



CYPRUS MATHEMATICAL SOCIETY
REGIONAL COMPETITION

NOVEMBER 2017

GYMNASIUM C'

Date: 11/11/2017

Time: 10:00 -12:00

INSTRUCTIONS

1. Solve all the problems by giving full answers.
2. Each problem is marked with 10 points.
3. Write with blue or black ink (Shapes can be drawn with pencil).
4. The use of corrective liquid (Tip-Ex) is not allowed.
5. The use of a calculator is not allowed.

PROBLEMS

Problem 1

Calculate the expression $B = A - \frac{1}{2}$, if

$$A = \frac{1}{7^{-2017} + 1} + \frac{1}{7^{-2016} + 1} + \dots + \frac{1}{7^0 + 1} + \dots + \frac{1}{7^{2016} + 1} + \frac{1}{7^{2017} + 1}$$

Problem 2

If $(2^{2^5} + 1)(2^{2^4} + 1)(2^{2^3} + 1)(2^{2^2} + 1)(2^{2^1} + 1)(2^{2^0} + 1)(2^{2^0} - 1) = a^a - 1$, compute a .

Problem 3

Three friends, Aris, Hermes and Athena took part in a 100 questions Mathematical quiz competition. Aris and Athena solved correctly 55 questions each and Hermes solved correctly 70 questions. At the end of the contest, a quiz's question was considered difficult if it was only solved by a student and easy if was solved by all three. Find out how many are the difficult questions than the easy questions.

Problem 4

In the following figure E and Z are points on the sides of the square $AB\Gamma\Delta$, M is the intersection point of AE and BZ , K is the intersection point of AZ and ΔE and Λ is the intersection point of BZ and ΔE . The quadrilateral $AK\Lambda M$ has an area of 26 cm^2 and the triangles BEM and ΔKZ have area 10 cm^2 and 5 cm^2 respectively. Calculate the area of the quadrilateral $\Gamma E\Lambda Z$.



