

## RĂSPUNSURI

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## Varianta 1

- I.**
1. A
  2. F
  3. A
  4. A
  5. F

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

**III.**

1.  $-2^3; 2^{-2}; 2^0; 2, 2^2.$

$$-8 < \frac{1}{4} < 1 < 2 < 4.$$

2.  $\frac{AB}{3} = \frac{AC}{4} = \frac{BC}{5} = k; AB = 3k, AC = 4k, BC = 5k, 12k = 36, k = 3$

a)  $AB = 9 \text{ cm}, AC = 12 \text{ cm}, BC = 15 \text{ cm}.$

b)  $9^2 + 12^2 = 15^2$

c)  $BC$  ipotenuză,  $AM$  mediană,  $AM = \frac{1}{2}; BC = \frac{1}{2} \cdot 15 = 7,5 \text{ cm}.$

## Varianta 2

- I.**
1. F
  2. F
  3. A
  4. A
  5. A

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

**III.**

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

b)  $x^2 = 4 \quad x \in \{\pm 4\}.$

2.  $S_{\text{romb}} = 2 \cdot \frac{\ell^2 \sqrt{3}}{4} = 2 \cdot \frac{10^2 \sqrt{3}}{4} = 50\sqrt{3}.$

3. Înălțimea triunghiului echilateral =  $\frac{\ell \sqrt{3}}{2} = \frac{10\sqrt{3}}{2} = 5\sqrt{3}.$

## Varianta 3

- I.**
1. A
  2. F
  3. A
  4. A
  5. F

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

**III.**

1. a)  $\frac{3 \cdot 2\sqrt{2}}{4\sqrt{2}} = \frac{x}{8}; \frac{3}{2} = \frac{x}{8} \Rightarrow x = 12.$

b)  $M_g = \sqrt{18 \cdot 12} = \sqrt{2 \cdot 9 \cdot 2^2 \cdot 3} = 6\sqrt{6}.$

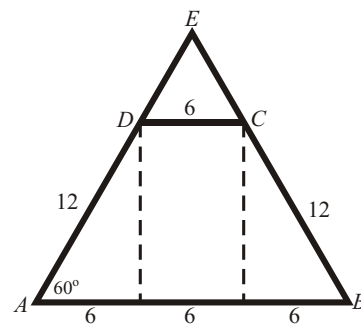
2. a)  $BC = 12.$

b)  $\triangle AEB \approx \triangle DEC$

Din definiția asemănării, cum unghiurile sunt egale avem și condiția rapoartelor egale adevărată. Deci:

$$\frac{DE}{AE} = \frac{CE}{BE} = \frac{DC}{AB} \Rightarrow \frac{6}{AE} = \frac{6}{BE} = \frac{6}{18}$$

$$BE = 18; AE = 18 \Rightarrow P_{\triangle ABE} = 18 + 18 + 18 = 54$$



## Varianta 4

- I.**
1. A
  2. F
  3. A
  4. A
  5. FA

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

**III.**

1. a)  $x \in \{\pm 5\};$  b)  $x \in \emptyset.$

2.  $CC' = BC' = 12 - 8 = 4$  (cm)

$$A_{\text{trapezului}} = \frac{(12+8)4}{2} = 40 \text{ (cm}^2\text{)}$$

$$CB = 4\sqrt{2}$$

$$P = 12 + 4 + 8 + 4\sqrt{2} = 24 + 4\sqrt{2}.$$

**Varianta 5**

- I.**
1. F
  2. A
  3. A
  4. A
  5. F

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

**III.**

1. a) varianta 1:  $x^2 - 9 = 0 \Rightarrow x^2 = 9 \Rightarrow x = \sqrt{9} \Rightarrow x_{1,2} = \pm 3$   
varianta 2:  $x^2 - 9 = 0 \Leftrightarrow (x - 3)(x + 3) = 0 \Rightarrow x_1 = 3; x_2 = -3$   
b)  $x^2 + 2x = 0 \Leftrightarrow x(x + 2) = 0 \Rightarrow x = 0$  sau  $x = -2$
2.  $P = 2L + 2\ell = 6\ell; L = 2\ell.$   
 $6\ell = 48 \Rightarrow \ell = 8 \text{ cm}; L = 16 \text{ cm}.$   
 $A_{\text{dreptunghiului}} = 8 \cdot 16 = 128 \text{ (cm}^2\text{)}$   
 $A_{\text{patrat}} = 2^2 = 4 \text{ (cm}^2\text{)}$   
 $128 : 4 = 32$  pătrate

