

## BAREM OLIMPIADA LOCALA

Cls a V-a 11.02 .2023

### Subiectul 1.

a) 4p

$$a = 2024 + 2 \cdot (1 + 2 + 3 + \dots + 2023)$$

$$a = 2024 + 2 \cdot \frac{2023 \cdot 2024}{2}$$

$$a = 2024 + 2023 \cdot 2024$$

$$a = 2024 \cdot (1 + 2023)$$

$$a = 2024^2$$

.....3p

$$a = (2023 + 1)^2$$

$$a = M_{2023} + 1^2$$

$a = M_{2023} + 1$  atunci restul impartirii lui  $a$  la 2023 este 1.

.....1p

b) 3p

Fie cele 2023 numere naturale consecutive:

$$x, x+1, x+2, \dots, x+2022.$$

$$2023^2 = x + x+1 + x+2 + \dots + x + 2022$$

.....1p

$$2023^2 = 2023x + \frac{2022 \cdot 2023}{2}$$

.....1p

$$2023^2 = 2023x + 1011 \cdot 2023 \quad :2023$$

$$2023 = x + 1011 \text{ atunci } x = 1012$$

Cele 2023 nr. naturale consecutive sunt :  
1012 , 1013 , 1014,.....,3034

.....1p

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### Subiectul 2.

a)4p

$$n=[3^{16} \cdot 3^{14} + (5^2)^{25} : 5^6 - 7^{32}] : [(3^2)^{15} + 5^{44} - (7^{16})^2]$$

$$n=(3^{30} + 5^{50} : 5^6 - 7^{32}) : (3^{30} + 5^{44} - 7^{32})$$

$$n=(3^{30} + 5^{44} - 7^{32}) : (3^{30} + 5^{44} - 7^{32})$$

$n=1$  atunci  $n=1^2$  este patrat perfect.

b)3p

$$8^{48} : 2^{-4^{71}} : 4 =$$

$$(2^3)^{48} : 2 - (2^2)^{71} : 2^2 =$$

$$2^{144} : 2 - 2^{142} : 2^2 =$$

$$2^{143} - 2^{140} =$$

$$2^{140} \cdot (2^3 - 1) =$$

$$2^{140} \cdot 7 =$$

$$2^{139} \cdot 2 \cdot 7 =$$

$2^{139} \cdot 14$  se imparte exact la 14.

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### Subiectul 3.

$$x+x+1+x+2+x+3+x+4=460$$

$$5x+10=460$$

$$5x=450 \text{ atunci } x=90; x+1=91; x+2=92; x+3=93; x+4=94$$

.....2p

**Cazul I.** Daca primul copil da celorlalti :I :90+16 =106; II:91-4=87;III:92-4=88  
IV :93 -4=89; V:94-4=90.

.....1p

**Cazul II.** Daca al doilea copil da celorlalti: I:90-4=86;II 91+16=107;III 92-4=88  
IV 93-4=89; V 94-4=90.

.....1p

**Cazul III.** Daca al treilea copil da celorlalti:I 90-4=86;II 91-4=87 III 92+16=108  
IV 93-4=89; V 94-4=90.

.....1p

**Cazul IV.** Daca al patrulea copil da celorlalti:I 90-4=86;II 91-4=87 III 92-4=88  
IV 93+16=109; V 94-4=90.

.....1p

**Cazul V.** Daca al cincilea copil da celorlalti:I 90-4=86;II 91-4=87 III 92-4=88;  
IV 93-4=89; V 94+16=110.

.....1p

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### Subiectul 4.

$$D=I.C+R, R<I$$

$$\overline{abc} = \overline{bc} \cdot 3 + 50, 50 < \overline{bc}$$

.....1p

$$100a+10b+c=(10b+c) \cdot 3 + 50, \quad \overline{bc} > 50$$

$$100a+10b+c=30b+3c+50$$

$$100a=20b+2c+50$$

$$50a=10b+c+25$$

.....2p

$$50a-25=\overline{bc}$$

$$25(2a-1)=\overline{bc}$$

.....1p

$$a=1, \quad \overline{bc}=25 < 50$$

$$a=2, \quad \overline{bc}=75 > 50$$

$$a=3, \quad \overline{bc}=100\text{-imposibil}$$

.....2p

$$\overline{abc}=275$$

.....1p