Xalq ta'limi vazirligi Fan olimpiadalari bo'yicha iqtidorli o'quvchilar bilan ishlash departamentining matematika fanidan haftalik topshiriqlari

10-11 sinf o'quvchilari uchun

1. Quyidagi ***A*** jadvalga qaraylik. Har qadamda ixtiyoriy satr, ixtiyoriy ustun va diogonallar bo'yicha joylashgan kataklardagi sonlarni qarama-qarshisiga almashtirish. Cheklita o'zgartirishlardan keyin ***B*** jadvalni hosil qilish mumkinmi?

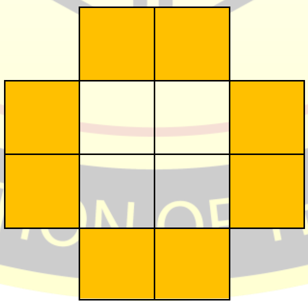
1	1	1	1
1	1	1	1
1	1	1	1
1	-1	1	1

A

1	1	1	1
1	1	1	1
1	1	1	1
1	1	1	1

B

Yechim: Jadvalning to'rtta burchagidagi kataklari hech qanday ahamiyatga ega emas. Chunki ulardagi sonlarning ko'paytmasi hech qachon o'zgarmaydi. Chunki har o'zgarishda qaysidir ikkitasi bir vaqtda o'zgaradi. Demak ularni olib tashlashimiz mumkin:



Endi har qaysi amalni bajarsak ham sariq rangli kataklardagi sonlar ko'paytmasini o'zgarmasligini ko'rish qiyin emas. Endi ***A*** va ***B*** jadvallar uchun ushbu ko'paytmalarni topaylik.

	1	1	
1			1
1			1
	-1	1	

$P(A) = -1$

	1	1	
1			1
1			1
	1	1	

$P(B) = 1$

Demak

$$P(A) = -1 \neq 1 = P(B)$$

ya’ni ***A*** jadvaldan ***B*** jadvalni hosil qilish mumkin emas.

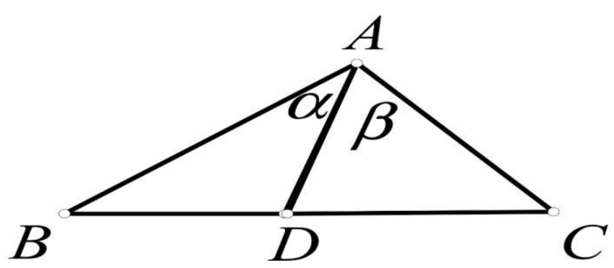
2. $ABCD$ qavariq to‘rtburchakda $AD \cap BC = K$, $AB \cap CD = L$, $BD \cap KL = F$ va $AC \cap KL = G$ bo‘lsin. U holda $\frac{2}{KL} = \frac{1}{KF} + \frac{1}{KG}$ tenglikni isbotlang.

Yechim: Dastlab quyidagi lemmani isbotlaymiz.

Lemma: Aytaylik $\measuredangle BAC < 180^\circ$ ichida D nuqta olingan bo‘lib, $\angle BAD = \alpha$ va $\angle CAD = \beta$ bo‘lsin. U holda D nuqta BC tomonda yotishi uchun

$$\frac{\sin(\alpha + \beta)}{AD} = \frac{\sin\alpha}{AC} + \frac{\sin\beta}{AB}$$

tenglik bajarilishi zarur va yetarli.



Lemmaning isboti: Ravshanki D nuqta BC tomonda yotishi uchun

$$S_{\triangle ABC} = S_{\triangle ABD} + S_{\triangle ACD} \qquad \textbf{(1)}$$

tenglik bajarilishi zarur va yetarli, bu yerda $S_{\triangle XYZ}$ deb $\triangle XYZ$ uchburchakning yuzasi olingan. **(1)** tenglikdan quyidagi tenglikni hosil qilamiz:

$$\frac{AB\cdot AC\cdot\sin(\alpha+\beta)}{2}=\frac{AB\cdot AD\cdot\sin\alpha}{2}+\frac{AC\cdot AD\cdot\sin\beta}{2} \quad \textbf{(2)}$$

