

Subiecte Clasa a VII-a

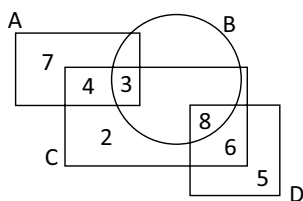
(40 de intrebari)

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

1. A si B sunt doua multimi, iar $\text{card}(A)=8$ si $\text{card}(B)=11$. Aflati diferenta dintre valoarea maxima si valoarea minima a $\text{card}(A \cup B)$.

A) 3 B) 5 C) 7 D) 8 E) 9

2. Privind figura alaturata, care din urmatoarele este gresita?



- A) $A \cap (B \cup D) = \{3\}$
 B) $A \cap D = \emptyset$
 C) $A \not\subset D$
 D) $(A \cup B) \cap C = \{3, 4\}$
 E) $B \setminus (A \cup D) = \emptyset$

3. Fie $A = \{-10; -5, 2; -\sqrt{3}; -\frac{1}{2}; 0; \sqrt{2}; 1, (7); 3\sqrt{5}; 10\}$.

Aflati elementele multimii: $(A \cap \mathbb{Z}^*) \cup (A \setminus \mathbb{Q})$.

- A) $\{-10; 10\}$
 B) $\{-\sqrt{3}; \sqrt{2}; 3\sqrt{5}\}$
 C) $\{-5, 2; -\frac{1}{2}; 1, (7)\}$
 D) $\{-10; -5, 2; -\frac{1}{2}; 1, (7); 10\}$
 E) $\{-10; -\sqrt{3}; \sqrt{2}; 3\sqrt{5}; 10\}$

4. $-4^2 + (-4)^2 \cdot (-2)^3 + 7^0 = ?$

- A) 145 B) 151 C) 113
 D) -111 E) -143

5. Pentru a incarca la capacitate maxima un camion este nevoie de 7 frigidere si 15 cuptoare cu microunde sau 13 frigidere si 6 cuptoare cu microunde. Daca scoatem 6 cuptoare cu microunde, cate frigidere este necesar sa asezam in loc?
- A) 2 B) 4 C) 5 D) 8 E) 9
6. Multimea $A = \{x \in \mathbb{Z} \mid 7 < x^2 \leq a\}$ are 12 elemente. Cate valori naturale poate lua a ?
- A) 8 B) oricate, $a \geq 64$ C) 17
D) 18 E) 64
7. $\left[\frac{(7 + 14 + 21 + \dots + 147)^2}{(14 + 28 + 42 + \dots + 294)^2} \right]^{-1} = ?$
- A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $-\frac{1}{2}$ D) 2 E) 4
8. Calculand $[3, (1) + 6] : [1, (5) + 3]$ obtinem:
- A) $\frac{1}{5}$ B) $\frac{5}{9}$ C) $\frac{1}{2}$ D) 1 E) 2
9. Solutia in \mathbb{Q}^* a ecuatiei: $\frac{0,32 \cdot x + 18}{x} = 0,82$ este:
- A) 5 B) 36 C) 60 D) 50 E) 80
10. $\frac{0,19}{0,0019} - \frac{0,5}{0,025} - \frac{0,1}{0,0008} = ?$
- A) -95 B) -45 C) 715 D) 875 E) 975
11. La Liceul International de Informatica 99% din totalul de 100 de elevi ai liceului au media la matematica peste opt si 98% din elevii care stau la internatul liceului au media la matematica peste opt. Cati elevi nu stau in internat?
- A) 1 B) 2 C) 49 D) 50 E) 98
12. Sa se determine valoarea maxima a numarului natural a , diferit de 0, pentru care:
- $$\frac{1}{3+6} + \frac{1}{3+6+9} + \frac{1}{3+6+9+12} + \dots + \frac{1}{3+6+9+12+\dots+2010} < \frac{1}{a}$$
- A) 5 B) 3 C) 4 D) 6 E) 7

13. Gasiti $a \in \mathbb{Q}$ astfel incat $\frac{x+a}{y+a} = \frac{x^2}{y^2}$ unde

$x \neq \pm y$.

