The Write Angle

Letter from the Editors

Founded in 2020, 'The Write Angle' is Exeter Mathematics school's official student newspaper. This is an accumulation of works from our students, run by a collection of student editors, posted on a biweekly basis. Here you can see articles, opinions and insights into life at EMS. We encourage all students to participate, whether by submitting articles or becoming a part time editor.

Photos of the Week

Would you like your photos featured in our next issue? 'Photos of the week' is a brand new section aimed to enhance creativity within students. You can submit any piece of school related photography or artwork straight to us and we will publish our favourites on the front page!

Good Luck

We'd like to say a quick good luck to all the year 12s for their EMC presentations next week. We are looking forward to seeing what you've managed to put together and hope you are both excited and ready. If you are a bit nervous, I can say it all does come together in the end, trust me, you'll be okay!

A Christmas Recipe

Christmas Tart (not safe for vegans)

Ingredients:

- 400 g bourbon biscuits
- 4 oz melted butter (any type)
- 7 oz brown sugar
- 1 oz muscovado sugar (can be replaced with more brown sugar)
- 8 oz of butter (hard, proper butter)
- 12 FL oz of double cream (4 FL oz for caramel, 8 for chocolate)
- 8 oz dark chocolate
- 4 oz milk chocolate
- 28 cm diameter tray (for freezing)

1.) Get all the bourbon biscuits and break them down into dust, either by hand with a rolling pin (advised to store the biscuits in a bag as you break with a rolling pin), or by using a blender to break the biscuits up.

2.) Melt the softer butter and mix with the biscuit, greasing the tin/dish before lining the dish with the biscuit base, placing it in the fridge and leaving to cool

3.) Mix the harder butter and the brown sugar on a medium/high heat and keep mixing until it begins to bubble, at which point stir for a further minute then take off the heat. Add the double cream to the caramel mix, as well as a pinch of salt, making sure to mix the cream in fully and leave to cool for 5-10 minutes in the pot.

4.) Pour the caramel sauce into the biscuit base and place in the refrigerator to solidify, leave for about 20 minutes or longer before making the chocolate, otherwise you will either melt the caramel beneath with the warm chocolate or the chocolate will solidify in the pot.

5.) Combine the chocolate and double cream in a saucepan and melt the chocolate on a low/medium heat, making sure not to overheat it and cause the double cream and chocolate to split, and to keep stirring. Once fully melted and mixed, leave for 4-5 minutes before pouring onto the solid caramel, leaving it to refrigerate until the chocolate layer is solid, or about 1-2 hours.

6.) Eat as is with some of the spare double cream (or get out the clotted cream) and enjoy the rich flavours.

By Simon Evans

Land Of Maths

The Christmas Count

Monitoring different bird species is important to ensure that they are all prospering. This occurs twice a year, one during the breeding season and the other is conducted on one day between December 14th and January 5th. This has become known as the christmas count. The count is made in the same 24km circle every year and is usually done by the local bird club or wildlife organization. However, recently someone new has joined the party.
You can find an article all about the christmas count here.

The addition to the party is a new AI being developed by a team of researchers at UC Merced. It does not seem that this AI has been named yet, so I will call it 'Orni', short for ornithology.
This is an AI that can recognise different species of bird by their call. So far it has been implemented in a bird habitat in Sonoma County, where recording devices were placed around the habitat, and sound was recorded in one minute bursts every ten minutes. The AI then calculated from the recordings the bird species that were present in the habitat, from the 45 different bird species that it can currently recognise. Which species can be heard on which recording device can give a picture of which species are where in the habitat and at what time. The AI is being developed by Department of Computer Science and Engineering professor Shawn Newsam and Electrical Engineering and Computer Science graduate student.