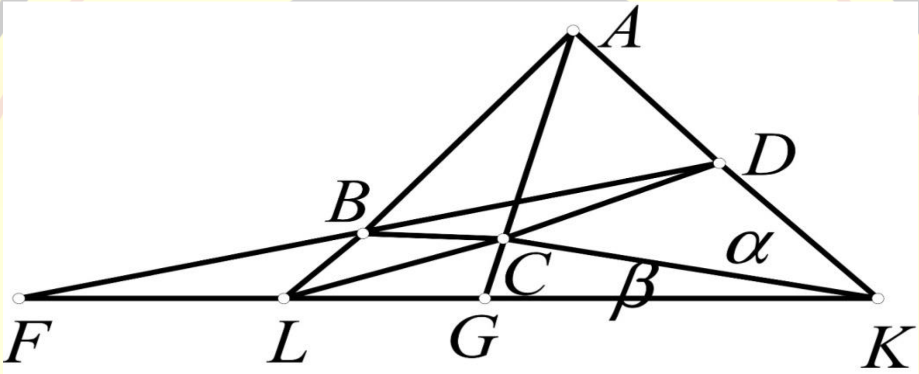
So‘nggi tenglikning har ikki tarafini

$$\frac{AB\cdot AC\cdot AD}{2}$$

ga bo‘lib natijani hosil qilamiz.▲

Endi masalaning yechimiga o‘tamiz.

Aytaylik $\angle AKB=\alpha$, $\angle LKB=\beta$ bo‘lsin. $\triangle KAL$, $\triangle KDL$, $\triangle KDF$ va $\triangle KAG$ uchburchaklar uchun **lemma**ni qo‘llaymiz:



$$\triangle KAL: \quad \frac{\sin(\alpha+\beta)}{KB}=\frac{\sin\alpha}{KL}+\frac{\sin\beta}{KA} \quad \textbf{(3)}$$

$$\triangle KDL: \quad \frac{\sin(\alpha+\beta)}{KC}=\frac{\sin\alpha}{KL}+\frac{\sin\beta}{KD} \quad \textbf{(4)}$$

$$\triangle KDF: \quad \frac{\sin(\alpha+\beta)}{KB}=\frac{\sin\alpha}{KF}+\frac{\sin\beta}{KD} \quad \textbf{(5)}$$

$$\triangle KAG: \quad \frac{\sin(\alpha+\beta)}{KC}=\frac{\sin\alpha}{KG}+\frac{\sin\beta}{KA} \quad \textbf{(6)}$$

U holda

(3) + (4) - (5) - (6)=0

munosabatdan quyidagi tenglikni topamiz:

$$\sin\alpha\cdot\left(\frac{2}{KL}-\frac{1}{KF}-\frac{1}{KG}\right)=0$$

Bundan $\sin\alpha \neq 0$ ekanligini hisobga olib,

$$\frac{2}{KL} = \frac{1}{KF} + \frac{1}{KG}$$

tenglikni hosil qilamiz. Masala to‘liq yechildi.

3. Barcha n natural sonlarni topingki, shunday x, y va $k>1$ natural sonlar topilib, $EKUB(x,y)=1$ va $3^n = x^k + y^k$ bo‘ladi.

Yechim: Agar k – juft son bo‘lsa

$$3 \,\Big|\, 3^n = x^k + y^k = \left(x^{\frac{k}{2}}\right)^2 + \left(y^{\frac{k}{2}}\right)^2$$

ya’ni x ham y ham 3 ga karrali bo‘ladi bu esa $EKUB(x,y)=1$ ekanligiga zid. Demak k – toq son ekan va $x+y=3^m$ bo‘ladi, bu yerda $m\in\mathbb{N}$. U holda

$$n = v_3(3^n) = v_3(x^k+y^k) = v_3(k) + v_3(x+y) = v_3(k) + m$$

Quyidagi ikki holni qaraylik.

