Welcome to Issue 56 of the Secondary Magazine.

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From the editor – Alice in Wonderland

Have you seen the new Disney Alice in Wonderland film yet? Directed by Tim Burton and starring such celebrities as Helena Bonham Carter, Stephen Fry and Johnny Depp, this new reworking around the Alice story benefits from the latest digital technologies to make a stunning cinematic experience. I am looking forward to seeing the White Rabbit, the Mad Hatter, the Cheshire Cat, Tweedledum and Tweedledee, the Queen of Hearts and other characters in their new representations.

And what would Charles Lutwidge Dodgson make of this? And why are we asking here?
Alice's Adventures in Wonderland and Through the Looking Glass were written by Lewis Carroll – the pseudonym of Charles Lutwidge Dodgson. Dodgson (1832-1898) was a mathematician based at Oxford University. He was also an Anglican deacon, enjoyed experimenting with logic and also took pleasure from entertaining young friends with mathematical tricks and stories.

Here are a couple of mathematical curiosities that Dodgson enjoyed:

Curiosity One
Is 142857 a magic number?

Look what happens when you perform these calculations:

142857 x 2 = 285714
142857 x 3 = 428571
142857 x 4 = 571428
142857 x 5 = 714285
142857 x 6 = 857142
142857 x 7 = 999999

It may be worth investigating the link between these numbers and the recurring decimal of
1/7 = 142857/999999 = 0.142857142857142857...

Curiosity Two
Write down the number 12 345 679.
Now, as April is the fourth month of the year I want you to think very hard about the number four and work out 36 x 12 345 679

Why does this work?
Well,
9 x 12 345 679 = 111 111 111
so 4 x 9 x 12 345 679 = 444 444 444

Once you understand the structure of this curiosity it would be possible to find a similar one for all the digits from 1 – 9

Curiouser and curiouser?
Wikipedia gives many references to the links between the Alice stories and Dodgson/Carroll's life as an academic mathematician.

I hope you can make some links between the Alice film and these mathematical curiosities to engage your pupils.

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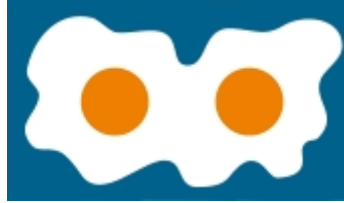
Up2d8 Maths

The fortnightly Up2d8 Maths resources explore a range of mathematical themes in a topical context. The resource is not intended to be a set of instructions but rather a framework which you can personalise to fit your classroom and your learners.

Have you ever had a double-yolk egg? On 6 February this year, a woman in Cumbria was surprised to find that she had a box of double-yolk eggs which she discovered when she cracked them to make her scrambled eggs for breakfast. The media presented this amazing story as beating trillion-to-one odds. But is that really the case? In this resource, students are introduced to the double yolk story and then invited to question the assumptions made in calculating the probabilities.

The activity gives students the opportunity to think about probability related to a real life situation. The public are fascinated by big numbers and trillion-to-one odds intrigue the reader. In this resource, pupils are invited to consider what 'trillion-to-one' really means and then consider if this situation really does have 'trillion-to-one' odds.

This resource is not year group specific and so will need to be read through and possibly adapted before use. The way in which you choose to use the resource will enable your learners to access some of the Key Processes from the Key Stage 3 Programme of Study.

Download this Up2d8 Maths resource - in PowerPoint format

Download this Up2d8 Maths resource - in PDF format

The Interview

Name: Bryony Black

About you: I am the NCETM Regional Coordinator in Yorkshire and the Humber.

The most recent use of mathematics in your job was... Well, I use it all the time, but today I have been trying to plan out my day, estimating how long each task will take and prioritising so that I get everything done.

Some mathematics that amazed you is... I love coincidences – meeting someone with the same birthday as me, bumping into people in the most unlikely places, and so on. It's interesting to discover that most of these can be explained mathematically – for example, to have a 50-50 chance of two people in a room having the same birthday, you only need 23 people to be there!

Why mathematics? Because teaching music would have been too noisy…sounds flippant, but I studied maths and music at university and loved them both.

Your favourite/most significant mathematics-related anecdote is...I taught mathematics in Namibia for two years. The students were absolutely fantastic, but no-one seemed to have mentioned to them that maths had anything to do with real life. I spent ages working on negative numbers with them, using all my usual examples: lifts going to the basement (all buildings were one storey high); bank accounts going into the red (no one had a bank account); temperatures going below zero (it was boiling hot all the time)…I really thought they had got it, until I set them a homework to make up some wordy negative numbers problems themselves. They came back with things like "I have -15 donkeys. I lose 7 of them. How many do I have left?", and "I have 24 fruits,12 of them are bad. How many can I eat?". All the answers they gave made mathematical sense, but I'm just not sure what -15 donkeys would look like.

