

# Maths monopolises the board!



Mathematics and applied mathematics are used in everyday life. Stock markets, mobile phones, car manufacturing, Google, Hollywood special effects, digital TV and satellites all use cutting-edge mathematics tools in their basic functions. The Mathematical Modelling Series presents a number of applications of mathematics in domains as varied as the human body, volcanology, telecommunications or finance.

## Can maths win at monopoly?

Every Christmas my family and I play a vicious game of monopoly. Every time I play I find myself asking questions like:

- Will my sister land on Ailesbury Road next turn? Will it be worth my while to build a hotel there?
- Should I pay a fine or take a chance?
- How much should I offer my brother for Crumlin?

Now, the mathematics used to power Google can help me to answer these questions.

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## How it works

To a mathematician a monopoly board can be thought of as a matrix of probabilities describing the chances that a player on one square, say Crumlin, will end up on another square, for

instance Go. These probabilities are governed by the roll of the dice, and the community chest and chance cards. From this matrix the probabilities of landing on each square can be calculated. The illustration gives the 10 squares players are most likely to land on. (Google ranks webpages based on probabilities calculated from a giant matrix describing every web page on the Internet.) Once I know these probabilities, I can calculate how much I will make from owning Crumlin and thus how much I should offer my brother to buy it off him. These are exactly the same calculations a stockbroker makes when trying to decide what portfolio of stocks to invest in.

## Conclusion

There is about half an hour's worth of playing time to go before the end of the game. If I build hotels on Kimmage and Crumlin I will make about €460 before the end of the game. I should offer my brother slightly less than half of this to buy Crumlin from him.

## Parts of the curriculum used in this project

- Matrices
- Sequences and series
- Probabilities
- Statistics
- Linear equations

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If you want more information about MACSI and this project:

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