1 – hol: $m>1$ bo‘lsin. Induksiya orqali $a\in\mathbb{N}$ uchun osongina $3^a \geq a+2$ tengsizlikni isbotlashimiz mumkin va undan foydalansak $v_3(k)\leq k-2$ ni topamiz. Aytaylik $M=\max(x,y)$ bo‘lsin.U holda $x+y=3^m\geq 9$ ga ko‘ra $M\geq 5$ ni topamiz va

$$3^n = x^k + y^k \geq M^k = M\cdot M^{k-1} \geq \left(\frac{3^m}{2}\right)\cdot(5^{k-1}) > 3^m\cdot 5^{k-2} \geq 3^{m+k-2} \geq 3^{m+v_3(k)} = 3^n$$

bo‘ladi, bu esa ziddiyat.

2 – hol: $m=1$ bo‘lsin. U holda $x+y=3$, bundan $x=2$, $y=1$ yoki $x=1$, $y=2$ va $3^{1+v_3(k)} = 1+2^k$. Lekin $3^{v_3(k)}\,|\,k$ ekanligidan $3^{v_3(k)}\leq k$ bo‘ladi. Demak

$$1+2^k = 3^{1+v_3(k)} \leq 3k \text{ yoki } k=3$$

ni topamiz. Nihoyat $(x,y,n,k)=(1,2,2,3),(2,1,2,3)$ bo‘lib, $n=2$ ekan.

4. Tenglamaning barcha haqiqiy yechimlarini toping:

$$\sqrt{x^3-2x^2+2x} + 3\sqrt[3]{x^2-x+1} + 2\sqrt[4]{4x-3x^4} = \frac{x^4-3x^3}{2} + 7$$

Yechimi: Dastlab aniqlanish sohaga e’tibor qarataylik:

$$\begin{cases} x^3-2x^2+2x\ge 0 \\ 4x-3x^4\ge 0 \end{cases} \Rightarrow \begin{cases} x((x-1)^2+1)\ge 0 \\ x(3x^3-4)\le 0 \end{cases} \Rightarrow 0\le x\le \sqrt[3]{\frac{4}{3}} \quad \textbf{(7)}$$

Bundan tashqari $x^2-x+1=\left(x-\frac{1}{2}\right)^2+\frac{3}{4}>0$. U holda Koshi tengsizligiga ko‘ra

$$\sqrt{x^3-2x^2+2x}+3\sqrt[3]{x^2-x+1}+2\sqrt[4]{4x-3x^4}=\sqrt{x(x^2-2x+2)}+$$

$$+3\sqrt[3]{(x^2-x+1)\cdot 1\cdot 1}+2\sqrt[4]{x(4-3x^3)\cdot 1\cdot 1}\le \frac{x+x^2-2x+2}{2}+(x^2-x+1)+1+1+$$

$$2\cdot\frac{x+4-3x^3+1+1}{4}=\frac{-3x^3+3x^2-2x+14}{2}$$

Demak

$$\frac{x^4-3x^3}{2}+7\le\frac{-3x^3+3x^2-2x+14}{2} \Leftrightarrow x(x^3-3x+2)\le 0 \Leftrightarrow x(x+2)(x-1)^2\le 0.$$

Lekin **(7)** ga ko‘ra

$$0\le x(x+2)(x-1)^2.$$

Demak

$$x(x+2)(x-1)^2=0 \Leftrightarrow x\in\{0,1\}$$

Tekshirib ko‘rish orqali faqatgina $x=1$ yechim bo‘lishini topamiz.

