

Concursul județean de matematică  
**”Sorin Simion”**  
 clasa a VI-a  
 6 aprilie 2019  
**Barem**

**Subiectul 1**

a)

$a = 6 \cdot 27^n + 17 \cdot 4^n$	1p
$a = 6(23 + 4)^n + 17 \cdot 4^n$	1p
$a = 6(M_{23} + 4^n) + 17 \cdot 4^n$	
$a = M_{23} + 4^n \cdot 23$	1p

b) i.

$S(A) = 2019^0 + 2019^1 + \dots + 2019^{2019}$	
$S(A) = (2019^0 + 2019^1) + (2019^2 + 2019^3) + \dots + (2019^{2018} + 2019^{2019})$	1p
$S(A) = 2020(1 + 2019^2 + \dots + 2019^{2018}) : 101$	1p

b) ii.

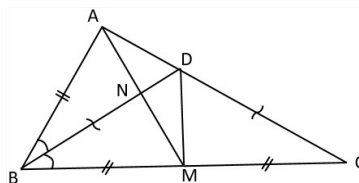
$2019 = 3 \cdot 673$	$\Rightarrow k : 6$	1p
$2019^k$ este pătrat perfect și cub perfect		
$k \in \{0, 6, 12, \dots, 2016\} \Rightarrow 337$ numere		1p

**Subiectul 2**

$\frac{a+2019}{2a+2019} \leq 1 \Rightarrow \frac{b^2+2019}{2b+2019} \leq 1 \Rightarrow b^2 \leq 2b \Rightarrow b \in \{0, 1, 2\}$	1p
Dacă $b = 0 \Rightarrow \frac{a+2019}{2a+2019} = 1 \Rightarrow a = 2a \Rightarrow a = 0$	
$\Rightarrow \frac{c^2-5a}{c^2-4b} = 1 \Rightarrow \frac{c^2}{c^2} = 1, c \in \mathbb{N}^*$	2p
Dacă $b = 1 \Rightarrow \frac{a+2019}{2a+2019} = \frac{2020}{2021} \Rightarrow a = 1$	
$\Rightarrow \frac{c^2-5a}{c^2-4b} = \frac{2020}{2021} \Rightarrow \frac{c^2-5}{c^2-4} = \frac{2020}{2021}$	
$\Rightarrow 2021 \cdot c^2 - 10105 = 2020 \cdot c^2 - 8080 \Rightarrow c^2 = 2025 \Rightarrow c = 45$	2p

Dacă $b = 2 \Rightarrow \frac{a+2019}{2a+2019} = \frac{2023}{2023} = 1 \Rightarrow a = 0$	
$\Rightarrow \frac{c^2-0}{c^2-8} = 1$ (nu convine)	2p

### Subiectul 3



a)

$\triangle ABN \equiv \triangle MBN$ (L.U.L.) $\Rightarrow$ $\Rightarrow [NA] = [NC] \Rightarrow N$ mijlocul lui $[AM]$	2p
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b)

$BA = BM, NA = NM \Rightarrow BD$ mediatoarea segmentului $[AM]$ $D \in BD \Rightarrow DA = DM \Rightarrow \triangle DAM$ isoscel	2p
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c)

$DM$ mediatoarea $[BC] \Rightarrow DM \perp BC \Rightarrow m(\widehat{MND}) = 90^0$ $\triangle ABD \equiv \triangle MBD$ (L.U.L.) $\Rightarrow m(\widehat{BAD}) = m(\widehat{BMD}) = 90^0$	3p
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