AI systems come in many different forms. One of the most popular forms of AI today is machine learning; these programs allow the computer to learn from its own mistakes by "training" it on a large dataset. Neural networks are one of the most well-known machine learning systems; these come in many varieties, from feed-forward to recurrent to convolutional networks, all of which are suited to different tasks. However, the basic premise of all these models is the same; they try to simulate a simplistic model of a real biological brain using a large, interconnected network of neurons. These 'neurons' are arranged in layers, with each node in one layer being connected to each node in the next; these connections have "weights" associated with them, effectively signalling how strong the connection is. Signals travel through this network in a very simple way that can be modelled with a few trivial equations. By tweaking the weights associated with these connections and other parameters on the network, it is nevertheless possible to obtain very precise and sophisticated behaviour; from image recognition to audio synthesis and many more fields. Even better, such systems tend to only improve further as given more data; this has allowed corporations like Google, with access to vast amounts of data, to create very complex cutting-edge machine learning systems for tasks from image recognition to video recommendation.

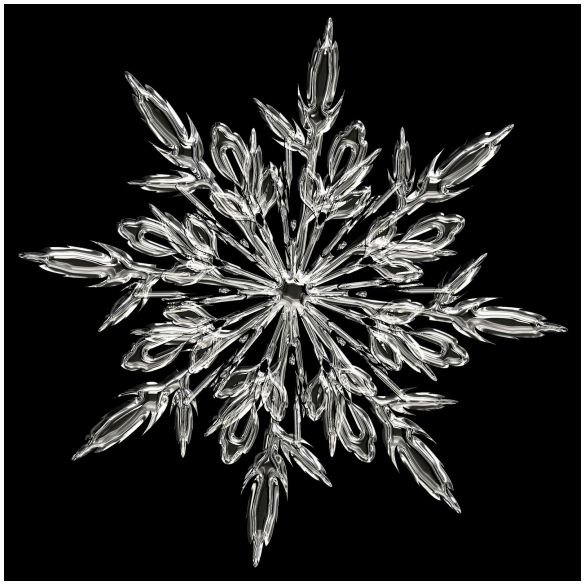
Using this technology, this time next year "the christmas count" could be entirely automated. AI systems are getting more and more use in more fields of study, and can basically be applied to any problem. It would not surprise me if over time, the use of AI extends to beyond anything we could imagine, creating an automated world. In a few christmases time, we could be living in a whole new reality.

By Matthew Lugg and Molly Briany Berridge

Mathematical Snowflakes

In the world of mathematics, we get to appreciate the beauty of snowflakes all year round. Through fractals and infinity, symmetry and pattern, we see the basics of their beauty in most avenues of our study.

A snowflake is crystalline water, forming when water molecules pack tightly together. They form in temperatures just below freezing, under normal atmospheric pressure with structures vaguely similar to that of honeycomb. Water molecules are tetrahedral in shape, with oxygen molecules at their centres, and hydrogen atoms at just two of their vertices. This explains how the snowflakes six-fold symmetry may arise, but what of their intricate patterns?



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As ice crystals grow, certain environmental conditions within clouds can arise, causing flat surfaces to become dynamically unstable. This effect is called the 'Mullins-Sekerka instability'. This instability causes the growth of fern-like crystals, as the concentration of water vapour increases in the environment. This fern-like pattern is caused by the instability through 'repeated tip-splitting' and is known as a dendrite. Dendritic growth is what causes the wide range of shapes, structures and patterns within the snowflakes we see on the ground.

Wilson Bentley was a man who shared our appreciation of snowflakes, and took photos of snowflakes under a microscope everyday until he died. After his death he was named the 'snowflake man', and a book was published about his work. Bentley discussed the secret beauty of snowflake transformations, and how symmetry made them tricksters by nature.

"Under the microscope I found that snowflakes were miracles of beauty; and it seemed a shame that this beauty should not be seen and appreciated by others. Every crystal was a masterpiece of design, and no one design was ever repeated. When a snowflake melted, that design was forever lost. Just that much beauty gone, without leaving any record behind." - Wilson Bentley

(His book 'Snowflake Bentley' is sadly underappreciated, and so we encourage you to read it if you wish to learn more. There are also many simulators on geogebra that visually illustrate snowflake symmetry. Both have been linked below.)

