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Subiecte Clasa a VIII-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.

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1. **Multimea solutiilor ecuatiei**

$$2x + 3 = 6 + |x|$$

este:

A) $\varnothing$ B) $\{3\}$ C) $\{1, 3\}$ D) $\{-1, 3\}$ E) $\{-3, -1, 1\}$

2. **Daca**

$x - y = -3z,$

$x + y = z$ **si**

$z \neq 0,$

calculati raportul: $\dfrac{2x+y+z}{x+2y+z}$

A) $\frac{1}{2}$ B) $\frac{5}{6}$ C) $\frac{1}{4}$ D) 0 E) -1

3. **Fie** $x, y \in \mathbb{R}$ **astfel incat**

$$x^2 + y^2 - 3(x - y) + 4{,}25 = 0.$$

Atunci:

A) $|x + y| > 4$ B) $1 < |x + y| \leq 2$ C) $|x + y| \leq 1$ D) $|x + y| = 4$ E) $2 \leq |x + y| < 4$

4. **Determinati numarul valorilor distincte pe care le poate lua restul impartirii patratelor perfecte la** 4**.**

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

5. **Cate numere intregi sunt intre numerele reale** $-2\sqrt{7}$ **si** $7\sqrt{2}$**?**

A) 11 B) 12 C) 13 D) 14 E) 15

6. **Calculati media geometrica a numerelor**

$$a = \sqrt{13+4\sqrt{3}} \quad \textbf{si} \quad b = \sqrt{(1-2\sqrt{3})^2}$$

A) 1 B) 11 C) $\sqrt{11}$ D) $2\sqrt{3}$ E) $\sqrt{3}$

7. **Numarul elementelor multimii**

$A = \{x \in \mathbb{Z} \ / \ |2x - 3| \leq 3\}$ **este:**

A) 4 B) 3 C) 7 D) 6 E) 2

8. **Numerele intregi** m **si** n **pentru care** $m + n\sqrt{2} = (5 + 2\sqrt{2})(3 - 2\sqrt{2})$ **sunt:**

A) $m = -6, n = 3$

B) $m = -1, n = -14$

C) $m = 5, n = -14$

D) $m = -2, n = 7$

E) $m = -14, n = -1$

9. **Cel mai mare numar intreg mai mic decat**

$$x = \frac{2+2\sqrt{2}+\sqrt{5}+\sqrt{10}-2\sqrt{3}-\sqrt{15}}{1+\sqrt{2}-\sqrt{3}}$$

este:

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

10. Din sapte numere naturale s-au eliminat doua numere. Suma numerelor ramase este 29.

Determinati o pereche posibila de numere eliminate din cele enuntate mai jos.

A) 2 si 3 B) 3 si 4 C) 4 si 7 D) 8 si 9 E) 6 si 7

11. **Comparati**

$$a = \sqrt{x+2} + \sqrt{x+7},$$

$$b = \sqrt{x+3} + \sqrt{x+6} \quad \textbf{si}$$

$$c = \sqrt{x+4} + \sqrt{x+5}$$

A) $a < c < b$ B) $c < a < b$

C) $b < a < c$ D) $a < b < c$

E) $c < b < a$

12. $2\sqrt{7+\sqrt{13}}$ **se poate scrie ca suma de doi radicali simpli astfel:**

A) $\sqrt{2} + \sqrt{13}$ B) $\sqrt{6} + \sqrt{7}$

C) $\sqrt{5} + \sqrt{2}$ D) $\sqrt{7} + \sqrt{13}$

E) $\sqrt{26} + \sqrt{2}$

13. **Valoarea maxima a expresiei**

$$E = 4 - \sqrt{x^2 - 8x + 25}$$

este:

A) –1 B) 1 C) 4 D) 5 E) –3

14. **Fie** $a, b \in \mathbb{R}$ **ce indeplinesc conditia**

$$a^2 + b^2 - 6a + 4b + 13 = 0.$$

Determinati $\dfrac{a \cdot b}{a+b}$.