## Varianta 6

I. 1. 1

2.  $x \in \{13; -9\}$ 

3. 1 cm

4. 18 cm

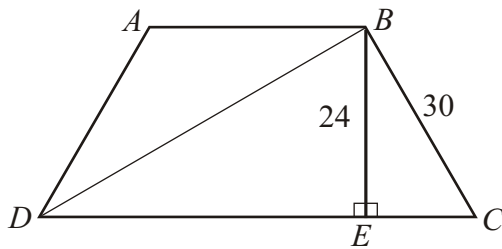
II. 5. b)  $x \in \{3; -5\}$ 6. b)  $\frac{1}{3}$ 7. c)  $6\sqrt{3}$  cm8. c)  $3\sqrt{3}$  cm

## III.

9. a) Fie  $x$  prețul inițial  $\Rightarrow x + \frac{10}{100} \cdot x = 22 \Rightarrow x = 20$  lei  $2, 2^2$ .

$$\begin{aligned} \text{b) } & \frac{\sqrt{2}-1}{\sqrt{2^2}-1^2} + \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3^2}-\sqrt{2}^2} + \frac{\sqrt{4}-\sqrt{3}}{\sqrt{4^2}-\sqrt{3}^2} + \dots + \frac{\sqrt{100}-\sqrt{99}}{\sqrt{100^2}-\sqrt{99}^2} = \\ & = \sqrt{2}-1 + \sqrt{3}-\sqrt{2} + \sqrt{4}-\sqrt{3} + \dots + \sqrt{100}-\sqrt{99} = -1 + \sqrt{100} = 9 \end{aligned}$$

## 10.

a) Din T.P.  $\triangle BEC \Rightarrow EC = 18$  cmDin T.C.  $\triangle BEC \Rightarrow DC = 50$  cm

$$\text{b) } A_{ABCD} = \frac{(AB + CD) \cdot BE}{2};$$

$$AB = DC - 2EC = 14 \text{ cm} \Rightarrow A_{ABCD} = 768 \text{ cm}^2$$

$$\text{c) } A_{DBC} = \frac{BE \cdot CD}{2} = 600 \text{ cm}^2;$$

$$A_{ABD} = A_{ABCD} - A_{DBC} = 168 \text{ cm}^2$$

## Varianta 7

- I.**
- |                         |                       |
|-------------------------|-----------------------|
| 1. $-3a$                | 6. 1                  |
| 2. $(x+1)(2x-5)$        | 7. $2\sqrt{5}$ cm     |
| 3. $x = 9$              | 8. $60^\circ$         |
| 4. $(x+2)^2$            | 9. 3 cm               |
| 5. $\frac{1}{\sqrt{5}}$ | 10. $20 \text{ cm}^2$ |

**II.**

11. a)  $m_a = \frac{(\sqrt{5}+2) + (\sqrt{5}-2)}{2}$ ;  $m_g = \sqrt{(\sqrt{5}+2)(\sqrt{5}-2)} = \sqrt{5-4} = 1$

b)  $\begin{cases} x+5y=8 \\ 7x-y=20 \end{cases} \cdot 5 \Leftrightarrow \begin{cases} x+5y=8 \\ 35x-5y=100 \end{cases} \Leftrightarrow 36x=108 \Leftrightarrow \begin{cases} x=3 \\ y=1 \end{cases}$

**12.**

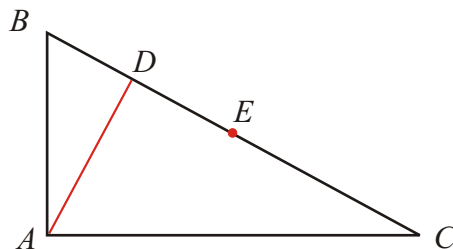
a)  $\sin B = \frac{AC}{BC} \Leftrightarrow 0,8 = \frac{AC}{25} \Leftrightarrow AC = 20 \text{ cm.}$

b) T.P.  $\triangle ABC \Rightarrow AB = 15 \text{ cm}$

$$A_{ABC} = \frac{AB \cdot AC}{2} = 150 \text{ cm}^2$$

c)  $AD = \frac{AB \cdot AC}{BC} = 12 \text{ cm.}$

d) T.P.  $\triangle ABD \Rightarrow BD = 9 \text{ cm} \Rightarrow ED = BE - BD = 3,5 \text{ cm.}$



