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PrimeTimes

EMAIL: mathsoc@greenwich.ac.uk

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A Welcome From the President

"It is an exciting time for MathSoc, with new directions and initiatives"

To all our new and continuing students, my warmest welcome to the MathSoc family!

The new executive committee officially took office on the 1st August 2017, with Dr Ana Paula Palacios and Dr Tim Reis taking over from Dr Steve Lakin as academic representatives on the board.

It is an exciting time for MathSoc, with new directions and initiatives. The committee started work with enthusiasm and a commitment to draw many members into the society. As a student in the Department of Mathematical Sciences at the university, you are an automatic member of MathSoc. Therefore you are very welcome to suggest programmes to enhance our efforts, and join us in further building our society. The executive committee has drawn up a lot of exciting activities for the academic year which include film shows, social outings, quiz competitions, academic talks and others.

The committee also focuses on events and programmes that are designed to encourage interaction with other maths societies in other universities. Our projects include future Society's Reunion Weekend, and networking events. I hope we will all seize the many opportunities that MathSoc presents to enrich our growth intellectually and personally. Therefore I invite you to take an active part in all our activities and events.

Welcome once again, and I wish all of you a fulfilling year ahead!
With best wishes,
Vincent Atigla, President of Mathsoc

Welcome to our Maths Community!

The warmest of welcomes to you all! We are delighted that you have joined our mathematical community and we are sincerely looking forward to getting to know you during this important and exciting period of your life.

You are now working towards one of the most respected qualifications in higher educations - a degree in mathematics. This may sound daunting but the Department of Mathematical Sciences will offer you a lot of support during your time here (believe it or not, we still remember what it was like for us!) and guide you through your studies. University and mathematics bring many opportunities beyond the lecture theatre and we will be encouraging you to seize them (as long as you do our coursework!) - this is a time that can change your life forever.

With our very best wishes,

Ana Paula Palacios
Senior Lecturer

Tim Reis
Senior Lecturer

Welcome to all New Students!

Hello and welcome to all newcomers I'm so happy to be able to welcome you to Greenwich, the home of a stone-y George II, the best pie and mash in the universe and our ever-growing Maths family. I absolutely loved my first year at the University of Greenwich and I'm incredibly privileged to be your new editor of *PrimeTimes*. If you've just moved in your brand new IKEA kitchen utensils and settled into accommodation nearby — welcome! You've made it; congratulations on unpacking! To those who will speed walk race fellow commuters on the underground, battle traffic jams and whatever else comes their way, every day to arrive in time at our beautiful campus - welcome! Wishing you the best of luck during the peak times for the rest of the year!

I want to take a moment to say congratulations on making it through the process of applying and being successful in your journey to university. We all understand that it can be a complicated process full of stressful decision making and lots of hard work. Congratulations for surviving it! It can be incredibly daunting now facing the beginning of a degree at university but rest assured you are not alone; we are all behind you and you can absolutely, 100%, smash it! My advice for new students would be "do not be afraid to ask for help". Ask the people sat next to, in front of, or behind you, in your tutorials. Help doesn't necessarily have to come from your lecturers or tutors immediately, your fellow students can be so great at explaining something you didn't get straight away (and let's face it, who gets everything straight away?) Also, remember, it's okay to ask "can you just explain that one more time?" Likewise, help others, take your time to explain something you understood to someone else — keep our family vibes flowing! This is a wonderful way to make friends. Friends that will cry with you about impending coursework deadlines and help you exhaustively work out a single digit addition after multiple hours of working on the same question in the library. If something still isn't clicking reach out to your tutors, send them an email, and ask them for help. They are incredibly supportive and they will help you.

There's so much this university can offer you. There's so much to get involved with, so many ways to have fun and lots of incredibly lovely, supportive people that will help you through a degree.

I look forward to getting to know you all, so, if you see me around campus, round town letting my hair down or even dodging the eye contact of strangers on the tube, be sure to grab my attention and say 'Hi!'.

