



Uchburchak va to'rtburchaklar kombinatsiyalariga oid masalalar

Qurbonaliyeva Shoira Maxmanazarovna

SamDCHTI akademik litseyi matematika fani bosh o'qituvchisi

shoiraqurbonaliyeva839@gmail.com,

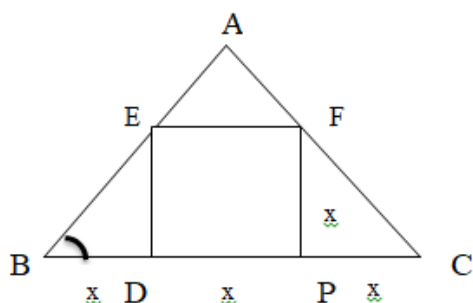
Annotatsiya: Ushbu ilmiy maqola akademik litseylar chuqurlashtirilgan guruhlarining geometriya darslarida uchburchak va to'rtburchaklar kombinatsiyalariga oid masalalar haqida nazariy bilim beradi. Shuningdek, matematika fanini bilish darajasini aniqlovchi Milliy sertifikat olish uchun mustaqil tayyorlanuvchilarga yaqindan yordam beradi.

Kalit so'zlar: uchburchak va to'rtburchaklar kombinatsiyalari

Uchburchak va to'rtburchaklar kombinatsiyalariga oid masalalar

1-masala. Asosdagi burchagi 45° bo'lgan teng yonli uchburchak ichiga bir tomoni asosda yotadigan qilib kvadrat chizilgan. Agar uchburchakning yuzasi 18 bo'lsa, kvadratning yuzini toping.

Yechilishi:



Masala shartiga ko'ra $\angle B = 45^\circ$, $\triangle ABC$ – teng yonli ekanligidan $\angle C = 45^\circ$. U holda $\triangle ABC$ –teng yonli to'g'ri burchakli uchburchak bo'lib, uning yuzasi $S_{\triangle} = \frac{1}{2} \cdot AB \cdot BC$. Masala shartiga asosan $S_{\triangle} = 18$.

Bundan $\frac{1}{2} \cdot AB \cdot BC = 18$ yoki $AB = BC$ ekanligidan $AB^2 = 36$. Demak, $AB = 6$.

Pifagor teoremasiga ko'ra $BC = AB\sqrt{2} = 6\sqrt{2}$. (1)

$\angle B = 45^\circ$ ekanligidan $\triangle BDE$ ham teng yonli to'g'ri burchakli bo'ladi. Bundan $BD = DE = x$.

Xuddi shunga o'xshash $\triangle CPF$ dan $PC = PF = x$. Demak, $BC = 3x$. (2)

(1) va (2) tengliklardan $3x = 6\sqrt{2} \Rightarrow x = 2\sqrt{2}$.

Shunday qilib, kvadratning yuzi $S_{kv} = x^2 = 8$.

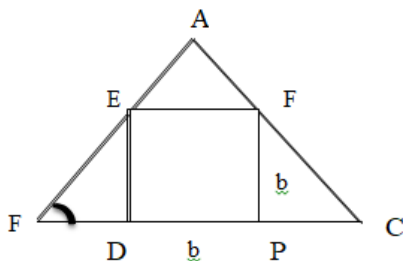
Javob: 8

2-masala. Muntazam uchburchak ichiga bir tomoni asosida yotadigan qilib kvadrat chizilgan. Agar kvadratning tomoni uzunligi $b = (2 - \sqrt{3}) \cdot \sqrt[4]{3}$ ga teng bo'lsa,



muntazam uchburchakning yuzini toping.

Yechilishi:



Masala shartiga ko'ra $\triangle ABC$ – teng tomonli uchburchak, u holda $\angle EBD = 60^\circ$.

$\triangle BDE$ – to'g'ri burchakli uchburchakdan

$$\operatorname{tg} 60^\circ = \frac{b}{BD} \Rightarrow BD = \frac{b}{\operatorname{tg} 60^\circ} = \frac{b}{\sqrt{3}}.$$