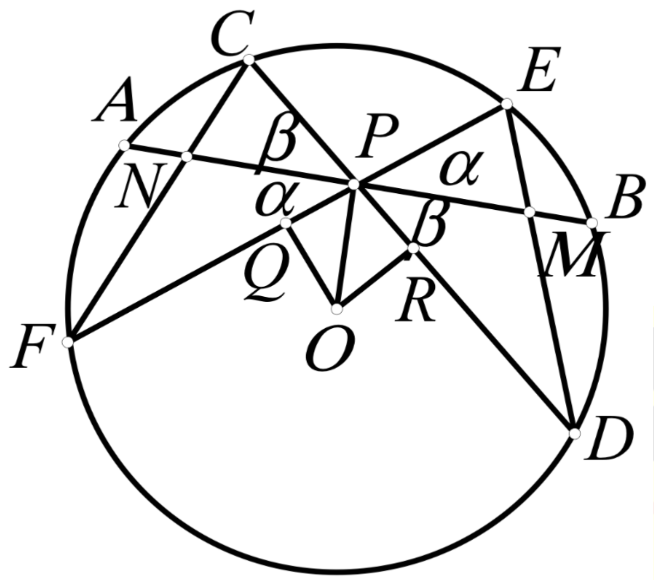
Javob: $x=1$

5. Aytaylik $\triangle ABC$ uchburchakda $BC>CA$ va CF balandlik, H – balandliklar kesishgan nuqta, O – tashqi chizilgan aylana markazi bo‘lsin. AC tomonda P nuqta shunday olinganki, bunda $PF\perp OF$ shart o‘rinli bo‘ladi. U holda $\angle FHP=\angle BAC$ tenglikni isbotlang.

Yechim: Dastlab **2 – masala**da isbotlangan lemma orqali mashhur *“Kapalak teoremasi”* ni isbotlaymiz.

Teorema. Aytaylik O markazli Γ aylanada A, C, E, B, D, F nuqtalar aynan shu tartibda yotib, $AB\cap DE=M$ va $AB\cap CF=N$ bo‘lsin. Faraz qilaylik CD va EF kesmalar

P nuqtada kesishsin va P nuqta AB kesmaning o‘rtasi bo‘lsin. U holda P nuqta MN kesmaning ham o‘rtasi bo‘ladi.



Isbot: Teorema $PM = PN$ tenglikka teng kuchli. Aytaylik

$$\angle CPN = \angle DPM = \alpha$$

va

$$\angle FPN = \angle EPM = \beta$$

bo‘lsin. Ravshanki

$$PC \cdot PD = PE \cdot PF \qquad \textbf{(8)}$$

tenglikni o‘rinli. L**emma**ni $\triangle PDE$ va $\triangle PCF$ uchburchaklar uchun qo‘llaymiz:

$$\frac{\sin(\alpha+\beta)}{PM} = \frac{\sin\alpha}{PD} + \frac{\sin\beta}{PE}$$

va

$$\frac{\sin(\alpha+\beta)}{PN} = \frac{\sin\alpha}{PC} + \frac{\sin\beta}{PF}$$

Shuningdek

$$0^\circ < \alpha + \beta < 180^\circ \;\Rightarrow\; \sin(\alpha+\beta) \neq 0$$

U holda $PM = PN$ tenglikni isbotlash uchun

$$\sin\beta\cdot\frac{PF-PE}{PF\cdot PE}=\sin\alpha\cdot\frac{PD-PC}{PD\cdot PC}\qquad \textbf{(9)}$$

tenglikni isbotlashimiz yetarli. Boshqa tomondan **(8)** tenglikni hisobga olsak **(9)** tenglik

$$\frac{\sin\alpha}{\sin\beta}=\frac{PF-PE}{PD-PC}\qquad \textbf{(10)}$$

tenglikka teng kuchli ekanligiga ega bo‘lamiz. Aylana markazi O nuqtadan EF va CD vatarlarga perpendikular tushiraylik va bu perpendikularlar asoslari mos ravishda Q va R bo‘lsin. Ma’lumki, bu nuqtalar ayni vatarlarni teng ikkiga bo‘ladi. Demak

