

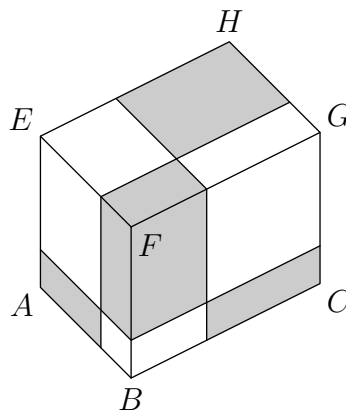
Dutch Mathematical Olympiad 2001
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by parmenides51

- 1 In a tournament, every team plays exactly once against every other team. One won match earns 3 points for the winner and 0 for the loser. With a draw both teams receive 1 point each. At the end of the tournament it appears that all teams together have achieved 15 points. The last team on the final list scored exactly 1 point. The second to last team has not lost a match.
 - a) How many teams participated in the tournament?
 - b) How many points did the team score in second place in the final ranking?

- 2 The function f has the following properties : $f(x + y) = f(x) + f(y) + xy$ for all real x and y
 $f(4) = 10$
 Calculate $f(2001)$.

- 3 A wooden beam $EFGH ABCD$ is with three cuts in 8 smaller ones sawn beams. Each cut is parallel to one of the three pair of opposite sides. Each pair of saw cuts is shown perpendicular to each other. The smaller bars at the corners A, C, F and H have a capacity of 9, 12, 8, 24 respectively. (The proportions in the picture are not correct!!). Calculate content of the entire bar.



- 4 The function is given $f(x) = \frac{2x^3 - 6x^2 + 13x + 10}{2x^2 - 9x}$.
 Determine all positive integers x for which $f(x)$ is an integer

- 5 If you take a subset of 4002 numbers from the whole numbers 1 to 6003, then there is always a subset of 2001 numbers within that subset with the following property:
 If you order the 2001 numbers from small to large, the numbers are alternately even and odd (or

odd and even).
Prove this.
