TASHKENT INTERNATIONAL MATHEMATICS OLYMPIAD

9-10-11 sinflar uchun o'tiladigan onlayn darslarga saralash olimpiadasi

3. 1 ballga baholanadigan savollar.

1. **(3.1 ball)** a, b, c haqiqiy sonlari $x^3 - x + 1 = 0$ tenglamaning ildizlari.
$$\frac{1}{a+1} + \frac{1}{b+1} + \frac{1}{c+1}$$
yig'indining qiymatini toping.
(A) 2 (B) -2 (C) 1 (D) -3
2. **(3.1 ball)** ABC uchburchakning AB va AC tomonlaridan mos ravishda E va F nuqtalar olingan. BE=3AE, AF=2FC.
$\frac{S_{BEF}}{S_{ABC}}$ ni toping.
(A) 1/2 (B) 2/5 (C) 1/3 (D) 1/4
3. **(3.1 ball)** Yozuvida 4 va 5 raqamlari ketma-ket kelgan va hamma raqamlari turlicha bo'lgan 10 xonali sonlar nechta?
(A) 2•9! (B) 16•8! (C) 9! (D) 8•8!
4. **(3.1 ball)** Uzumning 72%i suvdan iborat, mayizning esa 20%i suvdan iborat. 20kg uzumdan necha kg mayiz olish mumkin?
(A) 4 (B) 5 (C) 6 (D) 7
5. **(3.1 ball)** Hovuzni A jumrak 6 soatda to'ldiradi, B va C jumraklar mos ravishda 12 va 24 soatda bo'shatadi. A, B va C jumraklar birdan ochilganda 4 soat keyin C jumrak berkitilib, A va B jumraklar ochiq qolsa, hovuz hammasi bo'lib necha soatda to'ladi?
(A) 16 (B) 10 (C) 14 (D) 12

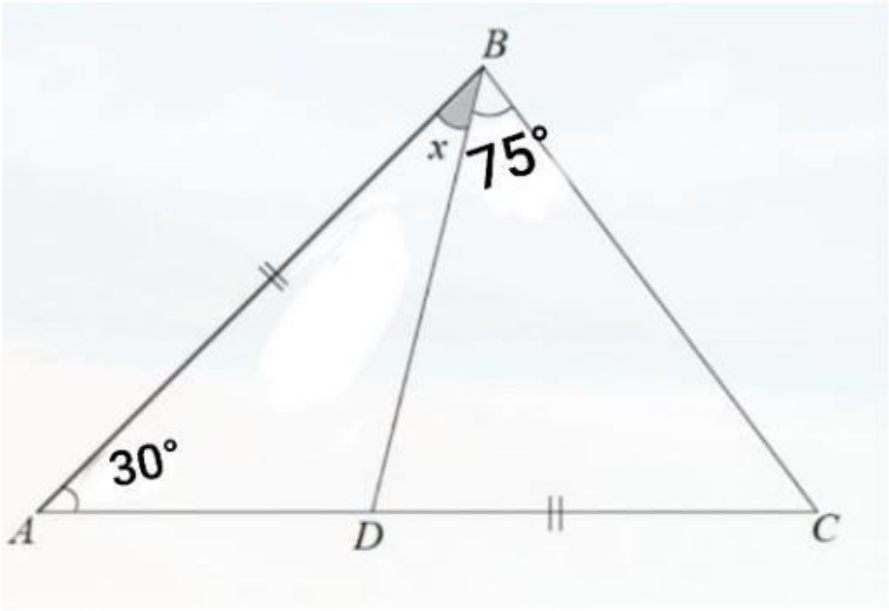
4. 2 ballga baholanadigan savollar.

6. (4.2 ball)

Nechta (a,b) butun sonlar juftligi $\begin{cases} a^2+b^2<16 \\ a^2+b^2<8a \\ a^2+b^2<8b \end{cases}$ sistemani qanoatlantiradi?

(A) 15 (B) 20 (C) 17 (D) 19

7. (4.2 ball) x=?