$$PF-PE=(PQ+FQ)-(QE-PQ)=2PQ=2OP\sin\alpha$$

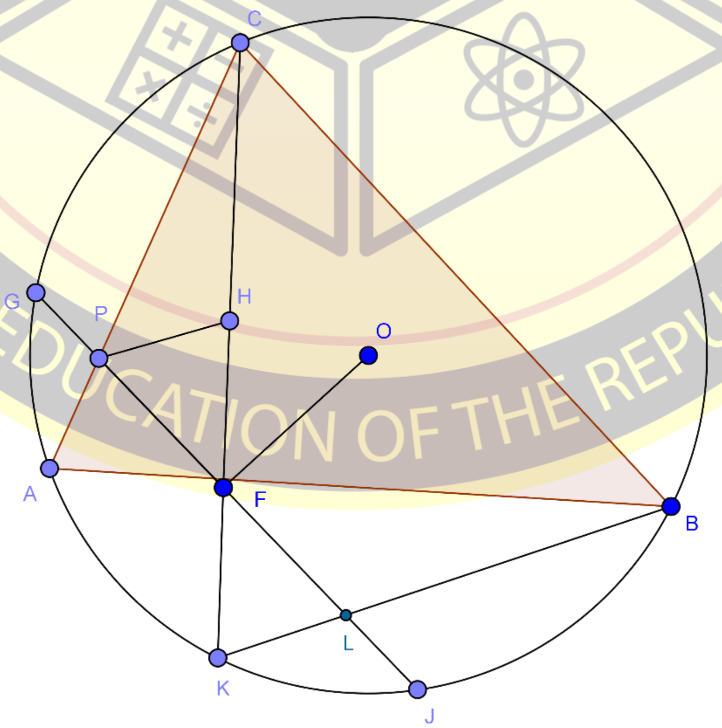
xuddi shu usulda

$$PD-PC=2OP\sin\beta$$

tenglikni topamiz. Bu tengliklardan **(10)** tenglik kelib chiqadi.

Endi masalaning yechimiga o‘tamiz.

CF balandlikni tashqi chizilgan aylanani K nuqtada kesguncha davom ettiramiz. PF kesma aylana G va J nuqtalarda kessin.



Aytaylik $BK \cap GJ = L$ bo‘lsin. $PF \perp OF$ shartga ko‘ra F nuqta GJ kesmaning o‘rtasi ekanligi kelib chiqadi. Bundan *“Kapalak teoremasi”* ga ko‘ra F nuqta PL kesmaning o‘rtasi ekanligini topamiz, ya’ni $PF = FL$. Shuningdek sodda trigonametrik hisoblashlardan *(mustaqil bajaring!)*

$$KF = 2R\cos A\cos B = HF$$

tenglikni hosil qilamiz. Shuningdek vertikal burchaklar tengligidan

$$\angle PFH = \angle KFL$$

Demak **TBT** alomatiga ko‘ra

$$\triangle PHF = \triangle LKF$$

tenglik o‘rinli. Qolaversa bir xil yoyga tiralgan burchaklar tengligidan

$$\angle LKF = \angle BKC = \angle BAC$$

tenglik ham o‘rinli. U holda

$$\angle PHF = \angle LKF = \angle BAC$$

Masala to‘liq isbotlandi.

7-9 sinf o‘quvchilari uchun

1. Tenglamalar sistemasining barcha haqiqiy yechimlarini toping:

$$\begin{cases} 16x^5 - 20x^3 = \sqrt{1-y^2} - 5y \\ 4(x+y) = \sqrt[4]{8(x^4+y^4)} + 6\sqrt{xy} \end{cases}$$

Yechimi: Dastlab aniqlanish sohaga e’tibor qarataylik:

$$\begin{cases} xy \geq 0 \\ 1-y^2 \geq 0 \\ x+y \geq 0 \end{cases} \Rightarrow \quad \begin{cases} x \geq 0 \\ 1 \geq y \geq 0 \end{cases}$$

Bundan

$$2(a^2+b^2) \geq (a+b)^2 \;\; \Rightarrow \;\; (a-b)^2 \geq 0$$

tengsizligiga ko‘ra

$$\left(\sqrt{2(x^4+y^4)}+2xy\right)^2 \le 2\left(2(x^4+y^4)+4x^2y^2\right)=4(x^2+y^2)^2 \;\Rightarrow$$

$$\sqrt{2(x^4+y^4)} \le 2\left(x^2+y^2-xy\right) \;\Rightarrow\; \sqrt[4]{8(x^4+y^4)} \le 2\sqrt{x^2-xy+y^2}$$

munosabatni topamiz. Bundan

$$4(x+y) \le \sqrt[4]{8(x^4+y^4)}+6\sqrt{xy} \le 2\left(\sqrt{x^2-xy+y^2}+3\sqrt{xy}\right)$$

