



CYPRUS MATHEMATICAL SOCIETY
NATIONAL COMPETITION
DECEMBER 2017

GYMNASIUM A'

Date: 02/12/2017

Time: 09:30 -12:30

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

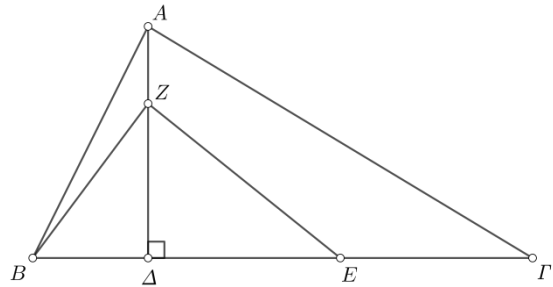
Problem 1

Each of two friends, A and B , has a calculator and starts doing operations at the same time. A starts from number 100 and adds 3 at each step, while B starts from number 2018 and subtracts 4 at each step. After ν steps, the two friends end up with the same result.

- (α) Find the value of ν .
(β) What is the common result that the two friends end up with?

Problem 2

In the adjacent figure a triangle $AB\Gamma$ is given. $A\Delta$ is a height of the triangle $AB\Gamma$, E is the midpoint of $\Delta\Gamma$ and Z is a point on $A\Delta$, such that the length of ΔZ is twice the length of AZ . If the area of the triangle ABZ is 5 cm^2 and the area of the quadrilateral $A\Gamma EZ$ is 30 cm^2 , calculate the area of the triangle BEZ .



Problem 3

Three jars, A , B and Γ , contain a mixture of water and acid. Jar A contains 400 ml mixture with 45% conciseness in acid. Jar B contains 500 ml mixture with 48% conciseness in acid. Jar Γ contains 100 ml with unknown conciseness in acid. We empty the entire quantity of the mixture contained in jar Γ in the first two jars, so that both now have mixture with 50% conciseness in acid. Calculate the quantity (in ml) of the mixture that we added in jar A .

Problem 4

Find all natural numbers which are smaller than 2017 and the remainders of their division by the numbers 7,8 and 9 are 6,7 and 8, respectively.