appear, disappear or even change colour when exposed to different types of light. This clever chemistry trick means you could show off your tattoo one day and make it invisible the next!

But this technology isn't just about cool body art. It could also have important medical uses, such as temporary tattoos that help doctors guide radiation treatment. Once treatment is finished, the tattoo could simply be switched off, leaving the skin looking normal again. Although the technology is still being developed, it could completely change the way we think about tattoos!

Revision tips!

By Poppy Williams

Revision can sometimes be difficult to be motivated for, so here are some tips to inject more fun into your routine!

- Try to create a song with what you're revising, especially if it's a dense couple of paragraphs. This will make the information more concise and more memorable

- Try to teach the content to a person or pet. This will improve your ability to communicate difficult ideas more accurately.

- Try to head out of your regular revision space, this could be to a local park or café. The new environment will help to stimulate your brain, helping you understand the content more easily

- Try to use a specific scent when you study, for example from a spray or candle, as this can help with memory as you associate the content with the smell

- Try to place post it notes around your house to provide a constant refresher of key words, equations and dates to your brain.

CAREERS

By Isabelle Donoghue

Fragrence Chemist

A fragrance chemist researches, formulates, and tests aromatic compounds and raw materials for perfumes, cosmetics, and household goods, combining molecular science with sensory evaluation.

· Primary Duties: Formulate new scent compounds, analyse chemical stability, test how scents interact with different product bases (like soaps or lotions), and ensure safety compliance.

· Key Responsibilities: Conduct gas chromatography or mass spectrometry testing, scale up laboratory formulas for manufacturing, and adhere to regulatory standards like IFRA.

· Requirements: A bachelor's or master's degree in chemistry, cosmetic science, or a related scientific discipline, paired with laboratory experience.

Average salaries:

· Entry-Level / Trainee: £25,000 to £30,000 per year.

· Mid-Level / Development Chemist: £30,000 to £45,000 per year.

· Senior / Specialist Roles: £45,000 to £60,000+ per year (top earners or specialized creative perfumers can scale significantly higher)

However, this is a highly competitive career due to the limited number of positions at major, specialised labs. This is why the requirements are so demanding, as individuals must be able to keep pace with the high technical demands and be able to go through the specialised training and rigorous education.





Thanks for reading our final edition!
If you have any questions or articles for future submissions please email us at TheLabReport@ccgrammarschool.co.uk



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Edited by Florrie Cartwright

Todays Joke
He wasn't very bright!