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## Varianta 8

4. a)  $-x+3$ ; b) 0; c)  $\{-2,4\}$ ; d)  $8\sqrt{2}$  cm.
5. B.
6. C.
7. A.
8. D.
9. F;A;F;A.
10. a)  $n=0$ ,  $A=\sqrt{2007}$  (1p)  
 $44^2=1936$ ;  $45^2=2025$   $= A \in (44,45)$  (4p)  
 $M=\{0,1,2,\dots,44\}$  (1p)  
 $\text{card}M=45$  (1p)  
 b) Pentru  $n \in N$ ,  $u(5n) \in \{0,5\}$  (3p)  
 $u(5n+2007) \in \{7,2\}$  (2p)  
 $5n+2007$  este nr natural si nu e patrat perfect,  $\forall n \in N$  (2p)  
 $\Rightarrow \sqrt{5n+2007} \in R \setminus Q, \forall n \in N$  (1p)
11. Desenul (2p)  
 a)  $OM \parallel AB = \triangle DMO \sim \triangle DAB$  (1p)  
 $\Rightarrow \frac{MO}{AB} = \frac{DO}{DB}$  deci  $\frac{DO}{DB} = \frac{1}{4}$  (1p)  
 Obtinem  $\frac{DO}{OB} = \frac{1}{3}$  (1p)  
 $DC \parallel AB = \triangle OCD \sim \triangle OAB$  si  $\frac{CD}{AB} = \frac{DO}{OB} = \frac{1}{3}$  (1p)  
 $\Rightarrow CD = \frac{8}{3} \text{ cm}$  (1p)  
 b)  $\triangle AOB$  dreptunghic isoscel,  $AB=8 = AO = 4\sqrt{2}$  (2p)  
 $\triangle COD$  dreptunghic isoscel,  $CD = \frac{8}{3} \Rightarrow DO = \frac{4\sqrt{2}}{3}$  (2p)  
 $AC \perp BD = \triangle AOD$  dreptunghic (1p)  
 $AD^2 = AO^2 + DO^2 \Rightarrow AD = \frac{8\sqrt{5}}{3} \text{ cm}$  (2p)  
 $AD = BC$  si  $P = \frac{16(2+\sqrt{5})}{3} \text{ cm}$  (1p)

## Varianta 9

## Varianta I

## Partea I

I.1 – 6 puncte	I.2 – 6 puncte	I.3 – 6 puncte	I.4 – 6 puncte	I.5 – 6 puncte
17	$\left\{-\frac{15}{13}; +\frac{15}{13}\right\}$	$\frac{103}{16} = 6,4375$	18	16

## Partea a II – a

II.1 – 6 puncte	II.2 – 6 puncte	II.3 – 6 puncte	II.4 – 6 puncte
B.	B.	D.	B.

## Partea a III – a

4.

a)  $102^2 = (100 + 2)^2$ ;  $101 \cdot 99 = (100 + 1) \cdot (100 - 1)$ ;  $97^2 = (100 - 3)^2$  3 puncte

finalizare: 29812 ... .. 3 puncte

b) scrierea corectă a formulelor de calcul prescurtat ... 3 puncte

finalizare:  $6x$  ... .. 3 puncte

5.

a) desenul ... .. 6 puncte

b) folosirea teoremei lui Pitagora ... .. 2 puncte

finalizare:  $5cm$  ... .. 4 puncte

c) folosirea teoremei catetei ... .. 4 puncte

finalizare:  $\frac{25}{13}cm$ ;  $\frac{144}{13}cm$  ... .. 2 puncte

d) scrierea formulelor de calcul ... .. 3 puncte

finalizare:  $P = 30cm$ ;  $A = 30cm^2$ ;  $h = \frac{60}{13}cm$  ... .. 3 puncte

## Varianta 10

## Partea I

I.1 – 6 puncte	I.2 – 6 puncte	I.3 – 6 puncte	I.4 – 6 puncte	I.5 – 6 puncte
0	2	23	16	4

## Partea a II – a

II.1 – 6 puncte	II.2 – 6 puncte	II.3 – 6 puncte	II.4 – 6 puncte
D.	A.	B.	D.

## Partea a III – a

4.

$$a) E(\sqrt{2}) = 2\sqrt{2} + 1; E(\sqrt{2} - 1) = 2\sqrt{2} - 1 \quad \dots \quad \dots \quad \dots \quad 4 \text{ puncte}$$

$$\text{finalizare: } E(\sqrt{2}) \cdot E(\sqrt{2} - 1) = 7 \quad \dots \quad \dots \quad \dots \quad 2 \text{ puncte}$$

$$b) E(1) + E(2) + \dots + E(n) = 2 \cdot \frac{n(n+1)}{2} \quad \dots \quad \dots \quad \dots \quad 4 \text{ puncte}$$

$$\text{finalizare} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad 2 \text{ puncte}$$

