

EVALUAREA NAȚIONALĂ PENTRU ABSOLVENȚII CLASEI a VIII-a
Anul școlar 2017 - 2018
Matematică – Rezolvare

SUBIECTUL I

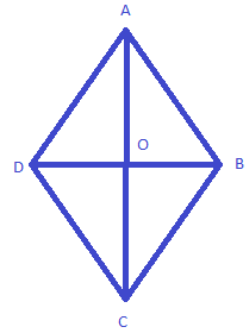
1. $16 - 16 : 4 = 16 - 4 = 12$

2. $\frac{x}{10} = \frac{20}{100} \Rightarrow x \cdot 100 = 10 \cdot 20 \Rightarrow 100x = 200 \Rightarrow x = \frac{200}{100} \Rightarrow x = 2$

3. *Nr. natural din intervalul (0, 2) este 1*

4. $AC = 16\text{cm} \Rightarrow AO = \frac{AC}{2} = \frac{16}{2} = 8\text{cm}$

$$BD = 12\text{cm} \Rightarrow OB = \frac{BD}{2} = \frac{12}{2} = 6\text{cm}$$



ΔAOB dreptunghic în O (în romb diagonalele sunt perpendiculare) $\xrightarrow{\text{T.Pitagora}}$

$$AB^2 = AO^2 + OB^2 \Rightarrow AB^2 = 8^2 + 6^2 \Rightarrow AB^2 = 64 + 36 \Rightarrow AB^2 = 100\text{cm}^2 \Rightarrow AB = \sqrt{100} \Rightarrow AB = 10\text{cm}$$

5. $AB = 6\text{cm} \Rightarrow AO = \frac{AB}{2} = \frac{6}{2} = 3\text{cm}$ (raza)

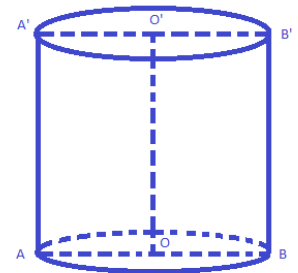
$$OO' = AB = 6\text{cm}$$

$$V = \pi R^2 H = \pi \cdot 3^2 \cdot 6 = 54\pi\text{cm}^3$$

6. Nr. elevilor care au obținut cel puțin nota 9 este = $5 + 3 = 8$ (elevi)

Nr. elevilor care au obținut cel mult nota 4 este = $1 + 2 = 3$ (elevi)

$$8 - 3 = 5 \text{ (elevi)}$$



SUBIECTUL II

1.

2. $x = (\sqrt{2} + \frac{5}{\sqrt{2}}) \cdot \sqrt{2} - (\sqrt{3} + \frac{1}{\sqrt{3}}) \cdot \sqrt{3}$

$$x = \left(\frac{2}{\sqrt{2}} + \frac{5}{\sqrt{2}}\right) \cdot \sqrt{2} - \left(\frac{3}{\sqrt{3}} + \frac{1}{\sqrt{3}}\right) \cdot \sqrt{3} \Rightarrow x = \frac{7}{\sqrt{2}} \cdot \sqrt{2} - \frac{4}{\sqrt{3}} \cdot \sqrt{3}$$

$$x = 7 - 4 \Rightarrow x = 3$$

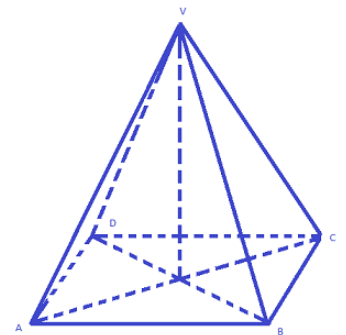
$$y = \left(\frac{3}{2\sqrt{5}} + \frac{2}{3\sqrt{5}}\right) : \frac{1}{\sqrt{180}} \Rightarrow y = \left(\frac{3 \cdot 3}{2 \cdot 3\sqrt{5}} + \frac{2 \cdot 2}{2 \cdot 3\sqrt{5}}\right) : \frac{1}{6\sqrt{5}}$$

$$y = \frac{9 + 4}{6\sqrt{5}} \cdot \frac{6\sqrt{5}}{1} \Rightarrow y = 13 \Rightarrow x + y = 3 + 13 = 16 = 4^2$$

3. $P_{\blacksquare} = 2 \cdot (L + l) \Rightarrow 220 = 2 \cdot (L + l) \Rightarrow L + l = 110$; Dar $L \cdot l = (L - 20)(l + 10)$

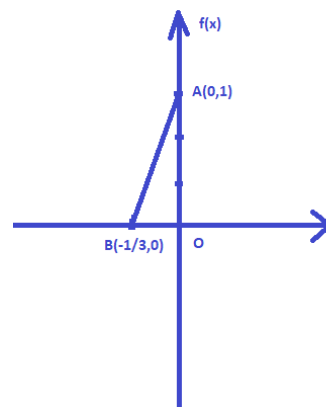
$$\begin{cases} L + l = 110 \\ L \cdot l = L \cdot l + 10L - 20l - 200 \end{cases} \Rightarrow \begin{cases} L + l = 110 \\ -10L + 20l = -200 \end{cases} \Rightarrow \begin{cases} L + l = 110 \\ 2l - L = -20 \end{cases}$$

$$3l = 90 \Rightarrow l = 30\text{cm} \Rightarrow L + 30 = 110 \Rightarrow L = 80\text{cm}$$