Snowflake Bentley:
Snowflake Bentley

Snowflake symmetry simulators:
Rotational Symmetry of a Snowflake – GeoGebra
Snowflake Rotational Symmetry – GeoGebra

By Freya Dover

Land Of Science

Frosty the Snowman: Christmas Hit or Tale of Woe?

We all know the Christmas hit "Frosty the snowman," as a cheerful, upbeat song about a jolly snowman come to life. Frosty is normally seen as a whimsical character, a figment of the children's imagination. What if Frosty wasn't just some imagined character, but a metaphoric representation of another figure in their lives?

The song opens with a basic description of Frosty, where he is described as having a "corncob pipe." This implies Frosty smokes. If Frosty is a metaphor for a figure in the lives of the children he plays with, then perhaps he represents some adult in their life, someone who smokes, or a more symbolic representation of maturity.

"But the children know how he came to life one day". This line implies that whatever occurs with Frosty the snowman is done away from the eyes of adults; only the children know what happens. However, reading the verse carefully, the opening line "a fairy tale, they say" has a dismissive tone, perhaps of trusted parents choosing to ignore what their child is telling them, brushing it off as only fantasy.

Moving forward, the line "the children say he could laugh and play just the same as you and me," has some potentially worrying hidden meanings. The children's need to say that he *can* play the same as others implies that there must be someone contradicting this. Perhaps, if Frosty is a metaphoric representation of someone else, then there might be a parent figure telling their children to stay away. They could be warning their children off playing with this person. The children don't understand why, so play with them anyway, which lands the metaphoric figure in trouble, as you will later read. This all begs the question: who is Frosty, and why are the children not allowed to play with him?

Towards the end of the song, we find that Frosty "knew the sun was hot that day". In the context of the song, this is a reference to snowmen melting in heat. This shows that Frosty knows he doesn't have much time left with the children. However, perhaps Frosty knowing about the heat has a similar meaning to the phrase "Catching heat," an idiomatic phrase that means to get in trouble, and is often used in relation to illegal activities gaining more attention from authorities. If Frosty is not allowed to be near the kids, and does so anyway, perhaps this is why he knows he will have to leave soon, otherwise he may be caught.
So Frosty leaves, but as he does he says "I'll be back again someday."
Is this a threat? Or is it a veiled reference to how childhood trauma (or even events that may not have seemed traumatic at the time) can often lead to mental health problems later down the line?

It's left up to you, the reader, to decide how you'll listen to Frosty the snowman from now on. Is he a jolly snowman come to life by a magic hat? Or is he a darker force at work, in the lives of the children in the song?

By Louie Bond

What's Wrong with Rudolph?

We all know the great fable of 'Rudolph the red nosed reindeer', but do we really know why he has such a shiny nose? Many great scientific minds have stooped so low as to try to answer this question, and now it is our turn to do the same.

Bioluminescent bacterial infection?

So, what could cause a seemingly normal reindeer to have such an peculiar facial feature? First we must search for organisms who share similar traits to that of Rudolph's shiny nose. Contrary to popular belief, it isn't just creatures of the fictional variety that are incandescent by nature, many such creatures are used frequently in scientific research such as the 'bioluminescent bacterium'. Of course, there are many more commonly known organisms that have the ability to glow such as fireflies, glow worms and certain species of Jellyfish. However, for this investigation we will primarily focus on unicellular organisms as their involvement merits more promise. So, why bioluminescent bacteria?

'Bio' - relating to life, 'Luminescent' - relating to their non-heat related light emission and 'Bacteria' - relating to this organisms domain within the classification system. All together, these bacteria can be defined as ' living organisms that emit light without the excess production of heat'. They do not differ from the kinds of bacteria we all know, as these entities are renowned for the symbiotic relationships they form with other creatures. So, would it be too much of a stretch to hypothesise their involvement with Rudolph? Well...perhaps. Yes, bioluminescent bacteria have been found by scientific researchers in the Northpole, 100 feet below ground that is. And, although that point alone does exclude our theory entirely, these bacteria have only been known to form symbiotic relationships with marine dwelling organisms. So, unless Rudolph has taken to free diving 100 feet below the surface of the Arctic Ocean, it is fair to assume that Rudolph's glowing nose has nothing to do with an infection caused by bioluminescent bacteria.

