



© 1997–2009, Millennium Mathematics Project, University of Cambridge.

Permission is granted to print and copy this page on paper for non–commercial use. For other uses, including electronic redistribution, please contact us.

November 2004

Regulars



Puzzle page

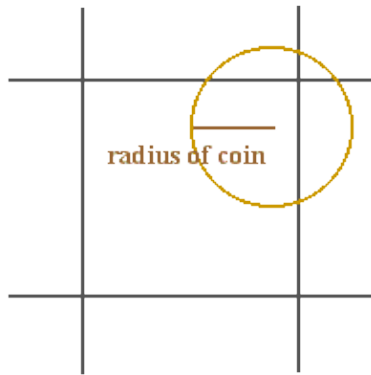


High roller

What is the probability, if you roll a coin across a chessboard and it comes to rest on the board, that it covers some corner of one of the grid squares?

(You can assume that the diameter of the coin is less than the sidelength of a single square on the chessboard.)

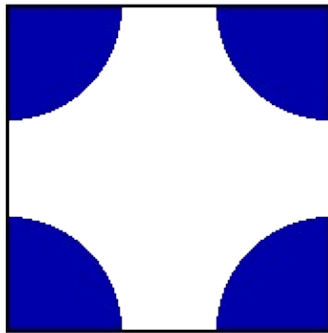
The solution



Suppose you randomly roll a coin (with radius r) across a chessboard (with squares with sidelength s) many times. What proportion of the time will it land covering a corner of one of the squares?

To cover a corner, the coin's centre must be less than the length of its radius away from the corner.

a single square of the chess board



the shaded regions
have joint area
equal to the area
of the whole coin

As the coin is equally likely to land with its centre in any position in the square, the probability it will land with its centre in the shaded region and hence cover a corner is the ratio of the coin's area to the area of a square on the board: $\pi r^2/s^2$, where r is the radius of the coin and s is the sidelength of a square of the chessboard.

[Back to main puzzle page](#)



Plus is part of the family of activities in the Millennium Mathematics Project, which also includes the [NRICH](#) and [MOTIVATE](#) sites.