A) –6 B) 6 C) –1 D) 5 E) 1

15. **Daca**

$a^2 + 2b = 7,$

$b^2 + 4c = -7$ **si**

$c^2 + 6a = -14$

pentru $a, b, c \in \mathbb{R}$, **calculati**

$a^2 + b^2 + c^2.$

A) 14 B) 21 C) 28 D) 35 E) 49

16. Determinati $n \in \mathbb{N}^*$ **, daca**

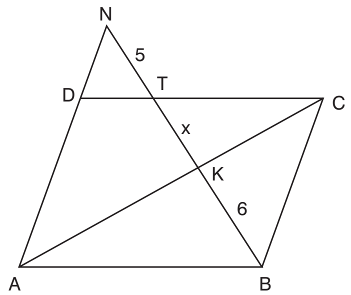
$1+2+\ldots+n \leq 2009 \leq 1+2+\ldots+(n+1)$.

A) $n = 63$ B) $n = 62$

C) nu exista D) $n = 60$

E) $n = 31$

17.



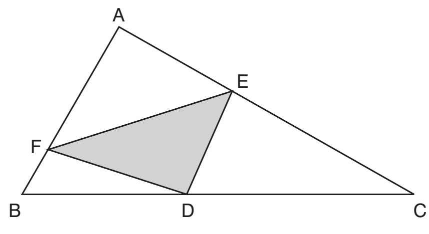
In paralelogramul ABCD se considera punctul $N \in (AD$, $NB \cap AC = \{K\}$ si $NB \cap DC = \{T\}$, astfel incat $NT = 5$ cm; $KB = 6$ cm.

Calculati lungimea segmentului TK.

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

D) $2\sqrt{6}$ cm E) 5 cm

18.

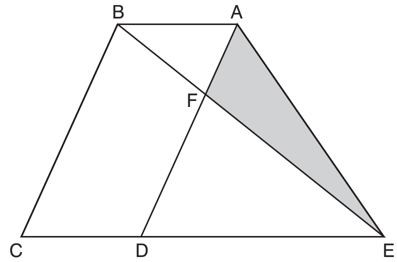


In figura de mai sus, D si E sunt mijloacele laturilor BC, respectiv AC.

Daca $F \in AB$ **si** $A_{ABC} = 32\ cm^2$, **aflati** A_{FED}.

A) 12 B) 10 C) 9 D) 8 E) 6

19.

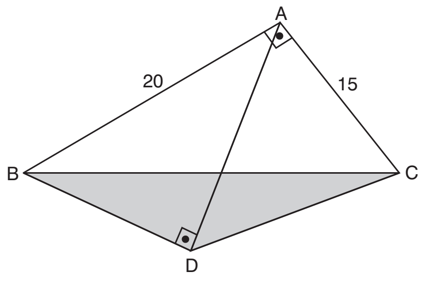


In figura de mai sus, ABCD este paralelogram.

Daca $BF = \frac{1}{3}FE$, **atunci valoarea raportului dintre aria hasurata si** A_{ABCD} **este:**

A) $\frac{2}{3}$ B) $\frac{1}{6}$ C) $\frac{8}{7}$ D) $\frac{2}{7}$ E) $\frac{3}{8}$

20.



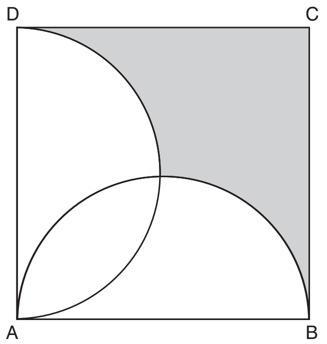
In patrulaterul ABDC, $AB \perp AC$ si $BD \perp AD$.

Daca $A_{ABD} = A_{ACD}$, $AB = 20$ **si**

$AC = 15$, **aflati** A_{BDC} .

