

# KARNO TEOREMASIGA OID MASALALAR

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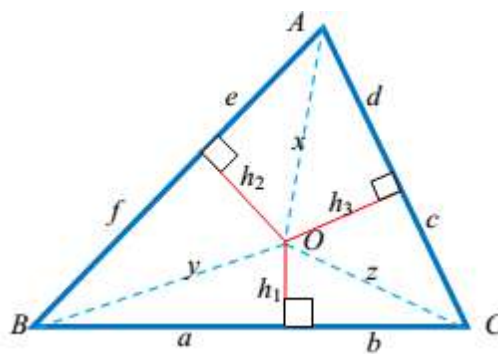
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**Annotatsiya:** Ushbu ilmiy maqola akademik litseylar geometriya darslarida uchburchaklarni yechishda Karno teoremasining qo'llanilishi haqidagi nazariy bilimni mustahkamlashda, yoshlar uchun sifatli ta'limni ta'minlashda, iqtidorli yoshlar qobiliyatini rivojlantirishda, shuningdek, matematika fanini bilish darajasini aniqlovchi Milliy sertifikat olish uchun mustaqil tayyorlanuvchilarga yaqindan yordam beradi.

**Kalit so'zlar:** Nisbatlar, kesmalar yo'nalishi

## Karno teoremasi (isbotsiz).

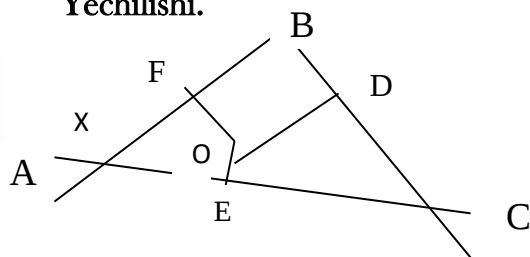
Uchburchak ichidan olingan nuqtadan tomonlariga tushirilgan balandliklari asosi uchburchak tomonlarida ajratgan kesmalar uchun  $a^2 + c^2 + e^2 = b^2 + d^2 + f^2$  tenglik o'rinli bo'ladi.



## Karno teoremasiga oid masalalar

**1-masala.** ABC uchburchakning ichidan olingan O nuqtadan uchburchak tomonlariga OD, OF, OE perpendikulyarlar o'tkazilgan:  $OD \perp BC$ ,  $OF \perp AB$ ,  $OE \perp AC$ .  $AE=8$ ,  $BF=6$ ,  $BD=2$ ,  $DC=4\sqrt{2}$ ,  $EC=8$  lar berilgan bo'lsa,  $AF=x$  ni toping.

**Yechilishi.**



Karno teoremasidan foydalanib  $x$  ni topamiz:

$$AF^2 + BD^2 + EC^2 = FB^2 + DC^2 + AE^2$$

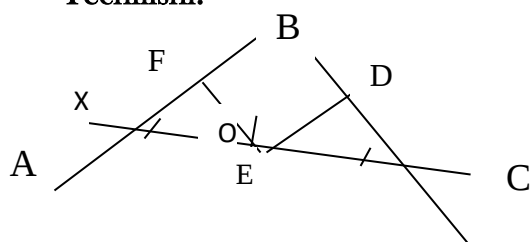
$$x^2 + 2^2 + 8^2 = 6^2 + (4\sqrt{2})^2 + 8^2$$

$$x^2 = 64$$

**Javob:**  $x = 8$

**2-masala.** ABC uchburchakning ichidan olingan O nuqtadan uchburchak tomonlariga OD, OF, OE perpendikulyarlar o'tkazilgan:  $OD \perp BC$ ,  $OF \perp AB$ ,  $OE \perp AC$ .  $AE=EC=a$ ,  $BF=3$ ,  $BD=4$ ,  $DC=5$  lar berilgan bo'lsa,  $AF=x$  ni toping.