(A)30° (B) 45° (C) 25° (D) 15°

8. (4.2 ball) Shaxmat taxtasida 8 ta ruhni hamma kataklar hujum ostida qoladigan qilib, nechta usulda joylashtirish mumkin?
(A) 16777212 (B) 16777214 (C) 16777216 (D) 16777218

9. (4.2 ball) Agar f(2x+1)-3f(1-2x)= x^2+2x bo'lsa, f(x)=?
(A) $f(x)=1/10(x^2-4x+3)$

(B) $f(x)=-1/10(x^2-4x-3)$
(C) $f(x)=1/5(x^2-4x-3)$
(D) $f(x)=1/10(x^2-4x-3)$

10. (4.2 ball) (2010!) ! soni ((n!)!)! ga bo'linadigan eng katta n ni toping.

(A) 5 (B)6 (C)7 (D)8

5. 3 ballga baholanadigan savollar.

11. (5.3 ball) To'g'ri to'rtburchak ichidan bitta P nuqta olingan PA=2 PB=3 PC=10 bo'lsa PD=?

(A) $4\sqrt{6}$ (B) $\sqrt{95}$ (C) $3\sqrt{11}$ (D) $3\sqrt{10}$

12. (5.3 ball) x va y sonlari uchun $x^2+y^2-3y-1=0$ bo'lsa x+y ning eng katta qiymatini toping.

(A) aniqlab bo'lmaydi. (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{\sqrt{26}+3}{2}$ (D) $\frac{8}{15}$

13. (5.3 ball) . $\frac{13!}{m}$ aniq kvadrat son bo'ladigan natural m sonlar yig'indisi $2^a \cdot 3^b \cdot 5^c \cdot 7^d \cdot 11^e \cdot 13^f$ ko'rinishda bo'lsa a+b+c+d+e+f ni toping

(A) 12 (B) 14 (C) 15 (D) 13

14. **(5.3 ball)** Stol tennisi turnirida har bir o‘yinchi boshqa har bir o‘yinchi bilan aniq bitta o‘yin o‘ynaydi. Ammo turnir davomida 3 nafar o‘yinchi turnirdan chiqib ketgan va ularning har biri faqat 2 ta o‘yinda qatnashgan. Agar turnirdagi jami o‘yinlar soni 50 ta bolsa, ushbu 3 nafar o‘yinchining faqat o‘zaro o‘ynagan o‘yinlari soni nechta?

(A) 0 (B) 1 (C) 2 (D) 3

15. **(5.3 ball)** $n!=m^2$ ushbu shartni qanoatlantiruvchi m va n butun juftliklari nechta?

(A) 1 (B) 2 (C) 4 (D) 3

7. 4 ballga baholanadigan savollar.

16. (7.4 ball) Quyidagi shartdan 2 tasi noto’g’ri bo’ladigan barcha 2 xonali A sonlarning yig’indisini toping.

1. A soni 5ga bo’linadi.

2. A soni 23ga bo’linadi.

3, A+7 to’la kvadrat.

4. A-10 to’la kvadrat.

17.(7.4 ball) Teng yonli ABC (AB=BC) uchburchakning AD medianasi va CE balandligi P nuqtada kesishgan va CP=5, PE=2 bo’lsa ABC uchburchak yuzining sakkizlanganini toping.

18.(7.4 ball) a natural son "omadli son" deyiladi, agarda uning raqamlari yig‘indisi 7 ga teng bo‘lsa. Barcha "omadli son"lar o‘sish tartibida yozildi: $a_1, a_2, \ldots$ Agar $a_n = 2005$ bo’lsa, a_{5n} ni toping.

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19. (7.4 ball) 27000001 soninig tub bo'luvchilari yig'indisini toping.

20. (7.4 ball) $x(y+z-x) = 22-2x^2$
$y(x+z-y) = 44-2y^2$ ushbu tenglamalar sistemasining butun
$z(x+y-z) = 55-2z^2$

yechimlarini sonini toping.