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Reviews

## 'The Math Chat Book'

reviewed by John Barrow



## The Math Chat Book

by Frank Morgan

Reviewed by John Barrow (Director of the Millennium Mathematics Project)

### All the maths that's fit to print

"Math Chat" began as a live phone-in TV show in the USA, spawned a newspaper column and a website, and now it has produced a book. The whole project was the brainchild of Williams' College mathematician Frank Morgan and has both stimulated interest in maths across a broad range of the community and led to the formation of highly successful undergraduate research groups in mathematics (see Morgan's homepage at <http://www.williams.edu/Mathematics> for more details about all these programmes.).

This is the book of the film, as it were. It is a short and fast-moving trip through some of the most interesting problems and solutions to puzzles posed on the Math Chat show or phoned in by viewers. My favourite was the chapter devoted to the two-dimensional version of the soap bubble problem which challenges us to find the shapes which enclose a given area using the shortest boundary. In fact, the general solution is two overlapping circles that cut at 120 degrees – an analogue of the famous soap bubble problem. Remarkably, this solution was only found in 1993 by a group of undergraduates working in the Math Chat research programme. Subsequently, some of them went on to solve much harder problems in three dimensions.

Each chapter is a short episode of no more than four pages which is guaranteed to have you soon reaching for pencil and paper to solve a problem. Here are a few of the chapter lead-in problems to give you a taste for the

## 'The Math Chat Book'

eclectic style:

- Suppose every couple keeps having children until they have a girl and then stops. Assuming boys and girls are equally likely, will this produce more baby boys or more baby girls in the whole population?
- John lives in an Atlantic coast state of the USA and Mary lives in a Pacific coast state. When talking on the telephone, they realised it was the same time in both locations. How could this have been possible?
- What is the shortest road network connecting the four corners of a unit square (using straight lines)?
- Take a bottle of milk with cream risen to the narrow tapered neck at the top of the bottle. Shake up the bottle so as to mix up the cream with the milk. Is the pressure on the bottom of the bottle more, less, or the same after mixing?
- What 5 coin values would ensure that you never needed more than 5 coins to make up any value of cents (or pence) from 1 to 99? (Note that in the USA there are currently 1, 5, 10, 25, and 50 cent coins so currently you would need 8 coins to make every number up to 99 cents – for example  $99 = 1 \times 50 + 1 \times 25 + 2 \times 10 + 4 \times 1$ .)

This is an engaging little book which should inspire school and college students to have a go at challenging puzzles that soon lead to unsolved problems. You could even phone the TV show.

### **Book details:**

*The Math Chat Book*

Frank Morgan

paperback – 111 pages (2000)

The Mathematical Association of America

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