Genetically engineered reindeer?

This realisation however, does not rule out the involvement of bioluminescence. Luciferase genes are the genes responsible for coding the protein involved in the production of the luminescence enzyme in the aforementioned bacteria. These genes are useful tools in the development of gene editing technologies such as CRISPR- Cas9. The process of 'CRISPR Mediated Gene-tagging' involves the attachment of a bioluminescent protein onto a selected gene. The exhibition of bioluminescence within the organism indicates that the gene insertion was successful.

Accepting this proposal certainly brings about some uncomfortable implications. If Santa is indeed responsible for Rudolph's apparently 'improved' characteristics, then these alterations would most likely have been completed in the germline. This therefore implies that Santa Claus is artificially inseminating his reindeer, a process that is neither PG nor appropriate for a festive song.

The Dominy Theory and a few evolutionary processes:

Nathaniel J Dominy of the department of Anthropology and Biological sciences at Dartmouth University, USA, aided in the formation of one of the most feasible explanations for this biological phenomenon. Dominy noted that arctic reindeer (such as Dasher, Dancer, Prancer, Vixen, Comet, Cupid, Donner, Blitzen, and Rudolph) have unusual vision when compared to most mammals. These reindeer can in fact see Ultraviolet light. This would not be very useful for us, however for reindeer it allows them to differentiate between food, predators, Santa and snow. This is because snow reflects ultraviolet light, whereas living organisms absorb it. The reason why we have not adapted to have this ability is because 1: the south-west never gets any damn snow anymore,

and 2: we live in a multichromatic environment where there is a stark difference between the pavement and an arctic wolf. This adaptation is especially important for the survival of Santa's reindeer in the winter months, when the sun is low in the arctic sky and the scattering of light in the Earth's atmosphere mainly produces light of shorter wavelengths (UV, violet, indigo and blue).

In the song 'Rudolph the Red Nosed Reindeer', we hear that a thick fog caused Santa Claus to request Rudolph's help in guiding his sleigh. Dominy notes that his theory is very much dependent on the type of fog this song is referring to. He notes that in a book by Robert. L May, the fog was described as: "Thick as white fizz," with near zero visibility (with it being described as: "Dark and drear"). Dominy narrowed it down to two types of fog: Radiation fog (where the ground is cooler than the air, and then cools the air by contact), or Ice fog (caused by the interaction between warm air and extremely cold air, resulting in the formation of tiny ice crystals).

Much like snow, fog reflects a lot of ultraviolet light. Infact, light's ability to travel through fog is highly dependent on its wavelength. The longer the wavelength, the farther it can travel, meaning red light can travel far further than ultraviolet light as its wavelength is much longer. However, no matter how long the wavelength, the distance the light can travel will decrease as the size of the ice crystals/water droplets within the fog increases. A process called 'Mie scattering' occurs in most fog types. This scattering is the reason why Dominy suggests that his theory would work best if the fog was in fact ice fog. Mie scattering is a solution to Maxwell's equations, and occurs when electromagnetic waves are scattered by homogeneous spheres (such as ice or water droplets). Red light would travel further in Ice fog when compared to radiation fog, as the ice crystals in ice fog are smaller than the water droplets formed in radiation fog, as less Mie scattering occurs. The Dominy Theory suggests that Rudolph's nose would work more like a fog light than a torch, or a beacon.

But what does reindeer vision have to do with Rudolph's nose? The Dominy Theory outlines how Rudolph's nose works in guiding Santa's sleigh, but it doesn't explain the biological processes in which the world's favourite reindeer's nose came to be.

