

**Mate 2000 Consolidare**  
**Clasa a VIII-a, semestrul I (2021-2022)**

**TESTE DE AUTOEVALUARE**

**– SOLUȚII –**

**Test de autoevaluare – p. 19**

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- I.** 1.  $a \in \{1, 3, 7, 9\}$ .  
2. 2.  
3.  $x \in \{0, 1, 2\}$ .  
4.  $x = 20$ .  
5. 2,3(5).  
6. F.
- II.** 1. D. 2. B. 3. B. 4. B.
- III.** 1.  $a = \sqrt{729} = 27 \in \mathbb{Q}$ .  
2.  $A = \{-7, -2, -1, 0, 1, 2, 3, 8\}$ ,  $B = \{-11, -4, -2, -1, 0, 1, 3, 10\}$ ;  
 $A \cap B = \{-2, -1, 0, 1, 3\}$ .  
3.  $\frac{2 + \sqrt{3} + 7 - \sqrt{3}}{2x - 1} = \frac{9}{2x - 1} \in \mathbb{Z} \Rightarrow x \in \{-4, -1, 0, 1, 2, 5\}$ .  
4.  $\sqrt{\frac{a+b}{9}} \in \mathbb{Q} \Rightarrow a + b = 9 \Rightarrow (a, b) \in \{(1, 8), (2, 7), (3, 6), (4, 5)\}$ .

**Test de autoevaluare – p. 27**

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- I.** 1. 6,8.  
2. -3,21.  
3. 8.  
4.  $x \in \{9, 10, 11, 12\}$ .  
5. 1.  
6.  $x \in \{-1, 2\}$ .
- II.** 1. B. 2. C. 3. D. 4. C.
- III.** 1. Pentru  $-2 < x < 3 \Rightarrow |x - 3| = -x + 3$  și  $|x + 2| = x + 2 \Rightarrow a = 5 \in \mathbb{N}$ .  
2.  $x = -1, y = 3 \Rightarrow x < y$ .  
3.  $x \in \{1, 2\}$ .  
4.  $\sqrt{2ab} \in \mathbb{N} \Rightarrow \overline{ab} \in \{25, 56, 89\} \Rightarrow$  suma este 170 și  $10 \mid 170$ .

## Test de autoevaluare – p. 41

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**I.** 1.  $-4$ .

2.  $[1; 5]$ .

3.  $[-2; 3]$ .

4.  $\{0, 1, 2, 3\}$ .

5.  $(-6; 8]$ .

6.  $-2$ .

**II.** 1. B. 2. C. 3. B. 4. A.

**III.** 1.  $A \cup B \cap \mathbb{Z} = \{-1, 0, 1, 2, 3, 4, 5, 6, 7\}$ .

2.  $A = \{2, 4\}; B = [1; 4); A \cap B = \{2\}$ .

3. Dacă  $x \in [-2; 5] \Rightarrow |x + 2| = x + 2$  și  $|x - 5| = -x + 5 \Rightarrow a = 7 \in \mathbb{N}$ .

4.  $x \in [1; 3]$  și  $y \in [-5; -3] \Rightarrow x > y$ .

## Test de autoevaluare – p. 47

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**I.** 1.  $\{0, 1, 2, 3, 4, 5\}$ .

2.  $\{-2, -1, 0, 1, 2\}$ .

3.  $S = [-3; 3]$ .

4.  $S = (-2\sqrt{3} - 1; 1)$ .

5.  $S = (-\infty; 7) \setminus \{-5\}$ .

6.  $S = [-2; +\infty)$

**II.** 1. C. 2. B. 3. B. 4. C.

**III.** 1.  $x \in [-5; 1]$ .

2.  $x \in (-2; 1) \setminus \{-1\}$ .

3.  $x \in \{0, 1, 2, 3, 4, 5\}$ .

4.  $x \in (-2; +\infty)$ .

## Test de autoevaluare – p. 65

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**I.** 1.  $-5x$ .

2.  $4x^2 + 2$ .

3.  $6x - 4$ .

4.  $x^2 + 5x$ .

5.  $x - 12$ .

6.  $30x^2$ .

**II.** 1. C. 2. D. 3. C. 4. B.

- III.** 1.  $a = x\sqrt{3} \Rightarrow x = \frac{a}{\sqrt{3}}$ .  
2.  $x^2 + x - 20$ .  
3.  $n = 9; x = 2\sqrt{6}; y = 6 - 3\sqrt{6}$ .  
4. 0.

### Test de autoevaluare – p. 73

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- I.** 1.  $9x^2 + 4$ .  
2.  $24x - 25$ .  
3.  $x^2$ .  
4.  $8x + 13$ .  
5. 5.  
6. -2.

**II.** 1. B. 2. B. 3. C. 4. C.

- III.** 1. -4.  
2.  $a = 21 \in \mathbb{N}$ .  
3. a)  $E_1(x) = -8x + 8; E_2(x) = 12x + 12$ ; b)  $E_1(n) + E_2(n) = 4(n + 5)$ . Dacă  $n = 2k + 1$ ,  
 $k \in \mathbb{N} \Rightarrow E_1(n) + E_2(n) = 8(k + 3)$ .  
4.  $a = |2x - y + 11| + |x - 2y - 15| - |x + y + 7|$  și, în condițiile date, avem  $a = 2x - y + 11 - x + 2y + 15 - x - y - 7 \Rightarrow a = 19$ .