5.

$$a) \text{desenul} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad 6 \text{ puncte}$$

$$b) \text{scrierea relației de calcul (suma unghiurilor)} \quad \dots \quad \dots \quad \dots \quad \dots \quad 2 \text{ puncte}$$

$$\text{finalizare: } 135^\circ \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad 4 \text{ puncte}$$

$$c) \text{determinarea laturii neparalele } 3\sqrt{2} \text{ cm} \quad \dots \quad \dots \quad \dots \quad \dots \quad 1 \text{ punct}$$

$$\text{determinarea bazei mari } 9 \text{ cm} \quad \dots \quad \dots \quad \dots \quad \dots \quad 1 \text{ punct}$$

$$\text{scrierea formulelor de calcul} \quad \dots \quad \dots \quad \dots \quad \dots \quad 2 \text{ puncte}$$

$$\text{finalizare: } P = 6(2 + \sqrt{2}) \text{ cm}; A = 18 \text{ cm}^2 \quad \dots \quad \dots \quad \dots \quad \dots \quad 2 \text{ puncte}$$

$$d.) \text{încadrarea diagonalei într-un triunghi dreptunghic} \quad \dots \quad \dots \quad \dots \quad \dots \quad 1 \text{ punct}$$

$$\text{folosirea teoremei lui Pitagora} \quad \dots \quad \dots \quad \dots \quad \dots \quad 2 \text{ puncte}$$

$$\text{finalizare: } 3\sqrt{5} \text{ cm} \quad \dots \quad \dots \quad \dots \quad \dots \quad 3 \text{ puncte}$$



## Varianta 11

## Partea I

I.1 – 6 puncte	I.2 – 6 puncte	I.3 – 6 puncte	I.4 – 6 puncte	I.5 – 6 puncte
0	(1;0)	5	9	$\frac{3}{5} = 0,6$

## Partea a II – a

II.1 – 6 puncte	II.2 – 6 puncte	II.3 – 6 puncte	II.4 – 6 puncte
C.	C.	D.	D.

## Partea a III – a

4.

a) folosirea formulelor de calcul ... .. 4  
puncte

finalizare ... .. 2  
puncte

b)  $E(1) + E(2) + \dots + E(10) = 960$  ... .. 6  
puncte

5.

a) desenul ... .. 6 puncte

b) încadrarea laturii oblice într-un triunghi dreptunghic ... 1 punct

folosirea raportului constant (cos) ... .. 2 puncte

finalizare:  $BC = 5cm$  ... .. 3 puncte

c) încadrarea înălțimii într-un triunghi dreptunghic ... .. 1 punct

folosirea teoremei lui Pitagora ... .. 2 puncte

finalizare:  $CC' = 4cm; CC' \perp AB$  ... .. 3 puncte

d) scrierea formulelor de calcul ... .. 2 puncte

finalizare:  $P = 30cm; A = 42cm^2$  ... .. 4 puncte

## Varianta 12

## Partea I

I.1 – 6 puncte	I.2 – 6 puncte	I.3 – 6 puncte	I.4 – 6 puncte	I.5 – 6 puncte
$\frac{12}{5} = 2,4$	(4;2)	$\frac{1}{2}$	30	10

## Partea a II – a

II.1 – 6 puncte	II.2 – 6 puncte	II.3 – 6 puncte	II.4 – 6 puncte
A.	B.	D.	C.

## Partea a III – a

4.

a) scrierea formulei de calcul ... .. 1 punct  
 finalizare:  $m_g = 1$  ... .. 5  
 puncte

b)  $\frac{1}{x} + \frac{1}{y} = 14$  ... .. 5 puncte  
 finalizare:  $E(x; y) = \frac{1}{7}$  ... .. 1 punct

4.

a) desenul ... .. 6 puncte  
 b) scrierea formulelor de calcul ... .. 2 puncte  
 determinarea înălțimii triunghiului ... .. 2 puncte  
 finalizare:  $P = 24cm; A = 16\sqrt{3}cm$  ... .. 2 puncte  
 c) determinarea razei cercului circumscris ... .. 2 puncte  
 scrierea formulelor de calcul ... .. 2 puncte  
 finalizare:  $l_c = \frac{16\sqrt{3}}{3} \pi cm; A_d = \frac{64}{3} \pi cm^2$  ... .. 2 puncte  
 d.) identificarea poziției punctului P pe (AC) ... .. 1 punct  
 determinarea triunghiurilor asemenea ... .. 3 puncte  
 finalizare:  $d(P; MC) = 3cm$  ... .. 2 puncte