



CYPRUS MATHEMATICAL SOCIETY
A' SELECTION COMPETITION IMC (Key Stage II)
MARCH 2018

Date: 7/03/2018

Time: 15:45 -17:45

Instructions:

1. Solve all of the problems. In problems **1 and 2** you should **show your work fully**. In problems **3, 4, 5 and 6** you should **write only the answer**.
2. Write with blue or black ink. (You may use pencil for the figures)
3. Do not use corrector liquid (Tipp-ex).
4. Do not use calculators.

Solve problems 1 and 2, **showing your work fully**. Each problem is **10 points**.

Problem 1

α) Calculate the value of:

$$\left(\frac{1}{3} - \frac{1}{4}\right) \times \left(\frac{1}{5} + 7\right) + \left(\frac{1}{3} - \frac{1}{6}\right) \div \frac{1}{24} + 6 =$$

b) If x and y are the solutions of the equations:

$$\frac{2}{3} = \frac{8}{x} \quad \text{and} \quad \frac{3y-15}{12} = 0$$

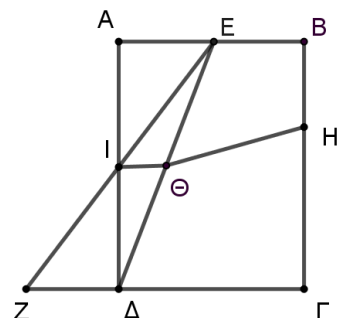
calculate the value of:

$$A = 3x - y^2 + (x+y)(x-y) - (x-2y)^2$$

Problem 2

In the following figure, $AB\Gamma\Delta$ is a rectangle. It is given that $AB = 8\text{cm}$, $B\Gamma = 12\text{cm}$, $BH = 4\text{cm}$, I is the midpoint of $A\Delta$ and ZE and E and Θ are the midpoints of AB and $E\Delta$ respectively.

- (a) Calculate the area of triangle $I\Theta\Delta$.
- (b) Calculate the area of triangle $EZ\Delta$.
- (c) Prove that $(Z\Delta) = 2(I\Theta)$.
- (d) Calculate the area of the quadrilateral $EBH\Theta$.



Solve problems 3, 4, 5 and 6 **giving only the final answer**.
Each problem is **5 points**.

Problem 3

In a 50-question test, each correct answer is marked with 2 points, while for each wrong answer 1 point is deducted. If a question is not answered at all, it is marked with zero points. The number of correct answers of Kostas in this test was four times as much as the number of his wrong answers. If Kostas got 56 points in the test determine how many questions were not answered by Kostas.

Problem 4

Five friends, Andreas, Voula, Giorgos, Dimitra and Eleni, sit clockwise around a round table to play a game. In order to decide who will play first, they count backwards starting from the current year, i.e. 2018. Whoever first gets to 1, will play first. Thus Andreas begins with 2018, then Voula continues with 2017, and so on.

(a) Find out which of them will play first.

(b) Under the same terms of the game, which is the first year after 2018, for which Andreas would play first?

Problem 5

The number $7a38b541c2$, where a, b, c are digits, is a multiple of 396. Determine the maximum possible value of $a + b + c$.

Problem 6

The majority of the 30 students in a class, bought pencils at the school bookstore. Each of these students bought the same number of pencils, and this number was greater than 1. The cost of each pencil in cents was greater than the number of pencils each student bought. The total cost of the pencils was €32,89. Find how many pencils the students have bought in total.