topics, and it goes out of its way to motivate them in elementary terms, and to explain what benefits come from the various abstract machines it introduces. And ultimately it succeeds in exposing the workings of the BSD conjecture.

What about the claim that a beginner, with only basic calculus and algebra, and some nerve for formulas, could read this book? Can they seriously learn what a torsion point is? I think yes (although I didn't manage to test drive it). There are no proofs, but there are precise statements, and honesty about tricky points where some things are swept under the rug. There are even a few simple exercises.

The book certainly gets tougher towards the end, and the target reader would have to be determined to get through. But the authors have done a remarkable job, and even if one doesn't quite finish, there are dozens of great ideas and results and stories to read throughout the text.

It may also have a good market at a slightly more advanced level. First-year undergraduates wanting to see abstract ideas being used for concrete purposes might enjoy the style. Final-year undergraduates trying to navigate courses in elliptic curves or algebraic geometry, or to read casually in advance, might follow the ideas here as a companion to conventional lecture notes or textbooks.

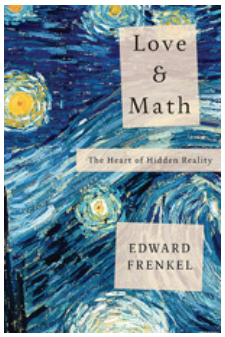
This book is a lot of fun, and easy to recommend; indeed Swinnerton-Dyer himself does just that on the dust jacket.

Gavin Brown
Loughborough University

LOVE & MATH The Heart of Hidden Reality by Edward Frenkel, Basic Books, 2013, 292 pp, £18.99, ISBN: 978-0-4650-5074-1.

This is a remarkable book. It has three; strands; firstly it is about Edward Frenkel's struggle, as a young Jew in the in the Soviet Union in the early 1980s to become a mathematician, secondly about the author's love affair with mathematics and thirdly, about explaining to the layperson some of the ideas about his research leading eventually to the Langland's programme. In the first chapter Edward tells

us that at first he found the maths he learned at school was boring, but he was fascinated by quantum physics. A professor at a local college in the small town where he lived told him that to understand quantum physics he needed to understand group theory and began teaching it to him. Then he understood what real maths was about and became hooked. He writes "the deeper I delved into maths, the more my fascination began, the more I wanted to know. This is what happens when you fall in love." He was advised to apply to Moscow State University (MGU) and then his problems began. Frenkel's father was Jewish and all sorts of obstacles were put in his way. It seems shocking that in 1984, only 30 years ago, anti-semitism was prevalent in many aspects of Soviet life, in particular at MGU. He did extremely well in his entrance exams but restrictions were put in his way. For example, he was asked in his oral exam to define a circle. He answered "a circle is the set of points in a plane equidistant from a single point. Wrong, said the examiner cheerfully. It is the set of *all* points in the plane equidistant from a given point." (This anti-Jewish discrimination is now well-documented, see for example "You failed your Math test, comrade Einstein", by M. Shifman.) Needless to say, Edward failed to get into MGU.



He was advised to attend the applied mathematics programme at the institute for oil and gas, where there was no anti-Jewish discrimination. There Mathematics was taught at a high level, but there was no really pure maths, so Edward found a sneaky way of attending seminars at MGU, and there he met many mathematicians. One of them, Dmitri Fuchs suggested he work on the problem of computing the Betti numbers of the commutator subgroup of the nth Braid group Bn. At the same time he attended the seminars of Gelfand, and worked with Boris Fegin on Kac-Moody algebras. As a result he was invited to Harvard in 1990 and later wrote his PhD thesis under Joseph Bernstein. We are now in the era of Gorbachev and Perestroika which resulted in many Russian mathematicians finding employment in the USA, many of whom Frenkel made contact with such as Vladmir Drinfeld. Chapter 15, is written in the form of a screenplay. It starts in Drinfeld's office in Harvard. Drinfeld: "so the Shimura-Taniyama-Weil conjecture gives us a link between cubic equations and modular forms, but Langlands went much further than this. He envisioned a more general relation in which the role of a modular form is played by automorphic representations of a Lie group" Edward. "What's an automorphic representation?" and so it goes on. You don't get to understand the Langlands program but you are led to believe that something exciting is going on.

While telling his story, various ideas of mathematics are introduced: symmetry groups, braid groups, Galois theory, Fermat's last theorem, (elliptic curves, modular forms and Riemann surfaces), Lie groups, Kac-Moody algebras, the Langland's programme and its connections to physics. Throughout, the essential unity of mathematics is emphasised. A crucial chapter is Chapter 9, *Rosetta Stone*. This is based on a letter Andé Weil wrote to his sister while in prison during the second world war. Here Weil tells us about the role of analogy in mathematics, in particular between number theory and geometry. The Rosetta stone tells us how to translate between, number theory, curves over finite fields and Riemann surfaces. Frenkel sees the Langlands program as being an extension of this; relating representations of Galois groups of number fields, (number theory) to automorphic functions, (harmonic analysis.)

The final chapter is *Searching for the Formula of Love*. It is about a film the author wrote with Reine Graves (the director) and in which he plays one of the two characters. This has already been reviewed in the *Newsletter* (September 2010.) In this short and rather beautiful film, inspired by the Japanese film *The Rite of love and Death* by Yukio Mishima, a mathematician tattoos a mathematical formula on the body of his lover. In the words of the author

"I wanted to show the intensity and passion involved in mathematical research. People tend to think of math as a stale, boring subject, and of mathematicians as bookworms, which couldn't be further from the truth. When you try to discover something new, something that no one has ever seen or understood before, you have to be very passionate about it, you have to be in love with it. It is a war with the unknown, a struggle unto death and the formulas you discover really get under your skin, that's how the idea of tattooing a formula came about."

