A A A A A A A A A A A A A A A A A A A A A A A A A

Subiecte Clasa a VII-a

(40 de intrebari)

- Puteti folosi spatiile goale ca ciorna.
- Nu este de ajuns sa alegeti raspunsul corect pe brosura de subiecte, ele trebuie completate pe foaia de raspuns in dreptul numarului intrebarii respective.

---

1. **Calculati** $\left[\left(\frac{4}{3}\right)^{-2}-1\right]:\left[\left(-\frac{3}{4}\right)^{2}+1\right]$.

A) 7 B) 1 C) $\frac{7}{25}$

D) $-\frac{7}{25}$ E) 0

2. Un jucator de tenis primeste dupa fiecare meci castigat 2000 RON si dupa fiecare meci pierdut pierde 1500 RON. Dupa 18 meciuri jucate el are 1000 RON.

Cate din cele 18 meciuri jucate a pierdut?

A) 10 B) 8 C) 18 D) 5 E) 7

3. Un vas se umple cu apa pana la $\frac{1}{6}$ din capacitatea sa si cantareste 12 kg. Acelasi vas umplut cu apa pana la $\frac{1}{4}$ din capacitatea sa cantareste 17 kg.

Cat cantareste vasul gol?

A) 6 kg B) 4 kg C) 2 kg

D) 1 kg E) $\frac{1}{24}$ kg

4. **Solutia ecuatiei:**

$$\frac{\frac{1}{a+b}+\frac{1}{a-b}}{2-\frac{a+b}{a-b}}\cdot\frac{1-\frac{4b}{a+b}}{1+\frac{a-b}{a+b}}=\frac{x}{a-b},$$

pentru a, b $\in \mathbb{R}$, a $\neq$ b, a $\neq$ –b, a $\neq$ 3b, a $\neq$ 0 este:

A) $\frac{1}{a+b}$ B) $\frac{3}{a+b}$ C) 0

D) $\frac{a-1}{a+b}$ E) $\frac{a-b}{a+b}$

5. Fie numerele rationale a, b de forma

$$a=(1+2^{-1})+(1+3^{-1})+(1+4^{-1})+...+(1+2010^{-1}),$$

$$b=\frac{1}{1+1^{-1}}+\frac{1}{1+2^{-1}}+\frac{1}{1+3^{-1}}+...+\frac{1}{1+2009^{-1}}.$$

Calculati media aritmetica a numerelor a si b.

A) 2008 B) 2007 C) 2009

D) 2010 E) 2011

6. Se considera fractiile

$$f_1 = \frac{x}{y} \text{ si } f_2 = \frac{x+2009}{y+2009}.$$

Daca x > y > 0, atunci care din propozitiile urmatoare este adevarata?

A) $2f_1 = f_2$ B) $f_1 > f_2$ C) $f_1 = f_2$
D) $3f_1 = f_2$ E) $f_1 - f_2 < 0$

7. Valorile naturale ale lui n pentru care $\frac{11}{8} < \frac{2n+1}{24} < \frac{5}{3}$ sunt:

A) $n \in \{17; 18\}$
B) $n \in \{16; 17; 18\}$
C) $n \in \{17; 18; 19\}$
D) $n \in \{18; 19; 20\}$
E) $n \in \{16; 17; 18; 19\}$

8. Solutia ecuatiei:

$$\frac{2009}{1005}x = \frac{1}{1} + \frac{1}{1+2} + \frac{1}{1+2+3} + \ldots + \frac{1}{1+2+\ldots+2009}$$

este:

A) 2 B) 3 C) 4 D) 1 E) 5

9. Aflati distanta intre cele mai apropiate 2 puncte obtinute prin pozitionarea fractiilor de mai jos pe axa numerelor rationale: $\frac{3}{2}, -\frac{1}{2}, \frac{5}{2}, -\frac{7}{2}$.

A) 0,5 B) 1 C) 1,5
D) 2 E) 3,5

10. Calculati $\sqrt{29 - \sqrt{19 - \sqrt{11 - \sqrt{4}}}}$.

A) 6 B) 5 C) 4 D) 3 E) 2

11. $\sqrt{294}$ este egal cu:

A) $7\sqrt{6}$ B) $6\sqrt{7}$ C) $7\sqrt{3}$
D) $2\sqrt{147}$ E) $7\sqrt{2}$

12. Se da ecuatia

$$\left|a(\sqrt{3}-2) + b + \left|2\sqrt{3} - 5\right|\right| = 2009.$$

Perechea de numere rationale pozitive (a; b) care verifica ecuatia este:

A) (2;2008) B) (3;2010)
C) (2;2001) D) (2;2013)
E) (3;2004)

13. Fie numarul:

$$x = \sqrt{1156 + 2 \cdot (1 + 2 + 3 + ... + 1155)}.$$

Calculati $\sqrt{x}$.

