Barem de corectare, cl. a V-a

1) a) $A = 4 = 2^2$ pătrat perfect ... 2p

$u(B) = 2 \Rightarrow B$ nu este pătrat perfect ... 2p

b) $x = 7$ ... 1p

$y = 4$ ... 1p

$x + y = 11$ prim ... 1p

2) $650 \cdot 20 = 13000$ ... 2p

$14510 - 13000 = 1510$ ... 2p

$1510 : 10 = 151$ bilete de 30 lei ... 2p

$650 - 151 = 499$ bilete de 20 lei ... 1p

3) a) $8 \cdot 3 < 25 < 27 \Leftrightarrow 24 < 25 < 27$ (A) ... 2p

b) (i) $2^3 \cdot 3 < 5^2 \Leftrightarrow (2^3 \cdot 3)^{20} < (5^2)^{20} \Leftrightarrow$

$\Leftrightarrow 2^{60} \cdot 3^{20} < 5^{40} \Leftrightarrow 4^{30} \cdot 3^{20} < 5^{40}$ ... 2p

ii) $5^2 < 3^3 \Leftrightarrow (5^2)^{33} < (3^3)^{33} \Leftrightarrow 5^{66} < 3^{99}$ ... 2p

iii) $2^3 < 3^2 \Leftrightarrow (2^3)^{2006} < (3^2)^{2006} \Leftrightarrow 2^{6018} < 3^{4012}$ ... 1p

4. $\overline{abcd} = \overline{acc} \cdot 9 + \overline{ccc}$ ... 2p

$100a + 100b + d = 200c$ ... 1p

ultima cifră a membrului drept fiind 0

$\Rightarrow d = 0$ și $a + b = 2c$ ... 2p

$\overline{abcd}$ fiind cel mai mare număr natural

și $a \neq b \neq c \neq d \Rightarrow a = 9$, $b = 7$,

$c = 8$

$\overline{abcd} = 9780$ ... 2p

Barem de corectare, clasa a VI-a

1. $ab = [a,b](a,b) \Rightarrow (a,b) = 6 \Rightarrow a = 6x, b = 6y$ cu $(x,y) = 1$; rezultă $xy = 12$ şi soluţiile $a = 6, b = 72$; $a = 18, b = 24$; $a = 24, b = 18$; $a = 72, b = 6$.

2. $2301 = a \cdot c_1 + r$, $3004 = a \cdot c_2 + r$, $3559 = a \cdot c_3 + r$, deci $a(c_2 - c_1) = 703$, $a(c_3 - c_2) = 555$; rezultă $a = 37$.

3. Notăm cu a, b, c, d, e măsurile celor 5 unghiuri şi rezultă $2b = a + c$, $2c = b + d$, $2d = c + e$, $a + b + c = d + e = 180°$. Găsim $a = 48°$, $b = 60°$, $c = 72°$, $d = 84°$ şi $e = 96°$.

4. a) $s_3 = 10$, $s_4 = 15$.

b) $s_n = \frac{(n+1)(n+2)}{2} \Rightarrow (n+1)(n+2) = 26$, imposibil; dacă $s_n = 28$, obţinem $n = 7$.

c) $75 : 5 = 15°$

$S = 5 \cdot 15° + 4 \cdot 30° + 3 \cdot 45° + 2 \cdot 60° + 75° = 525°$.

Barem de corectare şi notare

Clasa a VII-a

I $\overline{x,1(y)} = \dfrac{\overline{x1y}-\overline{x1}}{90} = \dfrac{90x+9+y}{90}; \ldots ; \overline{x,9(y)} = \dfrac{\overline{x9y}-\overline{x9}}{90} = \dfrac{90x+81+y}{90}$ (2p)

înlocuire şi aducere la forma: $\sqrt{2\cdot\dfrac{90x+45+y}{10}}$ (2p)

condiţia $y \vdots 5 \Rightarrow y=5$ (1p)

$a=\sqrt{18x+10}=\sqrt{2(9x+5)}\in\mathbb{N} \Rightarrow 2(9x+5)=k^2 \Leftrightarrow$

$2(9x+5)\in\{36,49,64,81,100,121,144;169\}$ (1p)

finalizare $x=3$ şi $x=5$ (1p)

II.

