NOTHING SQUARE ABOUT THE HIPPOCYPSE "THE MOST CREATIVE EXPRESSIONS OF PURE THOUGHT IN HUMAN HISTORY HAVE BEEN MATHEMATICAL, THAT'S PRETTY COOL," SAYS ALEX BELLOS
Would you like to come up and see my equations...

A REPORT SUGGESTS THAT MOST BRITONS ARE HAPPY TO BE INNUMERATE, BUT IS MATHS REALLY SO GEEKY? NO — IN FACT IT CAN BE AN APHRODISIAC, SAYS ALEX BELLOS

I recently struck up a conversation with a woman in my local takeaway. The banter began to run out of steam, so I switched the subject to maths. This uncharted chat-up territory. I asked her to doodle on a napkin. Without taking the pen off the paper, she drew a pattern of consecutive loops, then joined the line back to where she started. Then she criss-crossed the squiggles with an open grid of parallel lines. I asked her the minimum number of colours she would need to fill in the doodle completely, so that no two areas with the same colour were adjacent to each other. She hesitated. "Four!" The answer, in fact, is only two. She stared at the napkin in disbelief, then started to shade it in. Her eyes lit up as she realised that it was true.

"My experiment was a success." Yes, I got her number. But, more importantly, it reinforced my belief that maths can be fascinating to people who would usually claim to have no interest in it. You don't need to understand the proof of the two-colour doodle theorem to appreciate the "wow" of seeing such an inky mess reduced to a simple black and white masterpiece.

At school, those who shine at maths are seen as socially retarded, more comfortable around numbers than around people. I'm a card-carrying mathlete. I studied maths at university and am writing a book on it. On balance, however, I prefer people to numbers. In fact, the general perception that maths is just numbers is part of the problem with the prejudice against us. My mental arithmetic is bad (and I'm not proud of it) but this does not restrict my love of the subject.

Maths, for me, is about seeing the world in terms of patterns and symbols and marvelling at how they interrelate. Recursive language and a self-reflecting consciousness are uniquely human, so is the ability to think mathematically. I'd argue that the most impressive, and creative, expressions of pure thought in

There are an infinite number of infinities. That's fascinating, and I'd bring it up on the second date.
When girls know you're into maths it lowers their expectations

TOM WHITTLE MIXES WITH THE FUTURE ISAAC NEWTONS AT TRINITY COLLEGE, CAMBRIDGE

Dusk in Cambridge. The exams are over, champagne is chilling and the mathematicians have come out to play.

A couple of hundred men and a dozen women mill around the medieval grounds of Trinity College. Some are discussing the ins and outs of space, some the topology of seacups. But most just have a few drinks or play Frisbee on the lawns. It is the annual mathematicians’ garden party.

“They choose Frisbee,” Peter Fremin explains, like a TV anthropologist observing an Amazonian tribe, “because it requires little sporting ability, and the way it flies involves interesting physics.”

Fremilin is an interloper. He used to study maths but changed to English (”I was in a lecture, there was an equation that went across four blackboards and I thought ‘maybe I’m in the wrong place’”). But his former colleagues are no more skilled at “waving up their cuff-jetet, Tim Dey, an undergraduate, admits that it carries a stigma: “People picture a beardy, bespectacled, socially inept guy,” he pauses and looks around. “And, to be fair, at Cambridge those attributes don’t exactly go against you.”

If there is anywhere that a mathematician should feel comfortable, it is in Trinity College. Since subject-based legen-
tables began, Cambridge has been top for maths. And in each of those years, Trinity has taken in more mathemati-
cians than any other Cambridge college. This year 46 new undergraduates arrived, almost 20 per cent of the intake for the university as a whole.

Their prospects are good. With one of the most sought-after degrees in the world, most will go on to earn fortunes in the City. Others will be woned by technol-
ogy companies. As one professor says: “Maths makes things like Google work. The internet would not be possi-
ble without some fairly hardcore maths that was only done about 20 years ago.”

Those who stay in academia can aspire to emulate the college’s four Fields Med-
allists (the mathematical equivalent of Nobel laureates), one of whom is the garden party. Arguably the college’s greatest alumni is Sir Isaac Newton, one of history’s greatest mathematicians. And yet. Even here there is self-

deprivation, the embarrassed air of “I may-do-maths-but-let-me-prove-that-I’m-normal. When the Times photographer asked someone to act naturally and chat to his friend, he replied: “Ah, that’s where you’re wrong — thinking isn’t natural for a mathematician.”

Describing his wooing technique, Ed Smith, a second-year, said: “The best thing is to lie. I pretend to do archae-
ology and anthropology.”

Tim Dey has similar tactics. “The first couple of weeks, I told girls I did dance studies at Anglia Polytechnic,” he says. “That generally gets a better response than saying I did maths at Cambridge — until they saw my moves. Of course, in a way, though, saying that you do maths lowers their expectations, so it’s good.”

“The thing is, most people can’t relate to a maths subject. Everyone, roads and looks at a painting every now and then. But maths is just not interesting in the same way, so we can’t talk about it.”

This attitude of society against the mathematician is something that last week’s report on the state of British maths is trying to change. It laments a situation where it is socially acceptable

PLAY THE GAME THEY CHOOSE FRISBEE BECAUSE THE WAY IT FLIES INVOLVES INTERESTING PHYSICS SAYS PETER FREMIN.

Prime example
Try this test yourself

Proof by contradiction is one of a mathematician’s most powerful tools. Its most famous use is in proving that there are infinitely many prime numbers. A prime number is a whole number that can be divided only by itself and 1. So 7 is prime because it cannot be divided by anything else, but 8 is not because it can also be divided by 4 and 2. Also, all numbers can be reduced to their primes. 56 would be 3×2×2×2, but 7 could only be 7.