A) 34 B) 25 C) 30 D) 40 E) 20

14. Care din urmatoarele calcule au ca rezultat un numar intreg?

I. $4\sqrt{2} - \sqrt{32}$

II. $2\sqrt{6} : (2\sqrt{3})$

III. $9\sqrt{2} \cdot \sqrt{32}$

IV. $\sqrt{5} + \sqrt{20}$

A) I si II B) III si IV C) II si IV
D) II si III E) I si III

15. Media geometrica a numerelor

$a = 2 + 2^2 + 2^3 + \ldots + 2^{2009}$ **si**

$$b = \frac{2}{2^{2009} - 1}$$

este:

A) 4 B) 1 C) $\sqrt{2}$ D) 3 E) 2

16. Fie multimile:

$A = \{-3\sqrt{2}; -\sqrt{9}; -3,5; 1,(3); \sqrt{17}; 7; 25\}$
si
$B = \{-10; -\sqrt{17}; -\frac{7}{2}; 0; \sqrt{5}; \sqrt{49}\}$.

Aflati elementele multimii $(A \cap B) \cup (A \setminus \mathbb{Q})$.

A) $\{-3\sqrt{2}; -3,5; 1,(3); \sqrt{17}; 7\}$

B) $\{-3\sqrt{2}; \sqrt{17}; 7; -\frac{7}{2}\}$

C) $\{-3,5; -\sqrt{17}; \sqrt{49}\}$

D) $\{-3,5; 1,(3); 7\}$

E) $\{-3\sqrt{2}; -\sqrt{9}; -\sqrt{17}\}$

17. Numarul elementelor multimii

$$A = \{(a;n) \in \mathbb{N} \times \mathbb{N} / a = \overline{xyz}, \sqrt{a} = 1 + 2 + 3 + ... + n\}$$

este:

A) 6 B) 2 C) 5 D) 0 E) 4

18. Calculand

$$\left|\sqrt{2} - \sqrt{3}\right| + \left|2 - \sqrt{3}\right| + \left|1 - \sqrt{2}\right|$$

obtinem:

A) $\sqrt{2}$ B) $\sqrt{3}$ C) 1 D) 3 E) 2

19. Rezultatul calculului

$$\sqrt{\left[\frac{6}{5}+\frac{7}{10}+\frac{8}{15}+...+\frac{50}{225}-\left(\frac{1}{2}+\frac{1}{3}+...+\frac{1}{45}\right)\right]\cdot 5}$$

este:

A) $\sqrt{50}$ B) $\sqrt{45}$ C) $\sqrt{54}$

D) $\sqrt{55}$ E) 5

20. Suma numerelor rationale x si y care indeplinesc conditia

$$\frac{x+2009}{\sqrt{4+2\sqrt{3}}}=\frac{\sqrt{4-2\sqrt{3}}}{\sqrt{3}}(y-2009)$$

este:

A) 2009 B) $2\sqrt{3}$ C) $4+2\sqrt{3}$

D) $4-2\sqrt{3}$ E) 0

21. Fie a, b $\in \mathbb{R}$, a > b > 0 astfel incat

$a^2 + b^2 = 2009 \cdot a \cdot b$.

Valoarea raportului $\frac{a+b}{a-b}$ este egala cu:

A) $\sqrt{\frac{2009}{2008}}$ B) $\sqrt{\frac{2011}{2007}}$ C) $\sqrt{\frac{2008}{2009}}$

D) $\sqrt{2009}$ E) $\sqrt{\frac{2013}{2009}}$

22. Cate valori naturale poate lua x astfel incat fractia $\frac{5x^2-3x+13}{3x-5}\in\mathbb{N}$?

A) o infinitate de valori B) 4 C) 2

D) 1 E) 0

23. Se da relatia

$2x^2+3y^2+5=2\sqrt{6}x+2\sqrt{6}y$,

unde x, y $\in \mathbb{R}^*$.

Calculand expresia $\frac{x}{y}+\frac{y}{x}+2$ se obtine:

A) $\frac{25}{6}$ B) $\frac{2\sqrt{6}}{5}$ C) $\frac{37}{6}$

D) $\frac{17}{6}$ E) 0

24. Se da

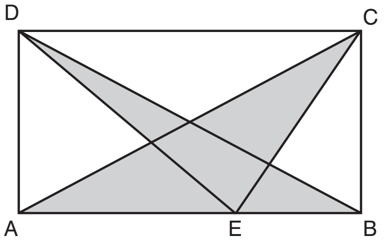
$$A=\sqrt{(x+y-1)^2+100+22(x+y)}.$$

Daca valoarea lui A este minima, valoarea sumei x + y este:

A) 10 B) –12 C) –10

D) –22 E) –100

25.

