

## Incredible Numbers

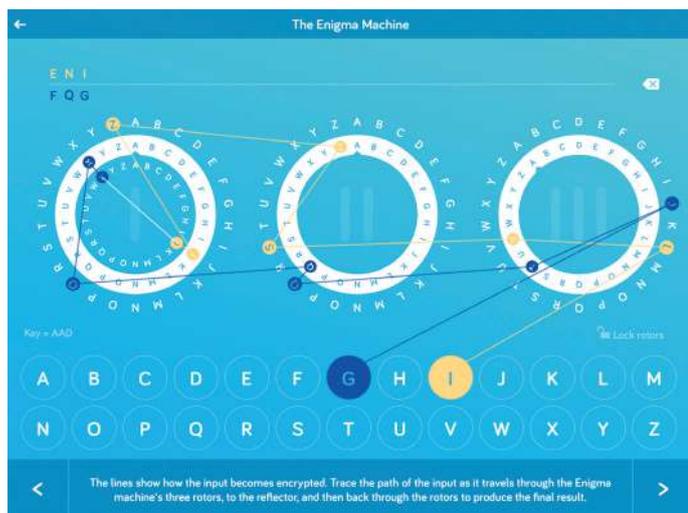
The app by Ian Stewart

TOUCH PRESS, IPAD ONLY (REQUIRES iOS 7.0 OR LATER)  
PRICE £6.99, <http://bit.ly/1jxTrkS>

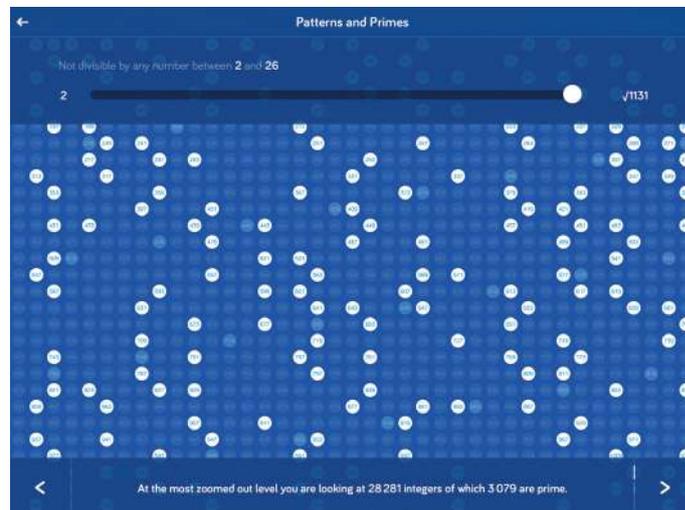
**Incredible Numbers is divided** into eight areas of mathematics, each of which covers a different topic and contains around three short articles. The articles include interactive sliders to punctuate the text, accompanied by one main interactive demonstration gadget, depending on the topic. The eight areas are **Primes**, **Secret Codes**, **Infinity**, **Factorials**, **Nature**, **Music**,  **$\pi$** , and **Polygons**.

At no point whilst I was using this app did it feel in any way like reading a textbook, as you get engrossed in beautiful demonstrations (that have a sharp and crisp appeal) at the same time as also helping you appreciate the great diversity of the subject. It is a technologically advanced book with pencil, paper, calculator and computer included. The app makes good use of the iPad control system, with sliders and the ability to pinch-zoom images.

The app allows you to be able to draw and play your own sound waves; see how patterns occur in nature, such as a beautiful sunflower seed arranger allowing you to specify the angle and visually show the Golden Ratio; creating your own Enigma secret code;



sliders that allow interactive approximations to  $\pi$  including a set of one million digits from which you can search for your own birth date in  $\pi$ ; approximations to 'Infinity' where you can start to explore infinity; pinch-zooms that allow you to look for patterns in Primes. Ian Stewart's app also has a section involving 'Polygons' which is designed to help the reader think about numbers as different shapes. In this section, which was one of my own personal favourites on the app, you study classical geometry and its links to pattern and structure.



The app also includes a selection of mathematics puzzles. I was slightly disappointed with some of these puzzles as they were not as interactive as the rest of the product. For an app such as this it would have been nice if all aspects of the product had some 'touch and zoom' feel. Whilst saying this about some areas of the app, the interactivity and bright, clean appearance of the vast majority of it captures the imagination and gives the user a sense that they themselves are bringing mathematics to life, guided by the expert commentary from Ian Stewart. It is an excellent app that enables you to get 'hands on' with mathematics and experiment with concepts as they are explained. It's a mathematical journey in the company of an expert.

Whilst designed for a general audience, *Incredible Numbers* could be used as an enrichment tool in school for Higher GCSE and A-level mathematics students, who would enjoy using the app to explore the subject in greater depth.

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## Enigmaths 152: All the digits by ZAG – Solution

1 2	2 8	3 7	4 3
5 5	6 7	6 6	9 9
7 3	8 5	0 0	9 4
10 4	2 2	11 1	2 2