



CYPRUS MATHEMATICAL SOCIETY  
REGIONAL COMPETITION

NOVEMBER 2017

GYMNASIUM B'

Date: 11/11/2017

Time: 10:00 -12:00

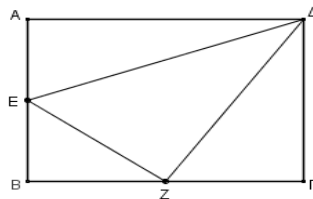
**INSTRUCTIONS**

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**

In the figure below the  $AB\Gamma\Delta$  is rectangular.  $Z$  is the midpoint of  $B\Gamma$  and  $E$  is the midpoint of  $AB$ . If the side  $B\Gamma$  is 16cm long and the  $EZ$  is 10cm long, find the area of the triangle  $\Delta EZ$ .



**Problem 2**

Andreas, Vasilis, Kostas, Depoina and Eleni share a bottle of orange juice. Andreas takes the bottle first, and as she pours juice into his glass, she spills 10ml. When his glass and the bottle have the same amount of juice, she passes the bottle to the next person. Similarly, Vasilis, Kostas, Despoina, and Eleni each spill 10ml of juice as they pour their own servings, and each stops pouring when their glass and the bottle have the same amount of juice. If each person pours his or her own glass of juice in turn and there is 10ml of juice remaining in the bottle after each person has had a turn, how many ml of juice were in the bottle originally?

**Problem 3**

The floor of a room is rectangular with dimensions of 6,30m and 4,05m. We want to cover it with square tiles all equal to each other with  $a$  cm side, which  $a$  is a natural number. What is the smallest number of tiles that can be placed on the floor of the room?

**Problem 4**

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

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