A maths joke that makes you laugh is... "Why did the maths book cry?" "Because it had so many problems!" This was made up by a 10-year-old-child in Singapore – I searched for absolutely ages to try and find a maths joke that was actually funny, but they are few and far between!

Something else that makes you laugh is... My husband.

Your favourite television programme is... Come Dine With Me.

Your favourite ice-cream flavour is... Vanilla. Boring, I know.

Who inspired you? My crazy maths teacher who taught me for GCSE (Mr Hatton). He was a bit like a mad professor – I remember one lesson where he didn't turn up for ages, so we all sat around chatting, wondering where he was, and about 10 minutes before the end of the lesson he suddenly appeared out of the cupboard, looking very surprised to see us! I admired his brain, and never really noticed that he only taught the top sets…

If you weren't doing this job you would…be up a mountain.

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Focus on…risk and chance

- How much can success in the football Premiership be attributed to chance? In this video, David Spiegelhalter, Winton Professor of the Public Understanding of Risk at the University of Cambridge, talks about how results in the Premiership and other leagues around the world might be if skill didn't play a part and the results were decided entirely by chance.

- What are your students' perceptions of the risks that they might encounter in their lives? The *How Risky is Life?* case study from Bowland explores probability and risk in everyday life.

- While you're looking at daily risk, you might like to watch this video - again from David Spiegelhalter - as he weighs up some of the risks that he faces in his life.

- Here's a quick test. Which of these two statements is true:

    A. Scientists in Norway have found that potentially dangerous fumes from pan-frying meat with gas were well below that country's occupational health limit.

    B. Scientists in Norway found that pan-frying meat with gas may be worse than electricity for raising cancer risk.

    How might the media use statistics to exaggerate a story? Which of these headlines would you run if you were a reporter? Read more about this story on the Straight Statistics website.

- What's the risk of a child choking on their food? The Washington Post reports that "The nation's largest paediatricians group is calling for sweeping changes in the way food is designed and labelled to minimize children's chances for choking. Choking kills more than 100 U.S. children 14 years or younger each year and thousands more - 15 000 in 2001 - are treated in emergency rooms. Food, including candy and gum, is among the leading culprits, along with items like coins and balloons. Of the 141 choking deaths in kids in 2006, 61 were food-related."
  Is there more to the story than the figures suggest? Read a breakdown of the article from stats.org.

- Ben Goldacre describes himself as "an award-winning writer, broadcaster, and medical doctor who specialises in unpicking dodgy scientific claims made by scaremongering journalists, dodgy government reports, evil pharmaceutical corporations, PR companies and quacks." His Bad Science website and his column in The Guardian explores the way that statistics and risk are reported in the media. For example, does smoking really reduce your risk of developing Alzheimers?

An idea for the classroom – ski graphs

I have talked before about engaging with my students on a personal level – trying to build up a relationship that acknowledges that we all exist and have lives that are independent of the maths classroom!!

February half term, for me, was spent having some brilliant skiing in Austria. As a mathematician, I was equally delighted that when I got back at the end of each day, I could log on to a website, enter the number of my ski pass and then access data about the ski lifts I had used that day.
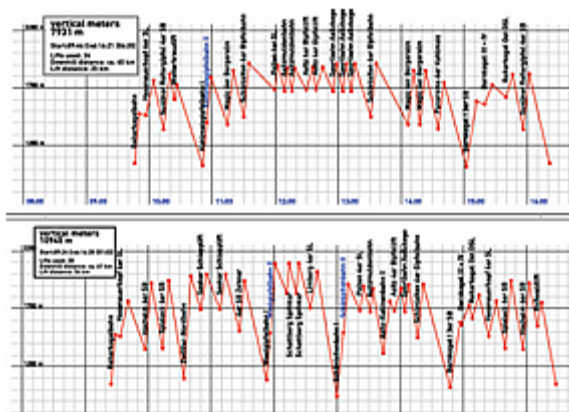
This resource is a PowerPoint (also available in PDF format) showing the data available for two of those ski days.

How did I use this in the classroom?

I used these graphs as a starter, so I displayed the PowerPoint slide in my classroom but also gave each pair of pupils a print out as they found it easier to read. Rather than just do this for myself, I printed and laminated a set of 16 as they then got passed around the department.

I asked my pupils, in pairs, to tell me five things that were the same and five things that were different about the two days' skiing. Here are some of the things they came up with:

Same
On both days:
- I descended to lower than the start altitude
- used the same lift to start
- the start and finish altitudes were the same
- I stayed above 900m
- I started before 10:00.

Different
- on the first day, between 12 and 1, I had used the same lifts several times, on the second day there was a greater variety of lifts used
- on the second day I skied for longer – 7 hours 3 minutes as opposed to 6hours 35 minutes (impressive, eh?)
- on the first day I probably had a lunch break between 13:30 and 14:00, on the second day it doesn't look as though I stopped at all

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- on the second day I skied the longest run and used the longest and fastest lift at around 13:00
- I went higher on the second day
- I skied faster on the second day.