A study in 2012 hypothesised that the reason behind Rudolph's luminescent red nose was due to the presence of highly dense and rich nasal microcirculation, perhaps in surplus. It was discovered that the noses of arctic reindeer contain complex capillary systems, resulting in a red hue, which are highly important in the reindeer's temperature regulation. Of course, a mutation resulting in such a phenomenon wouldn't come without its consequences. In order for the glow of Rudolph's nose to be maintained, he would have to consume large quantities of calorically dense food. While most children leave out mince pies for santa and carrots for the reindeer, this food may in fact end up being consumed by the seemingly wrong individuals. Santa, making the healthy choice, may opt for the carrots, whereas Rudolph may have to guzzle the mince pies in order to replace energy lost as a combination of heat and light. With this theory in mind, we may not need to fret over Santa Claus's health when talking about his poor diet; instead we should worry about the state of the toilet and the sanity of Ms Claus after Santa has eaten all those fibrous carrots!

Do you believe that Rudolph obtained a luminescent bacterial infection after becoming the first reindeer to take up free-diving, that Santa is actually a perverse Bio-hacker, or that Rudolph is simply a victim of the notorious genetic lottery? Perhaps you still believe that magic cannot be explained by scientific fact, or perhaps you will stay up all night on the 24th in order to obtain more information. Whatever the case, we wish you all a very merry christmas, and a wonderful new year.

By Freya Dover

Christmas Crafts

How to Knit your own Christmas Holly

Abbreviations:

k = knit, p = purl, st(s) = stitch(es),
m1 = make 1, sl1 = slip 1 stitch, psso = pass slipped stitch over, k2tog = knit 2 together

Use 4mm needles and double knitting wool throughout

Leaves (green)

Cast on 1 st

1st row: k into front and back of st [2 sts]

2nd and every even row: purl

3rd row: k into front and back of each st [4 sts]

5th row: k1 m1 k2 m1 k1 [6 sts]

7th row: k1 m1 k4 m1 k1 [8 sts]

9th row: k1 m1 k6 m1 k1 [10 sts]

11th row: sl1 k1 psso k6 k2tog [8 sts]

13th row: sl1 k1 psso k4 k2tog [6 sts]

15th row: k1 m1 k4 m1 k1 [8 sts]

17th row: k1 m1 k6 m1 k1 [10 sts]

19th row: sl1 k1 psso k6 k2tog [8 sts]

21st row: sl1 k1 psso k4 k2tog [6 sts]

23rd row: sl1 k1 psso k2 k2tog [4 sts]

25th row: sl1 k1 psso k2tog [2 sts]

27th row: k2tog [1 st]

28th row: p1

To get 2 leaves, return to row 1 and repeat, then fasten off

Tip: leave a decent length of wool at each end to be used to sew the holly onto an everyday jumper to convert it into a Christmas Jumper

Berries (red)

Cast on 3 sts

1st row: k into front and back of st, k1, k into front and back of st [5 sts]

2nd row: p5

3rd row: k2tog, k1, cast off first st, k2tog, cast off first st [1 st]

This completes the first berry.

Repeat for the second berry, using the remaining stitch and casting on 2 more so the berries are joined.

Sew the berries onto the join between the pair of leaves.

By Kate Child

Global Affairs

All I Want for Christmas is Tier 2

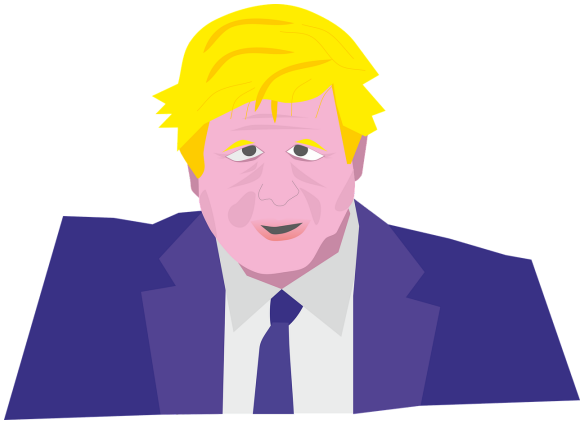
As we leave the second lockdown, England will now face the new three-tiered system of coronavirus measures, in which almost all of the country is currently placed under the strictest two tiers. Although the Pfizer-BioNTech vaccine has now been approved for use in the UK and the more readily distributable Oxford-AstraZeneca vaccine should soon be available, daily deaths remain higher than in May. As far as COVID-19 goes, it is clear that we are far from being out of the woods. Hence, why despite just coming out of a lockdown, strict measures stay in place for many people.