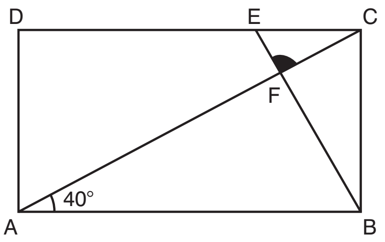


ABCD este un dreptunghi.

Daca $A_{CAE} + A_{DEB} = 18$, atunci A_{ABCD} este:

A) 18 B) 24 C) 27 D) 30 E) 36

26.

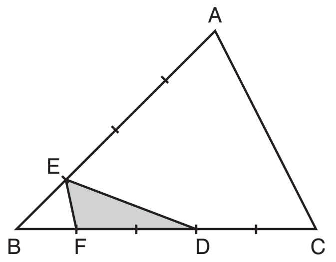


ABCD este dreptunghi, DE = BE. Daca $m(\measuredangle CAB) = 40^\circ$, calculati $m(\measuredangle EFC)$.

A) 50° B) 60° C) 70°

D) 75° E) 80°

27.

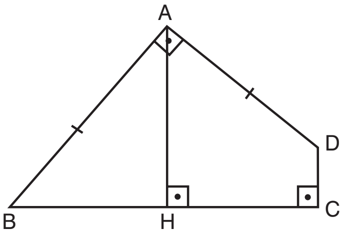


In figura alaturata, latura [AB] este impartita in 4 parti egale, iar [BC] in 5 parti egale.

Calculati raportul $\frac{A_{ABC}}{A_{EFD}}$.

A) 5 B) 9 C) 20 D) 10 E) 15

28.



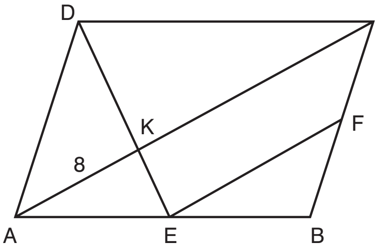
In figura alaturata, AB = AD, $AB \perp AD$, $AH \perp BC$ si $DC \perp BC$.

Daca $A_{ABCD} = 16$, calculati lungimea segmentului AH.

A) $2\sqrt{2}$ B) $2\sqrt{3}$ C) $3\sqrt{2}$

D) 4 E) 5

29.

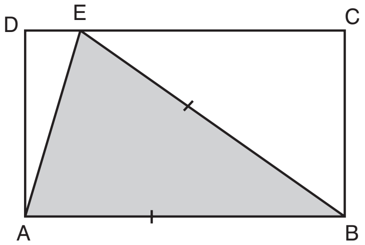


In paralelogramul ABCD, AE = EB, BF = FC, AC ∩ DE = {K} si AK = 8.

Lungimea segmentului EF este:

A) 14 B) 6 C) 10 D) 8 E) 12

30.

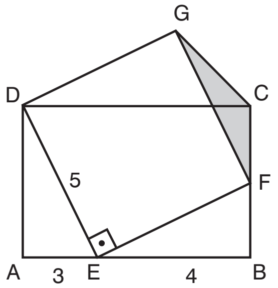


In dreptunghiul ABCD, AB = BE, m(∡DAE) = 15° si AB = 12.

Calculati A_{ABE}.

A) 72 B) 64 C) 48 D) 36 E) 60

31.



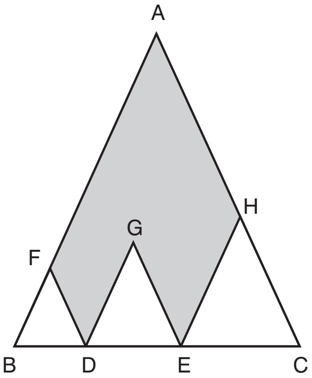
In figura alaturata, ABCD este dreptunghi si DEFG este patrat.

Daca DE = 5 cm, AE = 3 cm si EB = 4 cm, atunci A_{GCF}=?

A) $\frac{9}{8}$ cm^2 B) 1 cm^2 C) $\frac{3}{2}$ cm^2

D) $\frac{5}{2}$ cm^2 E) $\frac{7}{3}$ cm^2

32.

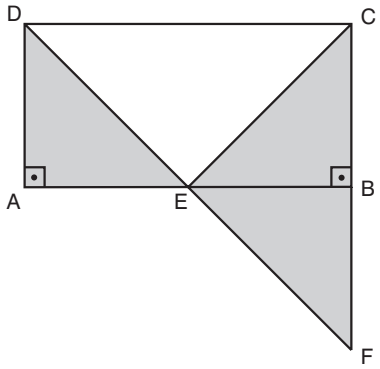


In triunghiul echilateral ABC din figura, sunt construite triunghiurile echilaterale FBD, GDE si HEC pe latura BC cu proprietatea 4BD = 2DE = EC.