A warm welcome to your new home.

With peace, love and pi,

Robyn Goldsmith

Editor of PrimeTimes magazine

1	2	3	=	8
2	3	4	=	18
3	4	5	=	32
4	5	6	=	50
5	6	7	=	?

Puzzle Palooza!

Puzzle Number:1

Follow us in twitter @UoG_MathSoc to find this and many more puzzles!

An Interview with Dr Nira Chamberlain

Nira Chamberlain was told by a teacher that he could be a boxer, not a mathematician. Later on in his life he made history as the first black mathematician to appear in the *Who's Who*. He is also listed by the Science Council as one of the UK's top 100 Scientists. We got the chance to ask him a few questions.

What career path did you take?
Mathematics BSc(Hons), MSc Industrial Mathematical Modelling, worked in industry as a full time professional mathematician and received a PhD in mathematics.

Some of our students were lucky enough to see your talk about the Black Heroes of Mathematics at the IMA Festival of Mathematics. Which of those heroes mentioned is most inspiring to you personally?
Euohemia Lofton Haynes. An African-American female in her 50s getting a PhD in Mathematics. She is living proof that mathematics is truly for everybody.

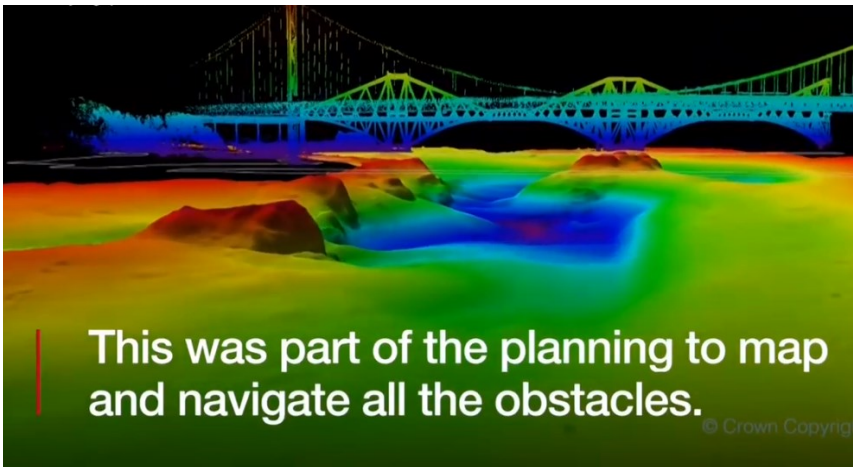
For those who are just joining us this September, or haven't seen your talk, who are the Black Heroes of Mathematics?
Francis Williams, Thomas Fuller, Benjamin Banneker, Elbert Cox, Katherine Johnson, Kate Adebola Okikiolu, J Ernerst Wilkins and David Blackwell to name a few.

What would you say is your greatest achievement?
The creation of a mathematical cost capability trade-off model for the HMS Queen Elizabeth at a time when the £6.2 billion project was still at the computer design stage and the first sheet of steel had yet to be cut.
This model convinced the client that this prestigious aircraft carrier should indeed be built. Found myself cited in the encyclopaedia of Mathematics & Society and my name is on a placard inside the ship.

> "You don't need anybody's permission to be a great mathematician"

What advice do you have for anyone aspiring to become a mathematician?
You don't need anybody's permission to be a great mathematician.

What advice do you have for our students who are beginning or continuing this September on their academic journey into mathematics?
A mathematician is not somebody who finds mathematics easy, a mathematician is someone who sees a problem and never, ever quits!



*Photographs supplied courtesy of Nira Chamberlay

Words of Wisdom from a Graduate!

I still remember the ice breaker where we had to find a different person to fit the questions on our yellow sheets. In a blink of an eye, I was graduating with all my friends wondering how we made it through those long nights at the library.

