CONCURSUL NAȚIONAL DE MATEMATICĂ APLICATĂ
„ADOLF HAIMOVICI”
Etapa locală – 28 februarie 2015
clasa a IX– a
Filiera teoretică - Profil uman - Specializarea Filologie, Ştiinţe Sociale

BAREM DE EVALUARE

1. $x \neq 0$, $x \neq 1$

Substituția $\left(\frac{x}{x+1}\right)^2 = t$, $t + \frac{1}{t} = \frac{17}{4}$ 3p

$4t^2 - 17t + 4 = 0$, $t_1 = 4$, $t_2 = \frac{1}{4}$ ....

1p

$\frac{x}{x+1} = \pm 2$, $\frac{x}{x+1} = \pm \frac{1}{2}$.

Scrierea rădăcinilor ecuației $-2, -\frac{2}{3}, -\frac{1}{3}, 1$ 3p

2.

a) $S_1 = b_1 = 2(5-1) = 8 \Rightarrow b_1 = 8$

……………………………………………………….1p

$S_2 = b_1 + b_2 = 2 \cdot 24 = 48 \Rightarrow b_2 = 40$

……………………………………………………… 1p

$S_3 = b_1 + b_2 + b_3 = 2 \cdot 124 = 248 \Rightarrow b_3 =$ 200……………………………………………1p

$S_4 = b_1 + b_2 + b_3 + b_4 = 1248 \Rightarrow b_4 = 1000$

……………………………………………..1p

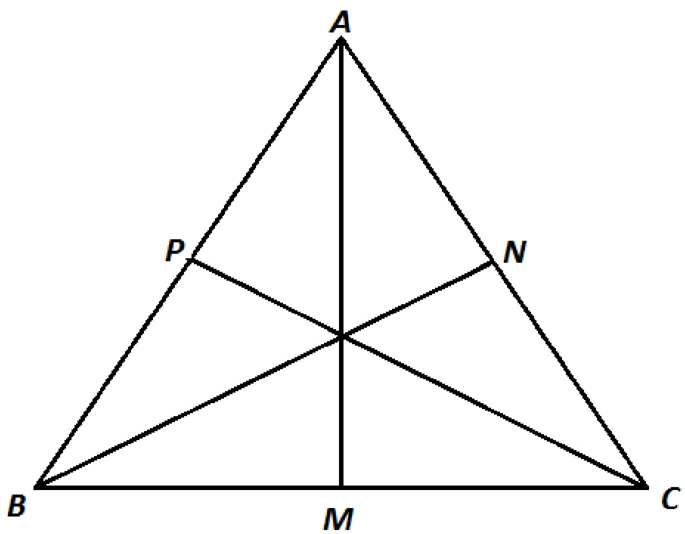
b) $q = \frac{b_2}{b_1} = \frac{40}{8} = 5$, $q = \frac{b_3}{b_2} = \frac{b_4}{b_3} = 5$

……………………………………………………….2p

$S_5 = \frac{1-q^5}{1-q} \cdot b_1 = 6248$

………………………………………………………………………………1p

3.



a) Regula triunghiului în ΔABC și ΔAMC

$\overrightarrow{AM}= \overrightarrow{AB}+ \overrightarrow{BM}$

, din cele două => 2AM= $\overrightarrow{AB}+ \overrightarrow{AC}+ \overrightarrow{BM}+ \overrightarrow{CM}$, dar $\overrightarrow{BM} + \overrightarrow{CM} = 0$

$\overrightarrow{AM}= \overrightarrow{AC}+ \overrightarrow{CM}$

.................3p

$2\,\overrightarrow{AM} = \overrightarrow{AB} + \overrightarrow{AC}$ => $\overrightarrow{AM}= \frac{1}{2}\,(\overrightarrow{AB} + \overrightarrow{AC})$

....1p

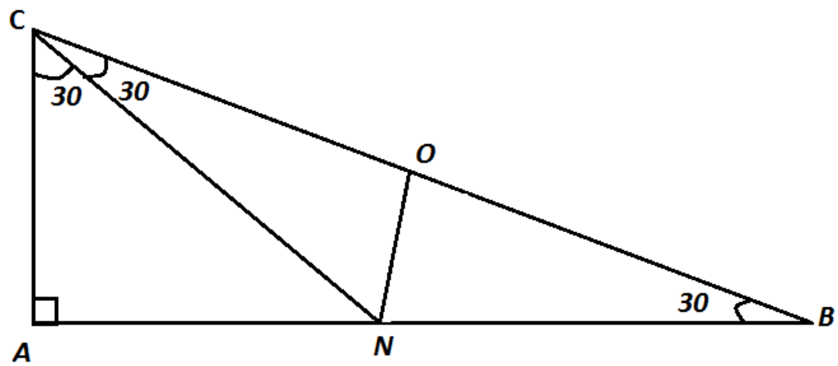
b) $\overrightarrow{AM} = \frac{1}{2}\,(\overrightarrow{AB} + \overrightarrow{AC})$

$\overrightarrow{BN}= \frac{1}{2}(\overrightarrow{BC}+ \overrightarrow{BA})$

$\overrightarrow{CP}= \frac{1}{2}(\overrightarrow{CB}+ \overrightarrow{CA})$ 2p

$\overrightarrow{AM}+ \overrightarrow{BN}+ \overrightarrow{CP}= \frac{1}{2}(\overrightarrow{AB}+ \overrightarrow{BA}+ \overrightarrow{AC}+ \overrightarrow{CA}+ \overrightarrow{BC}+ \overrightarrow{CB})= \frac{1}{2}\,\vec{0}= \vec{0}$..................1P

4.



CN- bisectoare => ΔCNB- isoscel=> ON- mediană, înălțime => m$\left(\widehat{CON}\right) = 90°$... 2p

ΔCON $\equiv \Delta CAN$

, din cele doua => $\Delta CON \equiv \Delta CAN \equiv \Delta BON$

Dar $\Delta CON \equiv \Delta BON$

....2p

b) $\Delta BON \sim \Delta BAC$ => $\frac{ON}{AC}=\frac{OB}{AB}$..2p

dar OB = AC => ON= $\frac{AC \cdot AC}{AB}=\frac{AC^2}{AB}$...1p