A) $\frac{xy}{x+y}$

B) $\frac{x+y}{xy}$

C) $\frac{xy}{x-y}$

D) $\frac{x-y}{xy}$

E) $\frac{-xy}{x+y}$

14. Daca numerele $(x-1)^3$ si 27 sunt direct proportionale cu 3 si $x-1$, gasiti valoarea pozitiva a expresiei $(x-1)^5$.

A) 81

B) 27

C) 4^5

D) 243

E) 3^6

15. Produsul dintre media geometrica si media aritmetica a numerelor $4 - \sqrt{15}$ si $4 + \sqrt{15}$ este:

A) $\sqrt{15}$

B) 4

C) $4 + \sqrt{15}$

D) $4 - \sqrt{15}$

E) 0

16. Suma a patru numere intregi strict pozitive, diferite doua cate doua, este 320. Care este valoarea maxima pe care o poate lua cel mai mic dintre ele?

A) 80

B) 1

C) 82

D) 314

E) 78

17. Daca $-1 < a < b < 0$ stabiliti cate din urmatoarele relatii sunt adevarate:

i) $a^2 > b^2$

ii) $\frac{a}{b} < a$

iii) $a^3 < b^3$

iv) $a \cdot b > b^2$

v) $2a > a + b$

A) 1

B) 2

C) 3

D) 4

E) 5

18. Cate dintre numerele $\sqrt{1}, \sqrt{2}, \sqrt{3}, \dots, \sqrt{2008}$ sunt rationale?

A) 2008

B) 43

C) 44

D) 45

E) 25

19. Suma solutiilor ecuatiei $|x-1| = \left| -\frac{1}{2} \right|$ este:

A) -2

B) -1

C) 0

D) 1

E) 2

20. Fie $A = \sqrt{1 \cdot 2} + \sqrt{2 \cdot 3} + \sqrt{3 \cdot 4} + \dots + \sqrt{30 \cdot 31}$ si

$B = \sqrt{5 \cdot 6} + \sqrt{10 \cdot 9} + \sqrt{15 \cdot 12} + \dots + \sqrt{150 \cdot 93}$,

aflati $\frac{B}{A}$.

A) $\sqrt{5}$

B) $\sqrt{3}$

C) $\sqrt{8}$

D) $\sqrt{15}$

E) $\sqrt{6}$

21. Valoarea expresiei:

$$\frac{1}{2\sqrt{1+1}\sqrt{2}} + \frac{1}{3\sqrt{2+2}\sqrt{3}} + \frac{1}{4\sqrt{3+3}\sqrt{4}} + \frac{1}{5\sqrt{4+4}\sqrt{5}} + \dots + \frac{1}{9\sqrt{8+8}\sqrt{9}}$$

este:

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

22. Calculand suma:

$$\frac{\sqrt{2}-\sqrt{3}}{\sqrt{6}} + \frac{\sqrt{3}-\sqrt{4}}{\sqrt{12}} + \frac{\sqrt{4}-\sqrt{5}}{\sqrt{4 \cdot 5}} + \dots + \frac{\sqrt{n}-\sqrt{n+1}}{\sqrt{n \cdot (n+1)}}$$

$n \in \mathbb{N}^*$ obtinem:

A) $\frac{1}{\sqrt{2(n+1)}}$ B) $\sqrt{n+1} - \frac{1}{\sqrt{2}}$ C) $\sqrt{2} - \frac{1}{\sqrt{n+1}}$

D) $\frac{1}{\sqrt{n+1}} - \frac{1}{\sqrt{2}}$ E) $\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{n+1}}$

23. Daca numarul natural n este patrat perfect, precizati care din urmatoarele numere nu poate fi niciodata patrat perfect.