kelib chiqadi. Boshqa tomondan

$$\sqrt{x^2-xy+y^2}+3\sqrt{xy}=\sqrt{x^2-xy+y^2}+\sqrt{xy}+\sqrt{xy}+\sqrt{xy} \le$$

$$\sqrt{4(x^2-xy+y^2+xy+xy+xy)}=2(x+y)$$

tengsizlikni topamiz. Demak barcha tengsizliklarda tenglik holi bajarilishi kerak ekan. Bundan $x=y$ ekanligini topamiz. U holda masalada berilgan sistemaning 1-tenglamasidan

$$16x^5-20x^3=\sqrt{1-x^2}-5x$$

tenglamani hosil qilamiz. Shuningdek $1 \ge y=x \ge 0$ tengsizlikdan

$$x=\cos\alpha, \quad \alpha \in \left[-\frac{\pi}{2};\frac{\pi}{2}\right]$$

deb olishimiz mumkin. Agar

$$16\cos^5\alpha-20\cos^3\alpha+5\cos\alpha=\cos 5\alpha$$

ayniyatni ham hisobga olsak,

$$\cos 5\alpha=16\cos^5\alpha-20\cos^3\alpha+5\cos\alpha=16x^5-20x^3+5x=\sqrt{1-x^2}=\sqrt{1-\cos^2\alpha}=|\sin\alpha|$$

ya’ni

$$\cos 5\alpha=|\sin\alpha|$$

tenglamani hosil qilamiz. Quyidagi hollarni qaraylik:

1 – hol: $\cos 5\alpha = \sin\alpha \geq 0 \Rightarrow \alpha \in \left[0; \frac{\pi}{2}\right] \Rightarrow \cos 5\alpha = \cos\left(\frac{\pi}{2} - \alpha\right)$. Bundan

$$\begin{cases} 5\alpha = \frac{\pi}{2} - \alpha + 2k\pi \\ 5\alpha = \alpha - \frac{\pi}{2} + 2k\pi \end{cases}; k \in \mathbb{Z} \overset{\alpha\in\left[0;\frac{\pi}{2}\right]}{\Longrightarrow} \begin{cases} \alpha = \frac{\pi}{12} + \frac{k\pi}{3} \\ \alpha = -\frac{\pi}{8} + \frac{k\pi}{2} \end{cases} \Rightarrow \alpha \in \left\{\frac{\pi}{12}; \frac{5\pi}{12}; \frac{3\pi}{8}\right\}.$$

2 – hol: $\cos 5\alpha = -\sin\alpha \geq 0 \Rightarrow \alpha \in \left[-\frac{\pi}{2}; 0\right] \Rightarrow \cos 5\alpha = \cos\left(\frac{\pi}{2} + \alpha\right)$. Bundan

$$\begin{cases} \alpha = -\frac{\pi}{12} + \frac{k\pi}{3} \\ \alpha = \frac{\pi}{8} + \frac{k\pi}{2} \end{cases} \overset{\alpha\in\left[0;\frac{\pi}{2}\right]}{\Longrightarrow} \alpha \in \left\{-\frac{\pi}{12}; -\frac{5\pi}{12}; -\frac{3\pi}{8}\right\}$$

Lekin cosinus juft funksiya ekanligidan ikkala holdagi yechimlar ustma-ust tushadi.

Javob: $(x, y) \in \left\{\left(\cos\frac{\pi}{12}; \cos\frac{\pi}{12}\right); \left(\cos\frac{5\pi}{12}; \cos\frac{\pi}{12}\right); \left(\cos\frac{3\pi}{8}; \cos\frac{3\pi}{8}\right)\right\}.$

2. $x^9 + x^8 + x^7 - x^3 + 1$ yig'indini ko'paytuvchilarga ajrating.

Yechim: Ifodaning shaklini almashtirib yozamiz:

$$x^9 + x^8 + x^7 - x^3 + 1 = (x^9 - x^3 + x^2) + x^8 - x^2 + x) + (x^7 - x + 1) = (x^2 + x + 1)(x^7 - x + 1)$$

Javob: $(x^2 + x + 1)(x^7 - x + 1)$

3. Ixtiyoriy uchburchak uchun $p \geq 3\sqrt{3}r$ tengsizlikni isbotlang, bu yerda p uchburchakning yarim perimetri, r esa unga ichki chizilgan aylananing radiusi.