### Test de autoevaluare – p. 93

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- I.** 1.  $(5x - 4y)^2$ .  
2.  $5x^2(3x^2 - 5x - 7)$ .  
3.  $(x - 5)(x + 3)$ .  
4.  $2(a - b)(2a + 2b + 1)$ .  
5.  $(x - y - 2)(x - y + 2)$ .  
6.  $x \in \{-5, 1\}$ .

**II.** 1. D. 2. B. 3. B. 4. C.

- III.** 1.  $x = \sqrt{3}$  și  $y = -\sqrt{2}$ .  
2.  $3(x + 1)(3x + 5)(3x + 7)$ .  
3.  $(x + 2)(x - 1)(x + 3)(x - 2)$ .  
4.  $a = -1; b = 4$ .

## Test de autoevaluare – p. 103

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- I.**
- $x \in \{-3, 3\}$ .
  - $x \in \mathbb{R} \setminus \{3\}$ .
  - $\frac{-14x + 2x^2}{-2x^2 + 6x}$ .
  - $\frac{x^2 - 4}{x^2 + 4x + 4}$ .
  - $\frac{1}{x + 3}$ .
  - $\frac{2x + 1}{x + 5}$ .
- II.** 1. A. 2. A. 3. A. 4. D.
- III.**
- $\frac{(x+2)(x-1)}{x^2 + x + 1}$ .
  - Pentru  $x \in \mathbb{R} \setminus \left\{-1, -\frac{3}{5}, 1\right\}$ ,  $F(x) = \frac{1}{x-1}$ .
  - Pentru  $x \in \mathbb{R} \setminus \{-5, 0\}$ ,  $F(x) = \frac{x+5}{5x}$ .
  - a)  $\frac{2x+3}{x-2}$ ; b)  $A = \{-5, 1, 3, 9\}$ .

## Test de autoevaluare – p. 119

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- I.**
- necoplanare.
  - 90 cm.
  - 96 cm.
  - $36\sqrt{3}$  cm<sup>2</sup>.
  - $R = 6$  cm;  $G = 12$  cm.
  - $G = 10$  cm.
- II.** 1. B. 2. A. 3. D. 4. D.
- III.**
- $\mathcal{P}_{ABC} = 36$  cm.
  - $AC + AB' + BC' = 2(5 + \sqrt{34} + \sqrt{41})$  cm.
  - $SA = 12$  cm.
  - $G = 15$  cm;  $h = 3\sqrt{21}$  cm.

## Test de autoevaluare – p. 129

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- I.** 1. paralele.  
2.  $0^\circ$ .  
3. necoplanare.  
4. paralelă.  
5.  $45^\circ$ .  
6.  $60^\circ$ .
- II.** 1. B. 2. A. 3. D. 4. A.
- III.** 1.  $AA' = 6$  cm;  $MN \parallel (BA'C')$ .  
2. a) Cum  $O_1O_2$  este linie mijlocie în  $\triangle CAD' \Rightarrow O_1O_2 \parallel AD'$ ; b) 240 cm.  
3.  $DM = 6\sqrt{3}$  cm;  $AM = 6\sqrt{6}$  cm. Cu reciproca teoremei lui Pitagora în  $\triangle DAM$  dreptunghic, cu  $\sphericalangle ADM = 90^\circ \Rightarrow DM \perp DA$ .  
4. a)  $\text{tg}(\sphericalangle(VA, DC)) = \text{tg}(\sphericalangle(VA, AB)) = \text{tg}(\sphericalangle VAM) = \frac{4}{3}$ ;  
b)  $\sphericalangle(DC, VM) = \sphericalangle(AB, VM) = 90^\circ$ .

## Test de autoevaluare – p. 143

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- I.** 1. paralele.  
2. infinit.  
3. unu.  
4. unu.  
5. unu.  
6. perpendiculară.
- II.** 1. B. 2. C. 3. A. 4. B.
- III.** 1.  $D'O = 6\sqrt{6}$  cm.  
2.  $d(M, (ABC)) = 20$  cm.  
3.  $MB = 24$  cm;  $MC = 12\sqrt{6}$  cm;  $d(C, (MAD)) = CD = 18$  cm.  
4.  $MB = MD = 6\sqrt{6}$  cm;  $BD = 12\sqrt{2}$  cm;  $\mathcal{P}_{\triangle MBD} = 12\sqrt{2}(1 + \sqrt{3})$  cm;  $MO = 12$  cm;  
 $\mathcal{A}_{\triangle MBD} = \frac{MO \cdot BD}{2} = 72\sqrt{2}$  cm<sup>2</sup>. Fie  $DN \perp MO$ ,  $MO \perp DB \Rightarrow d(D, (MAC)) = DN$ ;  
cum  $DN$  este înălțime în  $\triangle MOD$  dreptunghic în  $O \Rightarrow DN = \frac{MD \cdot DO}{MO} =$   
 $= \frac{6\sqrt{6} \cdot 6\sqrt{2}}{12} = 6\sqrt{3}$  cm.