Many people urge you to have fun in your first year at uni. I went in the opposite direction. Being a maths student, I wanted to get to grips with the coursework deadlines and how to handle those 3 hour exams. Don't only do what I did. Join a society, play a sport, find a part time job; find something that makes you sane while you have Roman numerals or differential equations floating around in the back of your head.

Second year, I worked a little less, discovered how to party but I also helped start a new society. What I learnt in my second year was how and when to apply myself to uni work. First and second year had a similar difficulty level so you knew when you were doing alright.

Third year is a different ball game. Third year feels like two years rolled into one. You need to commit your life to the third year. Part time work and extra curricular activities need to be put on the back burner whilst you grind during this last year. It may sound daunting but it will all be worth it. No one can take this degree away from you. It is so valuable and I believe that you are so much better off with it. Not to mention how great you will look in a graduation gown: those Instagram boomerangs are going to be golden!

My main advice for third years would be to apply for jobs around October—December. Make use of the Christmas holiday to apply to many jobs and possible masters programmes. The earlier the better.

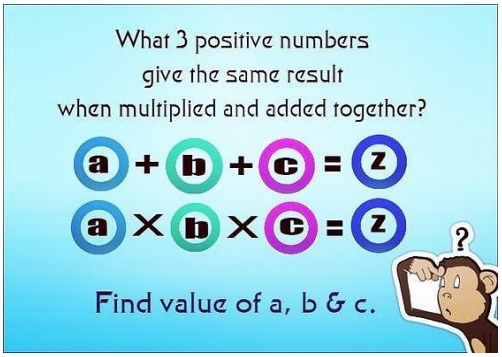
"I'm definitely not going to miss those 9am starts. I am going to miss the beautiful buildings of the University of Greenwich though."

For me, Ishmael Njie, I am going to do a masters' degree in big data science and hope to go into data analytics/statistical analysis. A big motivator for me was Noel-Ann and her Data Analytics course in the third year. I'm sure third years are going to hear a lot of VBA from Noel-Ann but honestly, learning VBA has put me on a trajectory to a possible career path and I thank her for that.

I'm definitely not going to miss those 9am starts. I am going to miss the beautiful buildings of the University of Greenwich though. It's definitely something at uni that I have not taken for granted, the aesthetics of our campus.

I wouldn't be giving great advice if I did write this to just depict sunshine and roses, there are some ups and downs but I wouldn't change my experience: it has got me to where I am today. I can't wait for my next chapter.

- Ishmael N'jie, graduated Summer 2017



Puzzle Palooza!

Puzzle Number:2

Follow us in twitter @UoG_MathSoc to find this and many more puzzles!

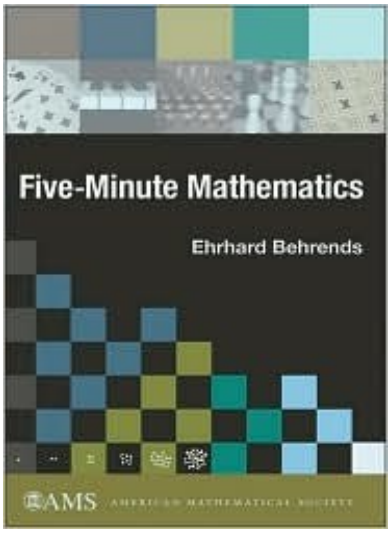
Five Minute Mathematics by Ehrhard Behrends—A Review

This book is unique in that it was not initially written with the intention to become a book. Rather, it is a collection of weekly articles taken from the mathematical column of a German broadsheet. Each chapter comprises one article, with the addition of diagrams to aid understanding.

Originating from a newspaper makes the general public the initial target audience. The style of writing and content of the book reflects this. As the name suggests, each chapter is kept brief, outlining only the basic concept of the topic it addresses. Often Behrends would make a real-world analogy to help explain an otherwise abstract concept, which made the content accessible to all ages and abilities. For this reason, I would recommend this book to anyone with even a vague interest in mathematics and at least a GCSE-level of understanding.

