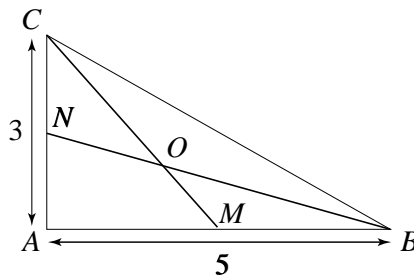**2002**

MATHEMATICS COMPETITION
CIPHERING ROUND

UNIVERSITY OF GEORGIA
OCTOBER 26, 2002

Problem 1. Find the number of odd positive integral divisors of 120.

Problem 2. Find the minimal value of $f(x) = |x - 2| + |x - 3| + |x - 6|$.

Problem 3. In right triangle ABC, angle A is $90º$, $AB = 5$, and $AC = 3$. Let BN and CM be medians, intersecting at point O. Find the area of $AMON$.


Problem 4. Valery throws two regular dice labelled with the numbers from 1 to 6. What is the probability that the sum of the two values is divisible by 3?

Problem 5. In a rectangular prism the lengths of three face diagonals are 5, 6, and 7. Find the distance from one corner to the farthest opposite corner.
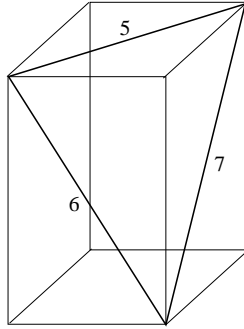
Problem 6. Find the last 4 digits of 401^5.

Problem 7. A circle of radius 1 rolls on the outside around a circle of radius 4. How many full revolutions does the little circle make as it goes around the big circle once?
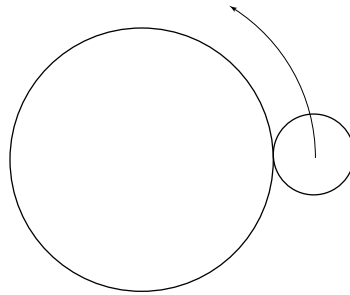
Problem 8. Find the number of spatial diagonals in a regular icosahedron (the regular solid with 20 triangular faces). A spatial diagonal connects two distinct vertices not lying on one face.
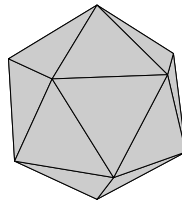
Problem 9. Find the maximum value of $4\sin x - 3\cos x$.

Problem 10. Find the number of zeroes at the end of

$$101 \cdot 102 \cdot 103 \cdot \ldots \cdot 499 \cdot 500 \ .$$