In making these statements, the pupils had to understand the information on the graphs. I tried to encourage them to be more precise with some of their comments – putting in times or altitudes where appropriate. They came to the conclusion that I was having an 'easy day' on the first of these graphs! I was keen to tell them how much I had enjoyed it!

I am always unsure whether pupils can relate to these experiences if they have never been on a ski holiday but the functional skills standards talk about 'familiarity'. Even if pupils have never set a ski on the snow, interpreting a graph of an unfamiliar situation is still a useful skill.

Have you used some interesting graphs for pupils to interpret? Why not tell us about them here?

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5 things to do this fortnight

- Meet the Mathematicians is an event for Year 12 or 13 students which includes:
  - o lectures and interactive sessions with leading UK scientists
  - o talks on applications of mathematics to science and engineering
  - o a chance to meet and chat with students and researchers in applied mathematics.

  This year's event is taking place at the Royal Society of Edinburgh on 7 April.

- Do you celebrate famous mathematicians' birthdays in your classroom? The new programme of study states that "students should learn about problems from the past that led to the development of particular areas of mathematics…" – and maybe celebrating birthdays will provide a context and prompt for this discussion with your class? This month alone you might talk about Andrew Wiles (11 April) and his proof of Fermat's Last Theorem, Euler (15 April) and the Seven Bridges of Königsberg, or Gauss (30 April) and number theory.

- Early warning that the 2nd National Conference on Dyscalculia and Maths Learning Difficulties takes place on 30 June with speakers including Dr Dave Hewett and Dr Steve Chinn. The conference is held at the Waldorf Hilton Hotel in London and costs £245.

- Have you experimented with the new portal features yet? The Audio Reflection Tool allows users to make immediate voice recording into the Personal Learning Space (PLS). The online communities have undergone a substantial rework and within each community it is now possible to subscribe to a range of email alerts. In what is probably a first for any website of this kind, there is a new 'remind me of this item' icon. If you see an item on the portal, make an entry into your PLS, or have completed some SET activity that you want reminding of in a day, week or month's time, click the 'lightbulb' icon. Then decide when and how often you want the reminder, and an email will arrive on the appropriate date. Finally, a spellchecker has been introduced throughout the site, and the portal now supports BrowseAloud, making it more accessible to those who require online reading support.

- Tutti Day falls on the second Tuesday after Easter and Hungerford is now the only place in the UK to maintain this tradition. The town crier blows his horn and calls together the Hocktide Court in the town hall. Here, all commoners living in the High Street must pay a fine to ensure their rights of fishing and grazing. While the court continues, 'tutti men', with florally decorated poles are led through the streets by the 'orange man' to collect a coin from the men and kisses from all the ladies resident in the High Street – but don't worry, they receive an orange in return!

Diary of a subject leader

Real issues in the life of a fictional Subject Leader

I woke this morning to the voice of Sir Malcolm Rifkind. No I don't have a weird ring-tone, he just happened to be talking about the issues around a new government taking office. I'm pretty bored with the election already, and it hasn't even started yet. However, the point Sir Malcolm was making returned to haunt me.

I'm on my school leadership team as an AP and my responsibility is maths. One way that I am responsible is through my own teaching, and that happens only three periods a fortnight – less than if I were a Main Scale Teacher. So when I need to do things that heads of department and senior leadership have to do, I need lots of cover. Every day of my timetable requires me to teach at least four out of five lessons. Similar to many schools in many areas, due to our status as penultimate in terms of education funding from central government, we face serious financial restrictions. We focus on CPD taking place within our school and we learn from each other, we can never have more than three teachers absent on a given day – so even arranged inset can be cancelled. Despite this, I think it's not been too bad.

Later this morning when I was checking my pigeon-hole, I found I had a circular from the SSAT about a maths network meeting. Unusually, it was a poor photocopy and had a note written from my head – "I think you should be going to these".

Well, as a matter of fact so do I, but there are other more important events I would like to attend, but already know I neither can afford the inset, nor be freed-up to allow me to go. The regular flyers I receive float into the recycling bin: I just know we haven't the time or finance. In short, it is a luxury we cannot afford.

However, I should be thinking about going, and in a way, I feel I have been sucked in. Far too much of my daily activity is about coping with the situation in front of me. Too often that is about dealing with a student who will not comply or engage with a community that focuses on learning. The only time I do lift my head up is in the holidays, and that I resent, and my family certainly resents it. It does make me think about the purpose of my role, and what I need to do to force a change in my role so that I can make a greater change and be able to look strategically at the learning that could happen in maths.

And what has all this to do with Sir Malcolm? Well, he was talking about the difference between new ministers of state dealing with strategy and policy. He quite succinctly stated that policy is what you will do today, and strategy is what you want to be doing in six months' time. He also warned of the dangers of the policy squeezing out the strategy in terms of just being able to cope. And if you do fall into that trap, Sir Malcolm suggested that you would be in office, but not in power! Well, I don't actually have an office, and as for the power…