To prove that there are infinite prime numbers, we first assume that there are a finite number of them; then try to show that this leads to an impossible situation. So, assume that there are finite primes. There could be seven, or a hundred million. For this example, let’s say that there are four.

Now, imagine another number which is all existing prime numbers multiplied together, plus 1. As we are mathematicians now, let us call that number “p”. So in our example, p would be 2×3×5×7+1, or 211. If we divide p by any of those other prime numbers, we are never going to get a whole number. We will always have 1 left over — a remainder. Check for yourself in our example, divide 211 by 3 and you get 67. (reminder 2). Divide it by 5, 7, 11, or 117, or 211 and that remainder will still be there. Remember, all numbers can be reduced to their prime factors, without any remainder anywhere. So, either p is prime, or there is another prime that we haven’t yet figured out. Either way, our initial assumption is false.

If only one rock star would admit spending his time on the tour bus doing Su Doku

GAGS BY NUMBERS
IT IS NO CONSECRANCE THAT MANY WITIERS ON THE SIMPSONS ARE MATHS AND COMPUTER SCIENCE GRADUATES.

history have been mathematical. That’s pretty cool.

OK, as an opening gambit the line is not exactly dynamite. Yet it has definitely helped me conversationally.

For a start, mathematicians have a refined sense of humour. It is no coinci-
dence that many writers on The Simpsons are maths and computer science graduates. One of the most basic forms of proof is proof by contradiction. This is when you prove the truth of state-
ment A by assuming that A is false, and then show that the falsity of A leads to an impossibility. This is precisely the structure of many jokes — start with a premise that is a slight modification of reality, and bring out the absurdity of the consequences. Doh!

Mathematicians are good at hashing ideas around — naging them, turning them inside out, pulverising them and rearranging the pieces. Sometimes the result is meaningful, sometimes it isn’t. And even then it has its rewards. Lewis Carroll, the father of nonsense verse, was a mathematician. Actually, he was a logician — they are even more hilarious.

Mathematicians are playful. I don’t mean by this the cliché of the wacky boffin with his Van de Graaf generator hair (nothing reinforces maths as boring so much as someone shouting “Electro!”). French mathematicians in the 17th cen-
tury analysed their gambling habits and ended up inventing the science of probabil-
ity, a basic understanding of which is as crucial to the modern world as the ability to remember one’s times tables.

For me, maths becomes most exciting when it touches on deep philosophical issues. We are taught that maths is a rigid and consistent system. Well, sorry to break the news, but it isn’t. Many weirdnesses lie within it. An example: there are two types of infinity, one bigger than the other. Actually, there are an infinite number of infinities, all of differ-
ent sizes. That’s fascinating, and I would probably bring it up on the second date.

One paradox connected with the British disrespect for maths is our generation of those with musical talent. Many mathemati-
cians are musical and many musicians have good intuitive understanding of maths. Both subjects involve a search for elegance, an improvisational creativity and a familiarity with symmetries and rules. In terms of “cool music”, Britain pushes above its weight. Perhaps attitudes to maths would change if just one rock star admitted that he spent his time at the back of the tour bus doing Su Doku puzzles. It wouldn’t make him a pariah. Researching my maths book I have learnt that there is no social skill more guar-
teed to charm than the ability to fold two business cards into a tetrahedron. Maths can be a powerful aphrodisiac. I now use it only sparingly in social situations.
to profess ignorance of maths, where it would not be of English. In a section entitled “From geeks to chic,” the authors call for change in the perception of maths for the subject to move “from Cinderella to Queen of the Sciences.” In short, they want maths to be cool.

Ben Green, a professor in pure mathematics, agrees. “Something is very wrong. Everyone should be basically mathematically literate. People say to me ‘ah, I was never very good at maths’ — it shouldn’t be possible to say that — it should be akin to saying ‘I’m stupid’ or ‘I’ve never been good at words’.”

“People should learn that yes, maths can be cool. Have you ever heard of the number \(\pi\)? Compute the decimal expansion of that number. I guarantee you’ll think that’s cool, and there’s some really cool maths behind that.”

There are many at the garden party who would agree. As strawberries and cream are distributed, Saul Glasman eulogises about his subject. “There’s a tonne of abstract beauty to be appreciated,” he says. “It’s the emergent complexity — the deeper you go, the more questions there are to ask.” To his left, one of his friends splatters over her wine. After a week of exams, some have had more than enough emergent complexity. But he ignores her. “And you reveal a structure. Some of it you feel you’ve made with your own hands, some of it you feel was there all along.”

Wylie, then, is this not appreciated in society at large? “Look around you,” Glasman’s friend Jack Shotton says as he flops down on the grass. “We’re not cool people.” Before starting as an undergraduate, Shotton represented Britain at the International Mathematics Olympiad. “The thing I like about maths is that you sit down, do a question, and four or five hours later you come out of it — you understand more and you know what you did is right as well.”

Perhaps, in asking if maths is cool, we are posing the wrong question. Coolness is ephemeral and implies trying too hard. In short, it is a bit too humanistic. “I’d love to say that I think it’s cool, but it’s really not,” says Doug Shaw, a cosmology researcher. “It’s otherworldly but also solid — it’s something that just is.”

And \(\pi\)? Well, its decimal expansion is 3.141592653589793238462643383279502884197169399375105820... and its fraction is 22/7. It is extremely close to being a whole number, cool is probably not the right word, but the result is certainly interesting. Ask any mathematician.