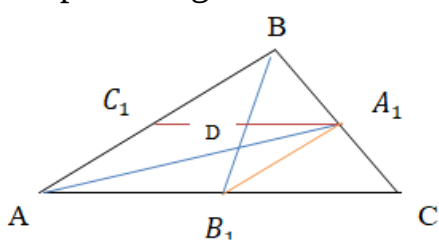
$\triangle BDE = \triangle CPF \Rightarrow BD = PC$. Demak,

$$BC = 2BD + DP = \frac{2b}{\sqrt{3}} + b = b \cdot \frac{(2+\sqrt{3})}{\sqrt{3}} = \frac{(2-\sqrt{3}) \cdot \sqrt{3} \cdot (2+\sqrt{3})}{\sqrt{3}} = \frac{1}{\sqrt{3}}.$$

$$\text{Muntazam uchburchakning yuzi } S_{\Delta} = \frac{BC^2 \sqrt{3}}{4} = \frac{\left(\frac{1}{\sqrt{3}}\right)^2 \cdot \sqrt{3}}{4} = \frac{1}{4} = 0,25.$$

Javob: 0,25

3-masala. ABC uchburchakda AA_1 va BB_1 medianalar o'tkazilgan, ular D nuqtada kesishadi. ABC uchburchakning C_1A_1 o'rta chizig'i o'tkazildi. $AB_1A_1C_1$ to'rtburchak parallelogramm ekanini isbotlang.



Isboti: Masala shartiga ko'ra AA_1 mediana ekanligidan

A_1B_1 - o'rta chiziq bo'ladi, natijada

$$A_1B_1 = \frac{AB}{2} = AC_1 \text{ va } A_1B_1 \parallel AC_1 \quad (1)$$

Ikkinchidan BB_1 mediana ekanligidan A_1C_1 ham o'rta chiziq bo'ladi, bundan

$$A_1C_1 = \frac{AC}{2} = AB_1 \text{ va } A_1C_1 \parallel AB_1 \quad (2)$$

(1) va (2) tengliklar esa parallelogram ta'rifiga mos keladi.

Demak, $AB_1A_1C_1$ - to'rtburchak parallelogramm ekan. Isbot tugadi.

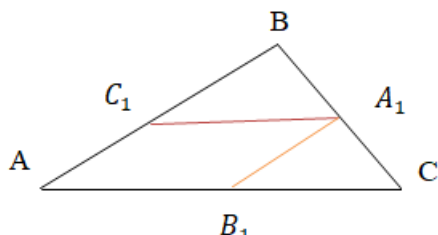
4-masala. Uchburchakka parallelogramm ichki chizilgan, uning o'tkir burchagi uchburchak o'tkir burchagiga mos keladi. Parallelogramm tomonlari 3:1 nisbatda, o'tkir burchakni tashkil etuvchi uchburchak tomonlari esa 24 va 36 cm. Parallelogramm tomonlarini toping.

Yechilishi :

Masala shartida $AB_1A_1C_1$ – parallelogramm ekanligidan $AB_1 \parallel A_1C_1$ va

$$AB_1 = A_1C_1 = 3x,$$

$$AC_1 = A_1B_1 = x,$$



$AB = 24 \text{ cm}$, $AC = 36 \text{ cm}$ bo'lsin. Parallelogrammning A o'tkir burchagi uchburchak o'tkir burchagiga mos hamda AB va AC_1 lar bitta nurda yotadi. Shuningdek, $AB_1 \parallel A_1C_1$ ekanligidan $AB_1 \parallel AC$. Bundan $\triangle ABC \sim \triangle C_1BA_1$. O'xshash uchburchaklarda mos tomonlari o'zaro proporsional:

$$\frac{AB}{AC_1} = \frac{AC}{C_1A_1} \Rightarrow \frac{24}{24-x} = \frac{36}{3x} \Rightarrow 6x = 72 - 3x \Rightarrow 9x = 72 \Rightarrow x = 8; 3x = 24.$$

Javob: 8 cm , 24 cm .

O'zingizni sinab ko'ring.

1-masala. Katetlari 6 va 8 sm bo'lgan uchburchakka kvadrat ichki chizilgan. Kvadrat va uchburchakning to'g'ri burchaklari umumiy. Kvadratning perimetrini toping.

2-masala. Tomonlari a va b bo'lgan uchburchakka romb ichki chizilgan. Shu tomonlari va ular orasidagi burchak romb va uchburchak uchun umumiy. Rombning tomonini toping.

3-masala. ABC teng yonli uchburchakka bir tomoni BC asosda yotuvchi kvadrat ichki chizilgan. Agar $BC = 10 \text{ sm}$, balandligi $AB = 15 \text{ sm}$ bo'lsa, kvadrat tomonini toping.

4-masala. To'g'ri burchakli uchburchakning katetlari uzunliklari 10 va 15 ga teng. Bu uchburchak bilan umumiy uchga ega bo'lgan kvadrat ichki chizilgan, bu kvadratning perimetrini toping.

Foydalanilgan adabiyotlar.

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