The purpose of the book appears to be to illustrate the huge array of mathematical topics that exist as well as their applications, in an attempt to prove to the public that mathematics is both intriguing and useful. Certainly the author has achieved this: one hundred chapters of essentially different topics! From probability to the work of notable historical mathematicians, through calculus, geometry, exponential growth, and all other conceivable topics in between, Behrends has managed to successfully outline the many different branches of mathematics. Each chapter presents a new subject, making it impossible for the reader to find any subject tiresome. The chapters are just long enough to convey the main points, but just short enough to leave you wanting to learn more. This element of the book suited me in particular; it meant that I wasn't overwhelmed with information but instead wanted to continue reading.

"It was written in such as way that it was neither too complex nor too patronising"



Publisher: American Mathematical Society

Some featured topics (e.g. probability) were already very familiar as I had covered such content before, whilst others (e.g. financial mathematics) were completely new to me. This captured my interest and provided opportunity for me to explore new areas. I also appreciated that the book didn't focus too heavily on complex mathematical principles. These rather intense chapters were broken up by more general chapters, discussing ideas such as number mysticism or the relationship between mathematics and music or magic. Such chapters provided the opportunity to think about mathematics in a different setting and I enjoyed this fresh stance. I feel that most readers would appreciate the style of writing; it was written in such as way that it was neither too complex nor too patronising. I believe it is important that educational books not only contain interesting content, but also be written in such a way that this content is enjoyable to read about. This has been achieved through a more conversational tone, even incorporating the occasional piece of humour.

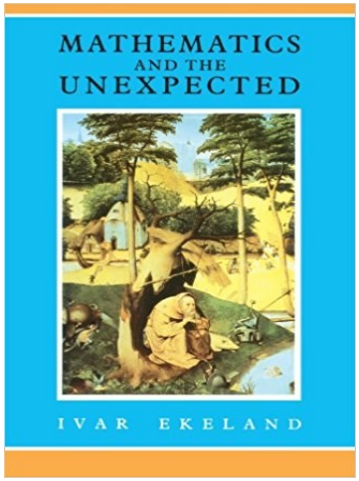
Still, any piece of work can always be improved upon. Though they were few and did not affect comprehension, there existed some grammatical errors. Being published in 2008 also makes this book a little out-of-date, as proven by this quote from Chapter 77: *"the pocket calculator...will certainly soon be built into every cell phone"* which served only to make me laugh and wonder at how far technology has progressed in the last eight years! The only real criticism I could make is that certain topics seemed to feature more than others, making those chapters feel a little repetitive. Prime numbers and probability seemed favourite topics of Behrends's, appearing in several chapters, with financial mathematics appearing in only one.

Overall, I found this book to be an enjoyable read. There was a fair amount of overlap between my studies and the topics discussed in the book. Those not relevant to my course made for interesting reading nonetheless, giving me a more rounded perspective of mathematics.

-Chloe Roebuck, MathSoc Social Media co-ordinator

Maths and the Unexpected by Ivar Ekeland—A Review

Mathematics and the Unexpected, written by Ivar Ekeland, a well known French mathematician, is a book focused on finding the answer to the unresolved question "*What is time, and how do we understand it?*" Originally written in French, with the subtitle "The Figures of Time from Kepler to Thom", this book was translated into English in 1988. Ekeland talks about great mathematicians including Isaac Newton, Henri Poincaré, Johannes Kepler, Henri Bergson and René Tom, and their contributions to mathematics, including how their mathematical discoveries have affected and influenced science and mathematics, as well as philosophy, in the modern day. Ekeland's use of pictures and diagrams help illustrate the points he makes, which allows this book to be more accessible to readers who are less mathematical and more interested in the science and philosophy side. However he provides an appendix filled with technical and mathematical methods to further a reader's knowledge should they be able mathematicians interested in the calculations and methods used in the concepts Ekeland provides.



Publisher: The University of Chicago Press.

