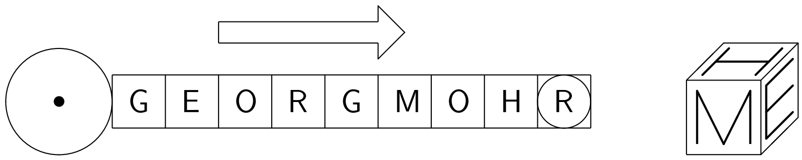
THE GEORG MOHR COMPETITION IN MATHEMATICS 2001

Thursday 11 January 2001, 9.00–13.00

Tools for writing and drawing are the only ones allowed.

Problem 1. For the GEORG MOHR game one uses a playing piece, a GEORG MOHR die (i.e. a die whose six sides show the letters G, E, O, R, M and H) and a board:



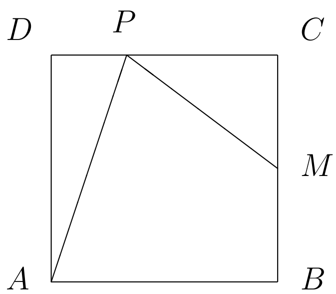
start square with the piece end square die

In every throw one moves to the next square with the letter shown by the die; if this is impossible one must stay.

Peter plays the GEORG MOHR game. Determine the probability of Peter completing the game in 2 throws.

Problem 2. Does such a positive integer n exist that the number $n!$ has exactly 11 zeros at the end? (The symbol $n!$ denotes the number $1 \cdot 2 \cdot 3 \cdot \cdots \cdot (n-1) \cdot n$.)

Problem 3. In the square $ABCD$ of side length 2 the point M is the mid-point of BC and P a point on DC. Determine the smallest value of $AP + PM$.



Problem 4. Show that any number of the form

$$4444....44 - 88..8$$

with twice as many digits 4 than digits 8 is a perfect square.

Problem 5. Is it possible to place within a square an equilateral triangle whose area is larger than $\frac{9}{20}$ of the area of the square?

Sponsors: Matematiklærerforeningen, Dansk Matematisk Forening, Georg Mohr Fonden, UNI·C, Gyldendal.