## Test de autoevaluare – p. 149

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- I.** 1. înălțimea prismei.  
2. două.  
3. 12 cm.  
4. 20 cm.  
5. 15 cm.  
6. 10 cm.
- II.** 1. C. 2. A. 3. D. 4. C.
- III.** 1.  $d(V, (ABC)) = 8$  cm.  
2. a)  $AB = 10$  cm; b)  $d(C', (BDD')) = C'O' = 5\sqrt{2}$  cm.  
3.  $a = 6\sqrt{3}$ ;  $b = 6$ ;  $c = 3\sqrt{3}$ .  
4.  $h = 4\sqrt{6}$  cm;  $d(O, (SBC)) = \frac{4\sqrt{6}}{3}$  cm.

## Test de autoevaluare – p. 159

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- I.** 1. a)  $30^\circ$ ; b)  $45^\circ$ ; c)  $\frac{\sqrt{2}}{2}$ .  
2. a)  $45^\circ$ ; b)  $45^\circ$ ; c)  $45^\circ$ .  
3. a)  $30^\circ$ ; b)  $30^\circ$ ; c)  $\frac{\sqrt{6}}{3}$ .
- II.** 1. B. 2. A. 3. B. 4. A.
- III.** 1.  $pr_{(BCC')} AC' = BC' = 6\sqrt{2}$  cm.  
2.  $\sphericalangle(A'C, (ABC)) = \sphericalangle A'CA = 60^\circ$ .  
3.  $SO = 6$  cm.  
4. a)  $\sphericalangle(VB, (VAC)) = \sphericalangle OVB$ ;  $\sphericalangle OVB = 45^\circ$ ;  
b)  $\sphericalangle(BC, (VAC)) = \sphericalangle BCO$ ;  $\sphericalangle BCO = 45^\circ$ .

## Test de autoevaluare – p. 165

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- I.** 1. unghi diedru.  
2. perpendiculare.  
3.  $90^\circ$ .  
4.  $0^\circ$ .  
5. a)  $45^\circ$ ; b)  $90^\circ$ .
- II.** 1. C. 2. C. 3. B. 4. A.
- III.** 1. a)  $\sphericalangle((A'AB), (A'AC)) = \sphericalangle BAC = 60^\circ$ ;  
b)  $BC \perp AD, BC \perp AA' \Rightarrow BC \perp (A'AD) \Rightarrow (BCC') \perp (A'AD)$ .  
2.  $\sphericalangle((B'AC), (ABC)) = m(\sphericalangle B'DB) = 60^\circ$ .  
3.  $\sphericalangle((BA'C'), (DA'C')) = \sphericalangle BO'D$ , unde  $A'C' \cap B'D' = \{O'\}$ . Se calculează  $\mathcal{A}_{\Delta BDO'} = \frac{BD \cdot OO'}{2} = \frac{BO' \cdot DO' \cdot \sin(\sphericalangle BO'D)}{2}$ , de unde  $\sin(\sphericalangle BO'D) = \frac{2\sqrt{2}}{3}$ .  
4. Dacă  $SABC$  – tetraedru regulat  $\Rightarrow \Delta SAB$  și  $\Delta SAC$  sunt echilaterale. Dacă  $M$  este mijlocul lui  $SA \Rightarrow \sphericalangle((SAB), (SAC)) = \sphericalangle(BM, MC) = \sphericalangle BMC$ .  
 $\mathcal{A}_{\Delta MBC} = \frac{BC \cdot MD}{2} = \frac{BM \cdot MC \cdot \sin(\sphericalangle BMC)}{2}$ , de unde  $\sin(\sphericalangle BMC) = \frac{\sqrt{2}}{3}$ .

## Test de autoevaluare – p. 173

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- I.** 1. a)  $12\sqrt{2}$  cm; b)  $45^\circ$ ; c)  $6\sqrt{2}$  cm.  
2. 25 cm.  
3. 24 cm.  
4.  $4\sqrt{6}$  cm.
- II.** 1. B. 2. B. 3. B. 4. B.
- III.** 1. a)  $d(D', AC) = 8\sqrt{3}$  cm; b)  $d(D', A'B) = \frac{16\sqrt{30}}{5}$  cm.  
2. a)  $d(A', BD) = 8\sqrt{2}$  cm; b)  $\sphericalangle((A'BD), (ABC)) = 45^\circ$ .  
3. Dacă  $D \in AB$  astfel încât  $AD \equiv DB$ , atunci se poate demonstra că  $(VAD) \perp (VAB)$ ; fie  $CM \perp VD \Rightarrow VM \perp (VAB)$ . În  $\Delta VDC$ ,  $VO \cdot CD = VD \cdot CM$ . Cum  $CD = 9\sqrt{3}$  cm,  $VD = 3\sqrt{7}$  cm  $\Rightarrow CM = \frac{18\sqrt{21}}{7}$  cm.  
4.  $d(O, AB) = 5$  cm  $\Rightarrow d(P, AB) = 10$  cm.