A) 42 B) 45 C) 48 D) 50 E) 52

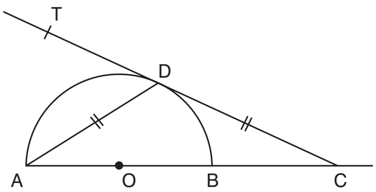
21.



In patratul ABCD, AB = 2 cm**. Daca** AD **si** AB **sunt diametre, atunci aria hasurata folosind** π = 3 **este:**

A) 2 cm^2 B) 3,5 cm^2 C) 1,5 cm^2 D) 4 cm^2 E) 4,4 cm^2

22.



In figura de mai sus, se da semicercul cu centrul in O, AB diametru, TD tangenta la cerc (cu D punct de tangenta) si $TD \cap AB = \{C\}$.

Daca $[AD] \equiv [DC]$, **aflati** $m(\measuredangle ADT)$**.**

A) 60° B) 45° C) 90° D) 30° E) 150°

23. Aflati multimea solutiilor ecuatiei

$$\frac{|x-2|+3x}{5}=\frac{|6x|}{2}$$

A) $\{\frac{-2}{5};\frac{-2}{7}\}$ B) $\{\frac{-4}{11};\frac{-2}{17}\}$ C) $\{\frac{-2}{1};\frac{-2}{19}\}$ D) $\{\frac{-2}{17};\frac{2}{13}\}$ E) $\{\frac{-2}{5};\frac{-1}{6}\}$

24. Daca $x+\frac{1}{x}=5$, **calculati** $x^2+\frac{1}{x^2}$.

A) 5 B) 25 C) 27 D) 23 E) 8

25. Se stie ca $\frac{x^2+y^2}{xy}=8$. **Atunci valoarea expresiei** $(x+y)\left(\frac{1}{x}+\frac{1}{y}\right)$ **este:**

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

26. Numarul $a=\sqrt{3^8+3^9}$ **este egal cu:**

A) $\sqrt{3^{17}}$ B) 3^{10} C) $3^4 \cdot 2$ D) $3^4\sqrt{3}$ E) $3^8\sqrt{6}$

27. Daca a + b = 9**, atunci media aritmetica a numerelor** a^2, b^2 **si** 2ab **este egala cu:**

A) 81 B) 27 C) 18 D) 9 E) 3

28. Fie multimea: $A = \{x \in \mathbb{R} / |x-2| \leq 3\}$.

Scriind sub forma de interval aceasta multime, se obtine:

A) [–5; 1] B) [–1; 5] C) [–5; 5] D) [–1; 1] E) [1; 5]

29. Calculati:

$$[7,3] + [-7,3] + \{6,2\} + \{-6,2\}$$

unde $[x]$ **este partea intreaga a lui** x **si** $\{x\}$ **este partea fractionara a lui** x**.**

A) 1 B) 0 C) –0,6 D) 0,4 E) –1

30. Rezultatul calculului

$$\sqrt{11-4\sqrt{7}} - \sqrt{(3-\sqrt{7})^2} + \sqrt{(-3)^2}$$

este:

A) 2 B) $2(\sqrt{7}-1)$ C) 4

D) $2(\sqrt{7}-4)$ E) $2(4-\sqrt{7})$

31. Fie

$$F = \left(\frac{\sqrt{3}+\sqrt{2}}{\sqrt{5}} - \frac{\sqrt{5}}{\sqrt{3}+\sqrt{2}}\right)^{-2} - \frac{5}{2\sqrt{6}}.$$

Daca $F = \frac{a}{b}$, **unde** a **si** b **sunt prime intre ele, atunci** $a + b$ **este:**

A) $10 + \sqrt{6}$ B) $5\sqrt{6}$ C) 49

D) 25 E) 50

32. Se da ecuatia $x^4 - 4y = 3$ **cu** $x, y \in \mathbb{Z}$.

Aflati intervalul [a, b) unde

$a = \min(x, y)$ **si** $b = \max(x, y)$**.**

A) [2, 3) B) [–6, 0)