For the Christmas period however (23-27 December), people will be able to form 'Christmas Bubbles' with another household that they don't normally live with, allowing for familial festivities to still occur. While a break from this isolating year may be a welcome change for some, questions arise about the viability of this policy.

Winter is very challenging for the NHS in normal times. The combination of the current pandemic and a decade of austerity will likely lead to the most challenging winter since the health service's conception. Moreover, it raises awkward questions about the supposed secularity of modern British society.

Diwali, the most important holiday in the Hindu calendar, occurred during the second lockdown. No exceptions were granted to individuals wishing to celebrate, despite adherents making up a much smaller portion of the population compared to those in the UK who celebrate Christmas (1.5% of the population compared to 91%). No similar exceptions will be granted for Hanukkah, which is due to begin this week.

This follows a similar theme to the way A Level grades were assigned this year. The government shows us once again that they are willing to expend too much energy in trying to attain superficial symbols of normality, without actually doing what is necessary to keep us safe in the present and make sure our futures remain secure.



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And once again in the same way disadvantaged groups were the most penalised by the A-level algorithm, minority groups have been disregarded. Boris Johnson claims that a lockdown-free Christmas is crucial for the mental and emotional well being of the nation, however he refuses to financially support the welfare schemes such as furlough, that would genuinely help those that the virus has impacted most.

By Jabez Kent

Good News

Tor Exists!

Christmas is a time to be grateful, to reflect on what you've taken for granted. So, this week in the Christmas edition of good news, we want to spread appreciation to all those good humans who work tirelessly behind the scenes.

"This is our christmas present to you. Thank you, our lives would have honestly fallen apart without you." - The Write Angle.

The concept 'out of sight, out of mind' has many consequences, and as humans we have a tendency to ignore things that aren't directly under our noses. Everyday individuals are ignored and taken for granted just because we cannot directly see the fruits of their labour. Everyone is guilty of this level of disregard occasionally, even the most aware of us. We forget that our beautiful school cleaners are the reason why we are not wading through mountains of grime, we forget that our teachers aren't paid overtime (and yet always put in those extra hours of planning and support) and we forget that our finance staff are the reason why our school has resources enough to support all students and why it hasn't run itself into the ground. It is difficult to find a reminder of all that is going on behind the scenes in day-to-day life. However, at EMS we are so lucky as to have our reminder sitting in reception Monday-Thursday with a smile on her face and a glint in her eye. Tor.

"She is always really nice and helpful. She always makes me smile as soon as I walk through the door." - Chloe-anne England

If you are unaware of who Tor is, then you either don't currently attend this school, or you need to go get yourself acquainted; as your experience at EMS is not complete without her. Given this, I wanted to take some extra time to appreciate this wonderful person, who is at the face of all those who are taken for granted within our school community.