4. a) $f(x) = 3x + 1$
 $f(0) = 3 \cdot 0 + 1 = 1 \Rightarrow A(0,1)$
 $f(x) = 0 \Rightarrow 3x + 1 = 0 \Rightarrow$
 $3x = -1 \Rightarrow x = -\frac{1}{3} \Rightarrow B\left(-\frac{1}{3}, 0\right)$

b) $\text{tg}(BAO) = \frac{\frac{1}{3}}{1} = \frac{1}{3}$



5. $E(x) = \left(\frac{x}{x+2} - \frac{3}{2-x} - \frac{6x}{x^2}\right) : \frac{(x-2)^2-1}{x^2+x-2}$

$$E(x) = \left(\frac{x}{x+2} + \frac{3}{x-2} - \frac{6x}{x^2-4}\right) : \frac{(x-2-1)(x-2+1)}{x^2+2x-x-2}$$

$$E(x) = \left(\frac{x^2-2x+3x+6-6x}{x^2-4}\right) \cdot \frac{(x-1)(x+2)}{(x-3)(x-1)}$$

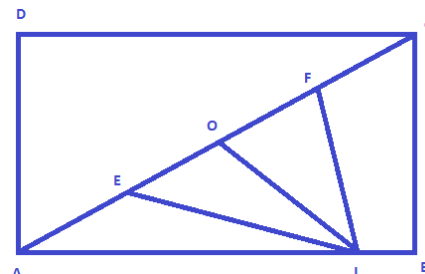
$$E(x) = \frac{x^2-5x+6}{(x-2)(x+2)} \cdot \frac{(x+2)}{(x-3)}$$

$$E(x) = \frac{(x-2)(x-3)}{(x-2)(x-3)} = 1 \Rightarrow E(x) = 1$$

SUBIECTUL III

1.

- ip) ABCD dreptunghi
 $AB > BC$
 $AC = 4 \text{ dm}$
 $AC \cap BD = \{O\}$
 E mijlocul lui $[AO]$, F mijlocul lui $[OC]$
 $L \in [AB]$, a.î. $EL = FL$



cl)

- a) $OE = 1 \text{ dm}$
b) $\Delta AOL \sim \Delta ABC$
c) dacă ΔELF echilateral $\Rightarrow AB = \frac{8\sqrt{7}}{7}$

dem)

- a) $AC = 4 \text{ dm} \Rightarrow AO = 2 \text{ dm} \Rightarrow OE = 1 \text{ dm}$
b) În ΔAOL și ΔABC avem:
 $m(OAL) = m(CAB)$ (1)
 $[EL] \equiv [FL] \Rightarrow \Delta EFL \text{ isoscel}$
 $[OE] \equiv [OF] \Rightarrow [OL] \perp [EF]$
 $\Rightarrow m(AOL) = m(ABC) = 90^\circ$ (2)

Din (1) și (2) $\Rightarrow \Delta AOL \sim \Delta ABC$

c) Dacă ΔELF echilateral $\Rightarrow OL = \frac{EF\sqrt{3}}{2} = \frac{2\sqrt{3}}{2} = \sqrt{3} \text{ dm}$

În ΔAOL avem:

$$m(\angle AOL) = 90^\circ \xrightarrow{T.Pitagora} AL^2 = AO^2 + OL^2$$

$$AL^2 = 2^2 + \sqrt{3}^2 \Rightarrow AL^2 = 7 \Rightarrow AL = \sqrt{7} \text{ dm}$$

$$\Delta AOL \sim \Delta ABC \xrightarrow{T.Th} \frac{AO}{AB} = \frac{AL}{AC} \Rightarrow \frac{2}{AB} = \frac{\sqrt{7}}{4} \Rightarrow AB = \frac{2 \cdot 4}{\sqrt{7}} = \frac{8\sqrt{7}}{7}$$

2.

ip) ABCD tetraedru regulat

AB = 10 cm

M mijlocul lui [CD]

N mijlocul lui [BC]

$P \in [AM], Q \in [DN], a. \hat{.} \frac{AP}{AM} = \frac{DQ}{DN} = \frac{1}{3}$

cl)

a) Suma muchiilor = 60 cm

b) $A_{totala ABCD} = \sqrt{3} \text{ dm}^2$

c) $PQ \parallel (ABD)$

dem)

a) ABCD tetraedru regulat = 6 muchii $\Rightarrow S_{muchii} = 6 \cdot 10 = 60 \text{ cm}$

b) $A_{ABC} = \frac{l^2 \sqrt{3}}{4} = \frac{100\sqrt{3}}{4} \text{ cm}^2$

$$A_{ABCD} = 4 \cdot A_{ABC} = 4 \cdot \frac{100\sqrt{3}}{4} = 100\sqrt{3} \text{ cm}^2 = \sqrt{3} \text{ dm}^2$$

c)

$$\frac{AP}{AM} = \frac{DQ}{DN} = \frac{1}{3} \Rightarrow \begin{cases} DN = 3 \cdot DQ, Q \text{ mijlocul lui } [OD] \\ AM = 3 \cdot AP \end{cases}$$

Construim $QR \parallel BD \Rightarrow QR$ linie mijlocie în $\Delta OBD \Rightarrow \frac{AP}{PM} = \frac{BR}{RM}$
 $\Rightarrow (PRQ) \parallel (ABD), PQ \subset (PRQ) \Rightarrow PQ \parallel (ABD)$

