

Dutch Mathematical Olympiad 1996
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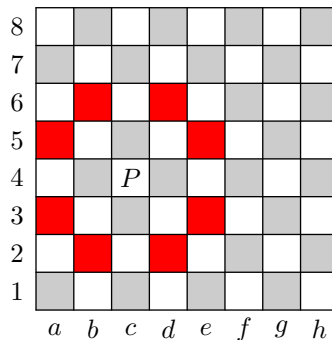
by parmenides51

- 1 How many different (non similar) triangles are there whose angles have an integer number of degrees?

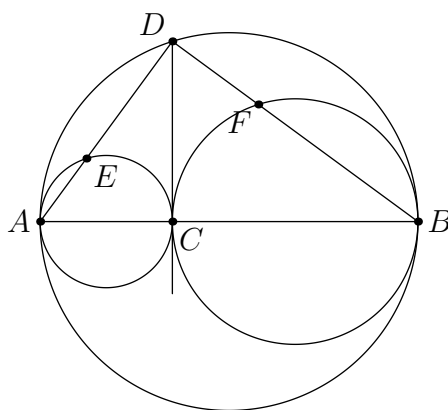
- 2 Investigate whether for two positive integers m and n the numbers $m^2 + n$ and $n^2 + m$ can be both squares of integers.

- 3 What is the largest number of horses that you can put on a chessboard without there being two horses that can beat each other?
 - a. Describe an arrangement with that maximum number.
 - b. Prove that a larger number is not possible.

(A chessboard consists of 8×8 spaces and a horse jumps from one field to another field according to the line "two squares vertically and one squared horizontally" or "one square vertically and two squares horizontally")



- 4 A line l intersects the segment AB perpendicular to C . Three circles are drawn successively with AB , AC and BC as the diameter. The largest circle intersects l in D . The segments DA and DB still intersect the two smaller circles in E and F .
 - a. Prove that quadrilateral $CFDE$ is a rectangle.
 - b. Prove that the line through E and F touches the circles with diameters AC and BC in E and F .



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- 5** For the positive integers x, y and z apply $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$.
Prove that if the three numbers x, y , and z have no common divisor greater than 1, $x + y$ is the square of an integer.
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