The main concept Ekeland portrays in *Mathematics and the Unexpected* is catastrophe and chaos Theory, explaining how a small change somewhere in time can lead to much larger, dramatic and sudden changes in the future. In *Mathematics and the Unexpected*,

> **"would appeal to all readers with an interest in modern science"**

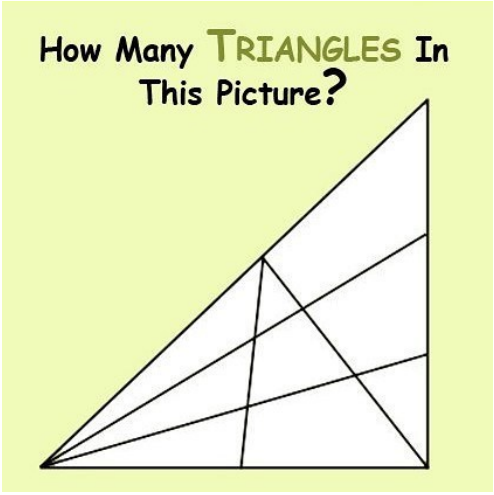
Ekeland explains catastrophe theory almost non-mathematically, referencing work from mathematicians René Thom and Christopher Zeeman from the 1960s and 1970s. Ekeland starts the book by introducing Kepler's laws, differential equations and Newton's work to do with celestial spheres and planets. He talks about how scientists believed they could pinpoint the exact location of a planet at any point, past, present or future, in its orbit, and how these calculations were impossible; how particular points could not be calculated with the mathematics and science known at those times, and how the geometry behind these calculations allowed scientists to predict general trends, however exactly accurate and particular events could not be foreseen.

In my opinion, *Mathematics and the Unexpected* is an extremely hard book to read. Whether this is to do with the translation from the original French publication of the book or not, I found the writing disjointed and almost boring. The main task of this book was to sum up the mathematics behind time, which was achieved. However, Ekeland was unable to answer the original question, and the book was more of a history lesson and a selection and explanation of other great mathematicians' work rather than his own (which is what I was expecting when I first picked up the book). I feel like some parts of the book did not relate to each other, and although the book is supposed to appeal to less mathematical readers, as a mathematics degree student I found some parts of this book very confusing to read and was not able to understand some of the concepts Ivar Ekeland was writing about. I do realise that the book was originally written in French so the sections that I found harder to read could possibly be due to translation errors. I found the first two chapters a lot more interesting and captivating than the last two and felt like Ekeland tried to explain too much for the size of the book. In retrospect, the diagrams and illustrations of the concepts were very helpful and explanatory, and I can see how this book would appeal to all readers with an interest in modern science and the mathematics behind time.

-Amber Kirton-Vaughn, Second Year Mathematics Student

Puzzle Palooza!

Puzzle Number: 3



Follow us in twitter @UoG_MathSoc to find this and many more puzzles!

What Did We All Get Up To Last Year?

Magic Evening, Monday 20th February 2017

This was just such a fabulous evening. A table was laid out for us students stacked up with soft drinks and nibbles. Additionally, one of our lecturers, Tim, was handing us nibbles as well. Yes, our department knows how to start a show! The other question is: can they *DO* a show? So rule *numero uno* for a good show "You may make it rain with some drinks and food" could be ticked off. And now rule *numero duo* "You better entertain like you have never entertained before" was hopefully also about to be ticked off. So our lecturer alias Maths Wiz Tony warmed us up with a magic card game. Our other tutors joined him for another trick. Another of our tutors, Dick, also made us think hard with a riddle. Noel-Ann, too, was part in on the act, showing us tricks with the Mobius band. Twisting, turning and sticking them together just to tear those poor pieces apart but luckily

"two of my talented fellow students presented some marvellous tricks"

unfolding them as beautiful squares, circle in square, twisted circle and so on. Not only were we entertained by our lecturers' with great tricks but it felt like they planned in some surprise magicians.