Valoarea raportului dintre A_{ABC} si aria hasurata este egala cu:

A) $\frac{7}{4}$ B) $\frac{3}{2}$ C) $\frac{4}{3}$ D) $\frac{9}{7}$ E) $\frac{5}{3}$

33.



In dreptunghiul ABCD, DF $\cap$ AB = {E}, AB $\perp$ CF si ΔBEF $\sim$ ΔBEC.

Care din urmatoarele afirmatii este corecta ?

A) AE < EB B) EB < AE
C) EF<DE D) EF = ED
E) EF = AD

34. In triunghiul isoscel ABC (AB = AC), m($\measuredangle$A) = 30°, AD $\perp$ BC, D $\in$ [BC] si DE $\perp$ AC, E $\in$ [AC].

Stiind ca DE = 1,4 cm, aria ΔABC este:

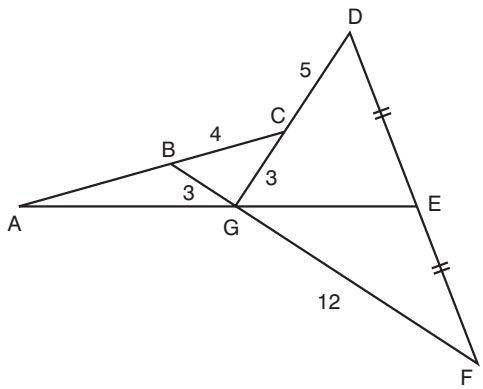
A) 7,84 cm^2 B) 18,4 cm^2
C) 19,6 cm^2 D) 10,8 cm^2
E) 6,4 cm^2

35. Fie ΔABC cu M mijlocul lui [BC] si N mijlocul lui [AB], AM $\cap$ CN = {G}.

Atunci $\frac{A_{CGM}}{A_{MNA}}$ este egal cu:

A) 1 B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{4}{5}$ E) $\frac{3}{4}$

36.

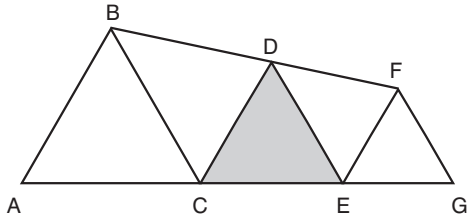


In figura alaturata, DE = EF, BC = 4, CG = BG = 3, CD = 5 si GF = 12.

Calculati lungimea segmentului AB.

A) 7 B) 8 C) 9 D) 10 E) 11

37.



In figura alaturata, ΔABC, ΔCDE si ΔEFG sunt echilaterale.

Daca BC = 6 cm si EG = 4 cm, calculati aria triunghiului CDE?

A) 6 cm^2 B) $6\sqrt{2}$ cm^2 C) $6\sqrt{3}$ cm^2

D) $6\sqrt{6}$ cm^2 E) 12 cm^2

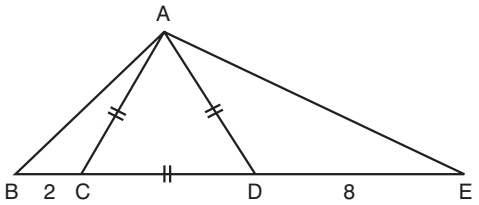
38. In trapezul isoscel ABCD, AD = BC, MN este linie mijlocie si CE este inaltime, $E \in [AB]$.

Stiind ca AE = 6 cm aflati lungimea lui [MN].

A) 12 cm B) 9 cm C) 3 cm

D) 10 cm E) 6 cm

39.



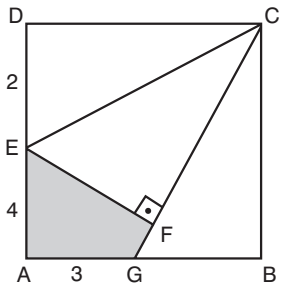
In figura alaturata, $m(\measuredangle BAE) = 120°$ si ΔACD este echilateral.

Daca BC = 2 si DE = 8, aflati lungimea segmentului CD.

A) 3 B) 4 C) $2\sqrt{3}$

D) $3\sqrt{3}$ E) 6

40.



In figura alaturata, ABCD este patrat, DE = 2 cm, EA = 4 cm, AG = 3 cm si GC = $3\sqrt{5}$ cm.

Cati cm^2 este aria hasurata ?

A) 8 B) 9 C) 10 D) 11 E) 12