

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

Subiectul 1

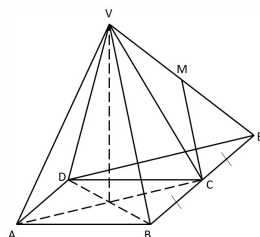
$\left. \begin{array}{l} x - 2010 \geq 0 \Rightarrow x \geq 2010 \\ y + 2012 \geq 0 \Rightarrow y \geq -2012 \\ z - 4 \geq 0 \Rightarrow z \geq 4 \end{array} \right\}$	1p
$\Rightarrow x + y + z + 1 - 2\sqrt{x - 2010} - 2\sqrt{y + 2012} - 2\sqrt{z - 4} = 0$	1p
$(x - 2010 - 2\sqrt{x - 2010} + 1) + (y + 2012 - 2\sqrt{y + 2012} + 1) + (z - 4 - 2\sqrt{z - 4} + 1) = 0$	2p
$\left. \begin{array}{l} (\sqrt{x - 2010} - 1)^2 + (\sqrt{y + 2012} - 1)^2 + (\sqrt{z - 4} - 1)^2 = 0 \\ (\sqrt{x - 2010} - 1)^2 \geq 0 \\ (\sqrt{y + 2012} - 1)^2 \geq 0 \\ (\sqrt{z - 4} - 1)^2 \geq 0 \end{array} \right\}$	1p
$\left. \begin{array}{l} x = 2011 \\ \text{Finalizare: } y = -2011 \\ z = 5 \end{array} \right\}$	2p

Subiectul 2

$\left. \begin{array}{l} d^2 = a^2 + b^2 + c^2 \\ d_1^2 = a^2 + b^2 \\ d_2^2 = b^2 + c^2 \\ d_3^2 = a^2 + c^2 \end{array} \right\}$	1p
$a^2 + b^2 + c^2 = \sqrt{2}(\sqrt{a^2 + b^2} + \sqrt{b^2 + c^2} + \sqrt{c^2 + a^2}) = \frac{3}{2}$	1p
$(a^2 + b^2) + (b^2 + c^2) + (c^2 + a^2) = 2\sqrt{2}(\sqrt{a^2 + b^2} + \sqrt{b^2 + c^2} + \sqrt{c^2 + a^2}) - 6$	
$\Rightarrow (a^2 + b^2 - 2\sqrt{2}\sqrt{a^2 + b^2} + 2) + (b^2 + c^2 - 2\sqrt{2}\sqrt{b^2 + c^2} + 2) + (c^2 + a^2 - 2\sqrt{2}\sqrt{c^2 + a^2} + 2) = 0$	2p
$(\sqrt{a^2 + b^2} - \sqrt{2})^2 + (\sqrt{b^2 + c^2} - \sqrt{2})^2 + (\sqrt{c^2 + a^2} - \sqrt{2})^2 = 0 \Rightarrow$	

$a^2 + b^2 = 2, b^2 + c^2 = 2$ și $a^2 + c^2 = 2$	
$a^2 = b^2 = c^2 = 1$	2p
\Rightarrow paralelipipedul este cub de muchie 1	1p

Subiectul 3



a)

$\triangle VBD$ dreptunghic cu $m(\widehat{V}) = 90^0$	
În $\triangle BVE$: $CV = BC = CE = \frac{BE}{2} \Rightarrow BV \perp VE$	
$\left. \begin{array}{l} BV \perp VE \\ BV \perp VD \end{array} \right\} \Rightarrow BV \perp (VDE) \Rightarrow d(B, (VDE)) = BV = a$	2p

b)

În $\triangle BDE$, $DC = \frac{BE}{2}$, DC = mediană	
$\Rightarrow \triangle BDE$ = dreptunghic cu $m(\widehat{EDB}) = 90^0$	
$\left. \begin{array}{l} BD \perp DE \\ VD \perp DE \end{array} \right\} \Rightarrow$	
$(ABC) \cap (VDE) = DE$	
$\Rightarrow m((\widehat{ABC}), (\widehat{VDE})) = m(\widehat{BD}, \widehat{VD}) = m(\widehat{BDV}) = 45^0$	3p

c)

Fie $CM \perp VE$, $CM \parallel BV$, $BV \perp (VDE) \Rightarrow CM \perp (VDE)$	
$\Rightarrow d = CM = \frac{BV}{2} = \frac{a}{2}$	2p