"She has this thing of lighting up a room, you can't ignore her. She's bubbly, and just brightens up your day." - Ekaete Iboro Offong
"She's brilliant!" - Ryan Traviss

I think the best way to really depict how beautiful of a person Tor is, is to give an example of the kindness she has shown us. Of course, all the year 13's will know about Tor's emails during the lockdown period. However, the year 12s most likely will not. In those tragic months of lockdown where we were bound to the walls of our houses, self-teaching at home, many of us were quite blue. We had been ripped from this socially-driven environment to isolation with our families. It is safe to say that all of us could have done with a bit of a pick-me-up, the teachers just as much as the students. This is exactly what Tor gave us.
Each and every school morning during the lockdown, Tor took time out of her day to send us a little puzzle and an optimistic message. It was something that many looked forward to each morning, especially on Fridays, in combination with Kerry's pun-filled weekly updates. It was at least one smile that we got out of our day, and I'm not sure she really knows how much it meant to us to get that little flash of optimism in the morning. She fought the loneliness that covid thrust into our lives. Just as Amy Green said: "COVID is scared of Tor". I think the correct words in response to her kindness during lockdown would simply be "thank you".

"She is patient, and takes her time with every single one of us." - Jabez Kent

This is not all that she has done for us. It would be impossible to go through all the greatness that Tor has done, this is just one example.

"Every time I have to climb up all the stairs at home, I remember how during lockdown,

whenever Tor was having to go up the stairs yet again, she saw it as an opportunity for more exercise, and it cheers me up." - Claire Willman

Apart from giving time to the students at the drop of a hat, and spending time making our days all the better, Tor works hard on keeping the school together. She keeps us all on the right path, teachers and students alike. She deals with everyone. She deals with the students, the teachers, the finance staff, the pastoral staff, governors, parents, and manages to treat all of them with kindness.

"She completes her job, but then doesn't stop. She far surpasses anyone's expectations, all while with a smile on her face. I could never keep myself together as well as Tor can. She truly represents the spirit of our school, alongside all those who we do not get to meet." -Freya Dover

She works so hard to keep everyone organised, keep the school organised and generally just support the school in every way you can think of. I think all the staff would agree that they rely on Tor for one reason or another.

"When she catches me doing any kind of admin task, she always volunteers to do it for me." - Nick Dean
"Tor knows everything." - Millie Furneaux

Everyday that I walk through the doors of EMS, I am greeted with a smile. It has been proven that a positive morning correlates to a productive day. Here is a paper on how happiness improves productivity.

"The amount of care she has for every person and the genuine welcoming attitude she expressess, contributes to the lovely atmosphere of EMS." - Poppy Loosely

One of the ways in which you can improve your mood in the morning is through positive social interactions. It has even been shown that lots of positive interactions and satisfying relationships can lead to a longer life, as your overall mental wellbeing is significantly improved by these interactions. Here is a paper on how positive interactions can improve our wellbeing, (I know they only collected data on men, which if you want to know why that is bad you should watch Lanella Wall's EMC next year, however we will overlook that for now).
So we can definitively say that the positive interactions that Tor provides us with everyday, does improve our mood, boost our productivity and even our lifespans.

"I love Tor in spite of the fact that she has terrible taste in music, country music in particular." - Stuart Allen

By Molly Briany Berridge

Devine's Problems

The Christmas Problem

Rudolph is a bit dumb so he's running along a train track. Every second he jumps a constant integer number of metres forward, always in the same direction. Luckily for Rudolph, Father Christmas has given him an invisibility cloak, and has cancelled all the trains so they don't hit him.

Scrooge has somehow found out that Rudolph's on the track, and wants to shoot him. Scrooge has also read all of the text before this sentence. Since Rudolph's got a bit chonky over the year with lockdown and everything, Scrooge can feel the vibrations every time Rudolph jumps, and can shoot exactly once between each jump (the gun needs to reload while Rudolph is jumping).

Father Christmas has arranged to come down and save Rudolph after an infinite amount of time. Can Scrooge guarantee to kill Rudolph before then? If not, why not? If so, find a strategy for Scrooge.

Last Week's Solution

Suppose there is a set of 50 bags, that has neither half of the iphones nor half of the samsungs, then you can get enough of each by taking the other 49.

Now suppose all sets of 50 bags either have half of the iphones or half of the samsungs, then there must be 2 sets of 50 that differ by only one bag, where one of them has half the iphones and the other has half the samsungs. This means that the 49 bags they share have both half of the iphones and half of the samsungs, so we're done!