C) [–2, 6) D) [6, 6)

E) [6, 12)

33. Care este numarul maxim de numere naturale consecutive a caror suma este egala cu 2009**?**

A) 39 B) 49 C) 41

D) 50 E) Alt raspuns

34. O piramida gigantica are in total 101 **varfuri. Numarul maxim de plane distincte determinate de aceste varfuri este:**

A) 4930 B) 4951 C) 4940

D) 101 E) 4950

35. Fie ABC un triunghi dreptunghic ($m(\measuredangle A) = 90°$). Pe latura [AB] se construieste dreptunghiul ABMN ($MN \not\subset (ABC)$).

Stabiliti pozitia dreptei AB **fata de planul** (ACN)**.**

A) $BA \cap (ACN) = \{C\}$

B) $BA \cap (ACN) = \{N\}$

C) $BA \cap (ACN) = \{B\}$

D) $BA \parallel (ACN)$

E) $BA \perp (ACN)$

36. ABC este un triunghi cu latura BC inclusa intr-un plan α, $A \notin \alpha$, AB = 15 cm si AC = 20 cm. Fie $D \in (AB)$ si $E \in (AC)$ astfel incat AD = 3 cm, EC = 16 cm.

Precizati cate puncte are in comun dreapta DE **cu planul** α**.**

A) nu se poate stabili

B) o infinitate

C) un punct

D) nici un punct

E) doua puncte

37. Se da paralelipipedul dreptunghic

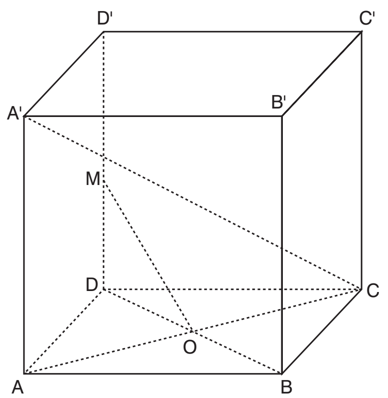
ABCDA'B'C'D' cu AB = 10 cm,

BC = 5 cm si AA' = 18 cm.

Daca M $\in$ (BB') **astfel incat perimetrul** ΔA'MC **sa fie minim, atunci lungimea** [MB] **este:**

A) 10 B) 6 C) 5 D) 9 E) 1

38.



In figura de mai sus ABCDA'B'C'D' este un cub de latura 8 cm.

Daca M **este mijlocul segmentului** [DD'] **iar** AC $\cap$ BD = {O} **atunci valoarea** sin($\measuredangle$(MO,A'C)) **este:**

A) $\frac{\sqrt{3}}{2}$ B) $\frac{2\sqrt{2}}{3}$ C) $\frac{\sqrt{7}}{3}$

D) $\frac{2\sqrt{3}}{5}$ E) $\frac{3}{4}$

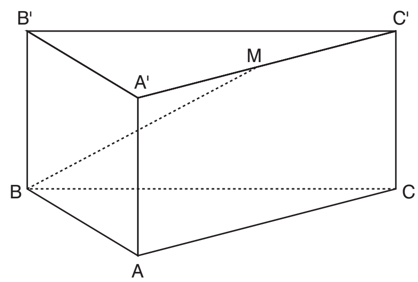
39. Fie VABCD piramida patrulatera regulata si triunghiul VAC echilateral de latura 8 cm.

Daca M $\in$ VC **astfel incat aria** ΔBMD **este minima atunci lungimea** [MC] **este:**

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

D) 2 E) 4

40.



In figura de mai sus ABCA'B'C' este prisma triunghiulara regulata.

Daca AB = 20 cm**,** AA' = 10 cm **iar** M **este mijlocul segmentului** [A'C'] **atunci** m($\measuredangle$(AA', MB)) **este:**

A) 60° B) 45° C) 90°

D) 30° E) 150°