$$a)\quad \frac{x_1}{1}=\frac{x_3}{3}=\ldots=\frac{x_{2011}}{2011}=\frac{2012^2}{1006^2}\overset{(2p)}{=}4 \Rightarrow x_1=1\cdot 4, x_2=2\cdot 4, x_3=3\cdot 4,\ldots,x_{2012}=2012\cdot 4 \quad (1p)$$

$$b)\quad \frac{k^2+k+1}{x_k\cdot x_{k+1}}=\frac{k(k+1)+1}{4k\cdot 4(k+1)}=\frac{1}{16}+\frac{1}{16}\left(\frac{1}{k}-\frac{1}{k+1}\right)\overset{(2p)}{\Rightarrow}$$

$$\Rightarrow s=\frac{1}{16}\cdot 2011+\frac{1}{16}\left(\frac{1}{1}-\frac{1}{2}+\frac{1}{2}-\frac{1}{3}+\ldots+\frac{1}{2011}-\frac{1}{2012}\right)\overset{(1p)}{=}\frac{1}{16}\cdot 2011+\frac{1}{16}\cdot\frac{2011}{2012}=\frac{2011}{16}\left(1+\frac{1}{2012}\right) \quad (1p)$$

III.

$$\left.\begin{array}{l}\Delta ABC\\ [BD-bisectoare\end{array}\right\}\overset{\text{teorema bisectoarei}}{\Rightarrow}\frac{AD}{DC}=\frac{AB}{BC}\Rightarrow DC=10cm, AD=4cm \quad (1,5p)$$

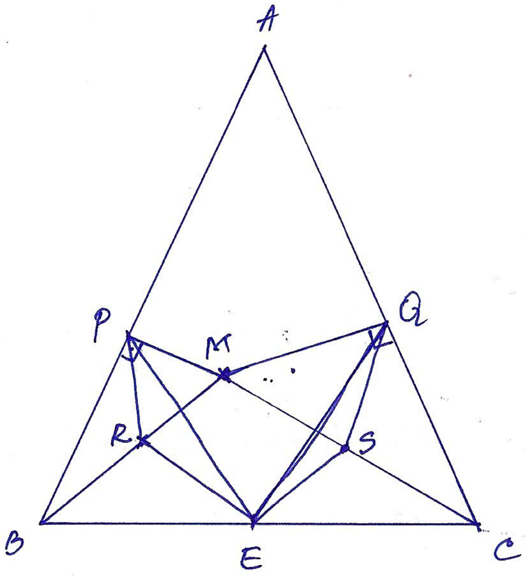
$$\left.\begin{array}{l}\Delta ABC\\ DE\parallel BC\end{array}\right\}\overset{\text{teorema Thales}}{\Rightarrow}\frac{AD}{AC}=\frac{AE}{AB}\Rightarrow AE=\frac{16}{7}cm, BE=\frac{40}{7}cm \quad (1,5p)$$

[BD-bisectoarea $\angle$B => $\angle$EBD≡$\angle$DBC (1) (1p)

BC | | DE si secanta [BD => $\angle$EBD≡$\angle$DBC (alterne-interne) (2) (1p)

Rezultă că $\angle$EBD≡$\angle$EDB => ΔBED este isoscel => $EB=ED=\dfrac{40}{7}$

$P_{\Delta AED}=\dfrac{16}{7}+\dfrac{40}{7}+4=8+4=12cm$ (1p) P_{BCDE}=BC+CD+DE+ED=$\dfrac{290}{7}cm$ (1p)



IV.

a) RE linie mijlocie în $\Delta BMC \Rightarrow$ (1p)

$\Rightarrow RE = \frac{MC}{2}$ și $RE \parallel MC$ (1p) $\Rightarrow$

$\Rightarrow$ MRES - paralelogram (1p)

b) ES - linie mijlocie în $\Delta CMB \Rightarrow$

$\Rightarrow ES = \frac{BM}{2} = PR$ (1p)

$RE = \frac{MC}{2} = QS$ (1p)

dem. că $\sphericalangle PRE \equiv \sphericalangle QSE$ (1p)

$\xRightarrow{LUL} \Delta PRE \equiv \Delta ESQ \Rightarrow [PE] \equiv [QE]$ (1p.