Yechimi: Agar $r = \frac{2S}{a+b+c}$ formuladan foydalansak, masala shartida berilgan tengsizlik quyidagi ko'rinishga keladi:

$$\frac{p}{r} \geq 3\sqrt{3} \Leftrightarrow \frac{(a+b+c)^2}{4S} \geq 3\sqrt{3} \Leftrightarrow (a+b+c)^2 \geq 12\sqrt{3}S$$

Uchburchak yuzasi uchun Geron formulasidan foydalansak, oxirgi tengsizlik quyidagi tengsizlikka teng kuchli ekanligi kelib chiqadi:

$$(a+b+c)^2 \geq 3\sqrt{3(a+b+c)(a-b+c)(a+b-c)(c+b-a)} \Leftrightarrow$$

$$\Leftrightarrow\ (a+b+c)^3 \ge 27(a-b+c)(a+b-c)(c+b-a).$$

Endi $c+b-a=2x>0$, $a-b+c=2y>0$ va $a+b-c=2z>0$ *(Ravi)* almashtirishini bajaramiz. Bundan so‘ng oxirgi tengsizlik quyidagi ko‘rinishni oladi.

$$8(x+y+z)^3 \ge 27\cdot 8xyz \ \Leftrightarrow\ (x+y+z)^3 \ge 27xyz$$

Bu tengsizlik esa O‘rta qiymatlar haqidagi Koshi tengsizligiga ko‘ra o‘rinli.

4. $\triangle ABC$ uchburchakning medianalari G nuqtada kesishadi. U holda uchburchak tekisligidagi ixtiyoriy P nuqta uchun quyidagi tenglikni isbotlang:

$$AP^2+BP^2+CP^2=AG^2+BG^2+CG^2+3PG^2$$

Yechimi: Vektorlarning skalyar ko‘paytmasi xossasiga ko‘ra

$$AP^2=(\overrightarrow{AP},\overrightarrow{AP})=(\overrightarrow{AG}+\overrightarrow{PG},\overrightarrow{AG}+\overrightarrow{PG})=AG^2+2(\overrightarrow{PG},\overrightarrow{AG})+PG^2$$

Xuddi shu kabi

$$BP^2 \ge BG^2+2(\overrightarrow{PG},\overrightarrow{BG})+PG^2$$

va

$$CP^2 \ge CG^2+2(\overrightarrow{PG},\overrightarrow{CG})+PG^2$$

Tengliklarni hosil qilamiz. Demak

$$AP^2+BP^2+CP^2=AG^2+BG^2+CG^2+2(\overrightarrow{PG},\overrightarrow{AG}+\overrightarrow{BG}+\overrightarrow{CG})+3PG^2$$

Shuningdek massa markazi *(medianalar kesishgan nuqta)* xossasiga ko‘ra

$$\overrightarrow{AG}+\overrightarrow{BG}+\overrightarrow{CG}=\vec{0}$$

edi. U holda

$$AP^2+BP^2+CP^2=AG^2+BG^2+CG^2+3PG^2$$

Masala to‘liq isbotlandi.

Izoh: Masalada isbotlangan tenglik *Leybnits formulasi* deyiladi.

5. Haqiqiy a, b, c sonlar uchun $a^3+b^3+c^3\ne 0$ shart o‘rinli. U holda

$$\frac{2abc-(a+b+c)}{a^3+b^3+c^3}=\frac{2}{3}$$

bo‘lishi uchun $a+b+c=0$ bo‘lishi zarur va yetarli ekanligini isbotlang.

Yechish: Masala berilgan tenglikni quyidagicha yozib olamiz:

$$2(a^3+b^3+c^3-3abc)+3(a+b+c)=0$$

Demak

$$(a+b+c)(2(a^2+b^2+c^2-ab-bc-ca)+3)=0$$

yoki

$$(a+b+c)((a-b)^2+(b-c)^2+(c-a)^2+3)=0$$

Shuningdek

$$(a-b)^2+(b-c)^2+(c-a)^2+3\geq 3>0$$

tengsizlikka ko‘ra masala sharti

$$a+b+c=0$$

tenglikka ekvivalenti ekanligini ko‘ramiz. Masala to‘liq yechildi.