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

24. Aflati media aritmetica a numerelor a si b $\in \mathbb{Q}$

astfel incat $\frac{a}{\sqrt{3-2\sqrt{2}}} - \frac{b}{\sqrt{3+2\sqrt{2}}} = \sqrt{2}$.

A) $-\frac{1}{4}$ B) $-\frac{1}{2}$ C) 0 D) 1 E) $\frac{1}{4}$

25. Daca $a^5 \cdot b^2 > 0$, $b^3 \cdot c^5 > 0$ si $a^3 \cdot c^3 < 0$, aflati semnele lui a, b si c.

A) $a > 0$; $b > 0$; $c < 0$ B) $a > 0$; $b < 0$; $c < 0$

C) $a < 0$; $b < 0$; $c < 0$ D) $a > 0$; $b < 0$; $c > 0$

E) $a < 0$; $b > 0$; $c < 0$

26. Stabiliti cate din urmatoarele relatii sunt adevarate:

i) $(a+b)^2 = a^2 + b^2 + 2ab$

ii) $a^2 - b^2 = (a-b)(a+b)$

iii) $(a-b)^2 = (a+b)^2 - 4ab$

iv) $a^2 + b^2 = (a-b)^2 + 4ab$

A) 1 B) 2 C) 3 D) 4 E) 0

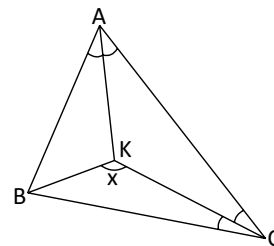
27. Pentru triunghiul ABC, AK si CK sunt bisectoare.

Daca

$m(\angle BAK) = m(\angle CAK) = 23^\circ$ si

$m(\angle ACK) = m(\angle BCK) = 15^\circ$

aflati $m(\angle BKC)$.



A) 103° B) 107° C) 110°

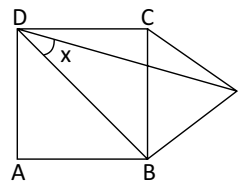
D) 112° E) 113°

28. In figura, ABCD este un

patrat si ECB este un

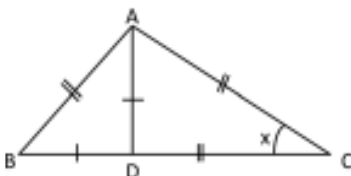
triunghi echilateral.

Aflati $m(\angle EDB) = x$



A) 25° B) 30° C) 32° D) 36° E) 40°

29. In triunghiul ABC, $AB=AC=CD$ si $BD=AD$. Aflati $m(\angle ACD)=x$.



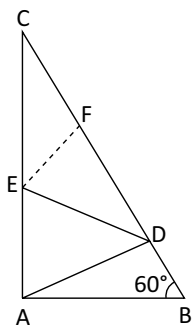
- A) 9° B) 18° C) 27° D) 36° E) 45°

30. Fie D un punct pe latura (AC) a $\triangle ABC$ cu $AB > BC$. Stabiliti ce relatie exista intre AB si BD.

- A) $AB < BD$ B) $AB > BD$ C) $2AB = BD$

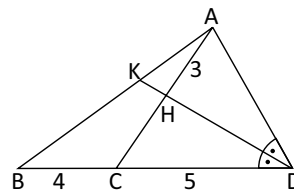
D) $\frac{AB}{BD} = \frac{1}{3}$ E) $AB = BD$

31. Fie triunghiul dreptunghic ABC, $m(\angle A) = 90^\circ$, $m(\angle B) = 60^\circ$, $AD \perp BC$, $D \in (BC)$, DE este mediana in triunghiul ADC, $E \in (AC)$ si (EF bisectoare in triunghiul EDC, $F \in (BC)$). Calculati raportul lungimilor segmentelor EF si AC.



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

32. In triunghiul ABD, DK este bisectoarea $\angle ADB$, $DH \perp AC$, $BC=4$, $CD=5$ si $AH=3$. Aflati $A_{\triangle AKH}$.