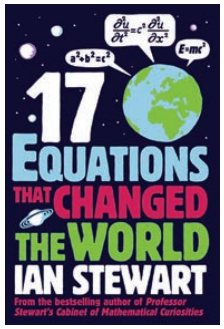
Throughout the book the author write with passion about his subject. All mathematicians should be inspired by it.

This book has a facebook page www.facebook.com/loveandmath.

David Singerman
University of Southampton

SEVENTEEN EQUATIONS THAT SAVED THE WORLD by Ian Stewart, Profile Books, 2012, pp 352, £8.99, ISBN 9781846685316

This book takes an historical tour of the most fundamental, influential and important equations in mathematics. The book ranges from pure geometry in the form of Pythagoras' theorem, to physics via relativity and Schrödinger's equation, and even the world of finance, ending with the Black-Scholes equation.



Each chapter builds on what has gone before. The chapters on thermodynamics and gravity, for example, make clear that they fundamentally rely on the previously discussed concepts of Fourier transforms and calculus. Especially for the lay reader, this helps stress that even the most abstract ideas are used in day-to-day life (albeit often indirectly). Mentioning ideas more than once also adds a feeling of continuity – rather than an endless string of facts, one thinks of a web of ideas. The further one progresses through the book the more one can place these ideas in a larger context.

Stewart does not shy away from going into details. Some of these are relegated to the appendices (I can appreciate that not every reader will want to see the formal definition of a limit), but it is nice to see them included. The majority of the details are in the main content however, and a good job is done of mixing them with examples and analogies. This allows the insightful reader to infer more than is written, whilst the content is still understandable to everyone.

There is an ongoing social commentary, especially in terms of historical context, making the equations and the mathematics more memorable. A particular highlight of this is the final chapter, which discusses the Black-Scholes equation. Great care is taken to show the very real effects that one equation can have on our world (no matter how abstract it may be). Ian Stewart points out that the current global financial problems were predicted in the mathematics community, and were contributed to by the misuse and misunderstanding of a simple mathematical equation. He takes the time to explain that whilst one can blindly use an equation and get a meaningful result, a lack of understanding and context will almost invariably lead to the result being misused.

In conclusion, this book gives a well rounded history of mathematics in a novel and interesting manner. By giving himself the broad topic of equations, Stewart has managed to present a medley of different fields and areas, yet still link them to each other and to the real world. This also limits the detail with which any one topic can be considered. Thus the book is probably best suited to mathematical enthusiasts. Such a reader will have a chance to see the beauty in mathematics that can be discovered in a short time by considering the right ideas. However, even the seasoned academic should appreciate this reminder of the breadth of his or her field.

Joe Tait
Southampton

CALENDAR OF EVENTS

This calendar lists Society meetings and other mathematical events. Further information may be obtained from the appropriate LMS *Newsletter* whose number is given in brackets. A fuller list is given on the Society's website (www.lms.ac.uk/content/calendar). Please send updates and corrections to calendar@lms.ac.uk.

NOVEMBER 2013

5 Collingwood Lecture 2013, Durham (430)
15 LMS Graduate Student Meeting, London (430)
15 LMS AGM, London (430)
16 Early Career Mathematicians' IMA Autumn Conference, University of Strathclyde, Glasgow
20 Network Coding, Partitions and Security, Durham (430)
28 Graphs, Groups and Probability Meeting, Warwick (430)
29 Integrable Systems and Quantum Geometry, Loughborough (430)
29 Noncommutative Geometry, Glasgow (430)

DECEMBER 2013

7 BSHM Christmas Meeting, Birmingham (430)
16 Interfaces between Numerical Analysis and Computational Statistics, Southampton
16 LMS South West & South Wales Regional Meeting, Swansea (430)
16-19 Categorical and Homological Methods in Hopf Algebras Workshop, Swansea (430)
17 6th Diderot Mathematical Forum 2013, Berlin, Exeter, Zagreb (430)
17-19 Combinatorial Physics Workshop, Cardiff (430)
18-20 LMS Prospects in Mathematics, Durham University (430)

JANUARY 2014

6-10 Free Boundary Problems and Related Topics, INI, Cambridge (428)
13-15 British Postgraduate Model Theory Conference, Leeds (429)
13-17 Inference for Change-point and Related Processes INI Workshop, Cambridge (428)
15 Interfaces between Numerical Analysis and Computational Statistics Meeting, Southampton (430)
17-19 Cryptography and Coding IMA Conference, St Anne's College, Oxford

FEBRUARY 2014

10-21 Higher Structures in Algebraic Analysis Winter School and Workshop, Padova, Italy (428)
24-28 Foams and Minimal Surfaces - 12 Years On, INI Cambridge (429)
28 Mary Cartwright Lecture, York

MARCH 2014

31 LMS Northern Regional Meeting, Durham (430)

APRIL 2014

1-5 Ischia Group Theory 2014, Naples, Italy (428)
7-10 British Mathematical Colloquium, Queen Mary, University of London (430)

JULY 2014

13-15 Modelling in Industrial Maintenance and Reliability IMA Conference, St Catherine's College, Oxford

AUGUST 2014

13-21 ICM 2014, Seoul, Republic of Korea (427)
17-19 Mathematical Cultures Conference, De Morgan House, London (417)

SEPTEMBER 2014

3-5 International Workshop on Operator Theory, Queen's University Belfast