Indeed two of my talented fellow students presented some marvellous tricks. Not only were our lecturers engaged but also the students were unstoppable in showing of their magic skills. Looking back I can honestly say this was a magical evening. Let me happily tick off rule *numero duo* like it has never been ticked off before and say thank you to our great tutors and our bold volunteers.

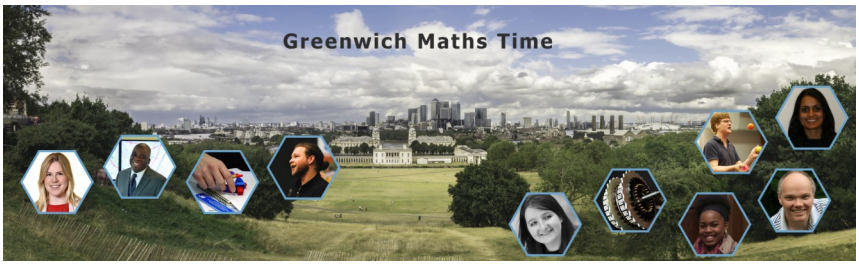
-Ruth Ejigayehu, Second Year Student

The IMA Festival of Mathematics and its Applications, 28th-29th June 2017

This two-day event saw thousands of visitors from across the country flock to the University of Greenwich. The events on offer included the opportunity for visitors to see a real-life Turing machine code a message right before their eyes as well as get their feet dirty (or not so dirty as the case may be) as they walked on custard. Other events saw Dr Nira Chamberlain pay tribute to the Black Heroes of Mathematics,

'The festival was a raging success, engaging and educating hundreds'

including the women who were responsible for successfully launching astronaut John Glenn into Orbit as well as an excitable crowd of students learning the profitability of knowing the maths in games from Rob Eastaway, and much, much more. Overall, the festival was a raging success, engaging and educating hundreds in the beauty, excitement and complex joy of mathematics.



Source: https://www.gre.ac.uk/ach/events/

A Student's Perspective

What a feast this was. James Grime with his Enigma Machine (borrowed from his friend Simon Singh), Collin Wright who juggled his way to my heart and Aoife Hunt where the stars of the first day. James showed us how with the original Enigma Machine during WWII coded and decoded secret messages. Collin surprised us with the patterns in juggling which, when broken down, are connected to the Fibonacci sequence. The presentation by Nira Chamberlain – Black Heroes of Mathematics – left me thinking why I was not holding my lecture notes in my hand and not calculating myself to the top! This gentleman was told he would not achieve his goals of becoming a mathematician and gaining a PhD. How heart-breaking is this?! Yes, then with all his positive energy and drive he reached all he dreamed of. How heart-warming is this?! I am grateful to be able to see a man who is making a huge impact in the mathematical world by *e.g* being the first black mathematician in *Who's Who* and encouraging other students to make a change.

-Ruth Ejigayehu, Second Year Student

An Original Poem

2016/17

My perspective shifted
And it came over me
A lighting of thought
A brainwave that flushes
Away former thinking
There is no destination
Here some clarification
My 2017 sensation
There is no destination
"The destination is the way"
I am already at the finish line
Everything I want
Is already mine

Ruth Ejigayehu, Second Year Student

MathSoc Committee 2016/2017

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Upcoming Events

MathSoc Event Film Screening: Hidden Figures	19th September 2017	17:00	**Stockwell Street Room 11_0003**	Mathsoc's first event of the year—don't miss out!
MathsJam	Second to last Tuesday of every month	19:00	**The Knights Templar, Chancery Lane**	Check the website www.mathsjam.com
Annual Actuarial Guest Lecture	9th October 2017	18.30-21.00	**Peston Lecture Theatre, Mile End Road**	Free, register online at eventbrite.co.uk
Mathematics: The Winton Gallery	Now Open	10.00-18.00 Everyday	**Science Museum**	Bringing 400 years of Mathematical History to life

Be sure to check out our next issue for all Puzzle Palooza answers!