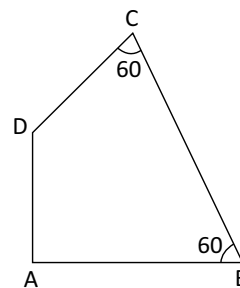


- A) $\frac{4}{3}$ B) $\frac{7}{2}$ C) $\frac{9}{5}$ D) $\frac{8}{5}$ E) $\frac{12}{7}$

33. In triunghiul dreptunghic ABC, $m(\angle A) = 90^\circ$, $m(\angle C) = 15^\circ$, se duc inaltimea AD, mediana AO si bisectoarea AE ($D, E, O \in BC$). Precizati relatia corecta.

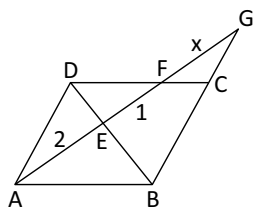
- A) $[OD] \equiv [DA]$ B) $2 \cdot AE = 3 \cdot EO$ C) $EO = 2 \cdot ED$
D) $[CE] \equiv [EB]$ E) $[OE] \equiv [ED]$

34. In figura, $m(\angle B) = m(\angle C) = 60^\circ$, $AD \perp AB$ si $BC+CD=15$ cm. Aflati AB.



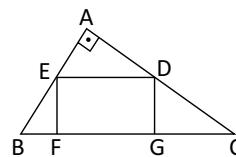
- A) 4,5 cm B) 5 cm C) 6 cm
D) 7,5 cm E) 9 cm

35. In figura alaturata ABCD este paralelogram. Daca $AE=2$ si $EF=1$, aflati GF.



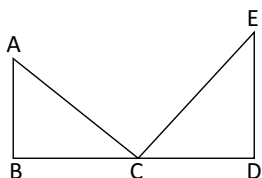
- A) 2 B) 3 C) 4 D) 5 E) 6

38. ABC este un triunghi dreptunghic cu $m(\angle A) = 90^\circ$ si DEFG este un dreptunghi. Daca $BF=4$ si $CG=9$ aflati DG.



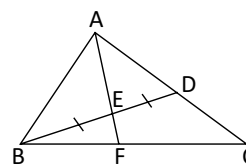
- A) 2 B) 3 C) 4 D) 6 E) 8

36. In figura alaturata $AB \perp BD$; $AC \perp EC$; $AB \parallel ED$; $BD = 2BC$ si $AB \cdot ED = 54$. Aflati CD.



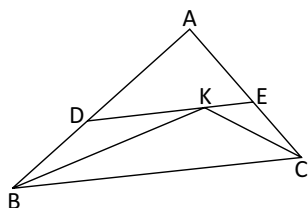
- A) $3\sqrt{6}$ B) $4\sqrt{3}$ C) $4\sqrt{2}$
D) $2\sqrt{6}$ E) $3\sqrt{2}$

39. In figura alaturata $BE=ED$, $2AD=3DC$ si $BF=6$. Aflati FC.



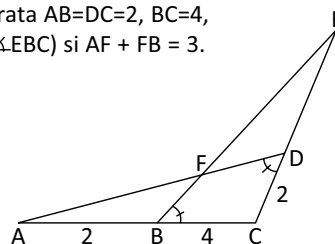
- A) 4 B) 6 C) 8 D) 9 E) 10

37. In $\triangle ABC$, BK si CK sunt bisectoare. Daca $DE \parallel BC$, $AD=12$ cm, $BD=6$ cm si $AE=8$ cm. Cati cm are BC?



- A) 12 B) 15 C) 18 D) 20 E) 24

40. In figura alaturata $AB=DC=2$, $BC=4$, $m(\angle ADC)=m(\angle EBC)$ si $AF + FB = 3$. Aflati $P_{\triangle FED}$.



- A) 21 B) 25 C) 22 D) 24 E) 27