4-6 sinf o‘quvchilari uchun

1. 2 ta oshqoshiq 480 so‘m, 3 ta choyqoshiq 240 so‘m turadi. Oshqoshiq choyqoshiqdan necha marta qimmat turadi?

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

2. Hisoblang: $3405+489\cdot 4-4078$

A) 1419 B) 1319 C) 1329 D)1283

3. Tomonining uzunligi 5 sm bo‘lgan kvadratning perimetrini toping.

A) 20 sm B) 10 sm C) 30 sm D) 25 sm

4. Bitta traktor uchun bir kunga 24 litr yonilg‘i ajratiladi. Agar bir kunda 19 litr yonilg‘i sarflansa, 14 kunda qancha yonilg‘i tejaladi?

A) 65 B) 70 C) 60 D)55

5. It 1 daqiqada 20 m yuguradi. U 1 soatda qancha masofa bosadi?

A) 1400 B) 1150 C) 1100 D)1200

6. $19+89+x$ ifodani soddalashtirib, so‘ng $x=12$ bo‘lgandagi qiymatini toping.

A) 120 B) 124 C) 130 D)128

7. Salim 1-kun 4 ta, 2-kun 1-kundagidan 2 marta ko‘p olma yedi. U shu ikki kunda jami nechta nechta olma yedi?

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

8. 5 mushuk 5 soatda 10 ta sichqon yeydi. 10 ta mushuk 10 soatda nechta sichqon yeydi?

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

9. $\overline{abc}+\overline{dc}=\overline{efgc}$ tenglikda a, b, c, d, e, f, g raqamlar bo‘lsa, $e^{a+b+c}+(e+f+g)^{c}$ ni toping.

A) 2 B) 7 C) 6 D)5

10. 1-soat har 4 soniyada 1 marta bong uradi. 2-soat har 5 soniyada 1 marta bong uradi. 30 soniyada jami necha marotaba bong uriladi?

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

11. Uyda 4 ta xona bor. Har bir xonada 5 tadan lampochka bor. Bu lampochkalarning har biri 1 soatda 100 so‘m pul ishlaydi. Agar lampochkalar kuniga 4 soatdan yoniq tursa, 5 kunda qancha pul to‘lash kerak?

A) 45000 B) 450000 C) 400000 D)40000

12. Mashina spidometri oldin 1579 sonini ko‘rsatayotgan edi. U 2 soat harakatlangandan keyin 1799 ni ko‘rsatdi. Mashinaning shu vaqt mobaynidagi o‘rtacha tezligini toping.

A) 65 B) 70 C) 60 D) 110

13. Likopchadagi 10 ta shirinlik bor edi. Ona bu shirinliklarni 5 ta o‘gliga 2 tadan bo‘lib berdi. Lekin likopchalarda ham 2 ta shirinlik qoldi. Shunday bo‘lishi mumkinmi?

A) ha B) yo‘q C) aniqlab bo‘lmaydi D) har doim emas

14. Barcha raqamlari toq bo‘lgan nechta 3 xonali son mavjud?

A) 115 B) 49 C) 120 D)125

15. Tufelkaning 1000 ta oyog‘i bo‘ladi va har soniyada 2 ga bo‘linadi. Agar bankaga 1 ta tufelka solib 3 soniyadan so‘ng oyoqlari sanalsa nechta bo‘ladi?

A) 8000 B) 4000 C) 2000 D) 1008

Izoh: *Ba’zi testlarning berilishidagi xatoliklar tuzatildi.*

Test topshiriqlarining javoblari

1. B	**6. A**	**11. D**
2. D	**7. D**	**12. D**
3. A	**8. D**	**13. B**
4. B	**9. A**	**14. D**
5. D	**10. B**	**15. A**

Fan olimpiadalari bo‘yicha iqtidorli o‘quvchilar bilan ishlash departamenti sizga omadlar tilaydi!