**Yechilishi.**



Karno teoremasiga ko'ra:

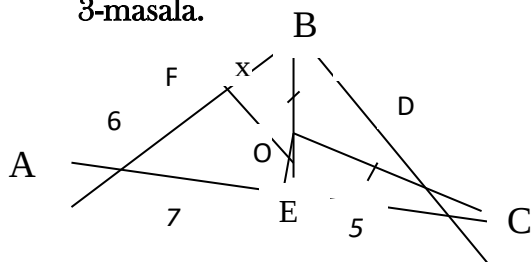
$$AF^2 + BD^2 + EC^2 = FB^2 + DC^2 + AE^2$$

$$x^2 + 4^2 + a^2 = 3^2 + 5^2 + a^2$$

$$x^2 + 16 = 9 + 25$$

**Javob:**  $x = 3\sqrt{2}$

3-masala.



Berilgan:  $\triangle ABC$  ,  
 $BO=OC$ ,  $AF=6$  cm,  $AE=7$  cm,  
 $EC=6$  cm ,  
 $AB \perp OF$ ,  $AC \perp OE$   
 Topish kerak:  $BF=x=?$

**Yechilishi:** Uchburchak ichidagi O nuqtadan BC tomonga OD perpendikulyar tushuramiz. Masala shartidan ma'lumki,  $\triangle BOC$  teng yonli, bundan OD balandlik mediana ham bo'ladi. Demak,  $BD=DC=a$ . Karno teoremasiga ko'ra :

$$AF^2 + BD^2 + EC^2 = FB^2 + DC^2 + AE^2$$

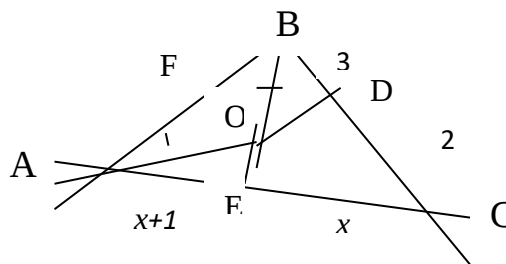
$$6^2 + a^2 + 5^2 = x^2 + a^2 + 7^2$$

$$x^2 = 14$$

$$\text{Javob: } x = \sqrt{14}$$

4-masala. Berilgan:  $\triangle ABC$  ,

$AE=x+1$  cm,  $EC=x$  cm,  
 $CD=2$  cm,  $DB=3$  cm ,  $AB=8$  cm,  
 $AO=OB$ ,  $BC \perp OD$ ,  $AC \perp OE$   
 Topish kerak:  $AC=?$



**Yechilishi.** Bu masalani yechishda ham uchburchak ichidagi O nuqtadan AB tomonga OF perpendikulyar tushuramiz. Masala shartidan ma'lumki,  $\triangle AOB$  teng yonli uchburchak bo'lib, OF balandlik mediana ham bo'ladi. Bundan  $AF=FB$ .  $AB=8$  cm ekanligidan  $AF=FB=4$  cm. Karno teoremasiga ko'ra :

$$AE^2 + CD^2 + BF^2 = EC^2 + DB^2 + FA^2$$

$$(x+1)^2 + 2^2 + 4^2 = x^2 + 3^2 + 4^2$$

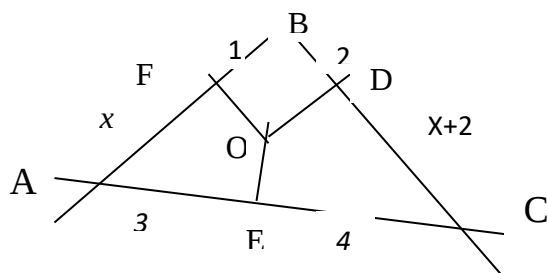
$$x = 2$$

$$AC = 2x + 1 = 5$$

$$\text{Javob: } AC = 5$$

O'zingizni sinab ko'ring.

5-masala. Berilgan:  $\triangle ABC$  ,



$AF=x$  cm,  $FB=1$  cm,  
 $BD=2$  cm,  $DC=x+2$  cm ,  $AE=3$  cm,  
 $EC=2 \cdot BD$  ,  $AC \perp OE$ ,  $BC \perp OD$ ,  
 $AB \perp OF$   
 Topish kerak:  $BC=?$

$$\text{Javob: } 5,5$$

6-masala. Berilgan:  $\triangle ABC$

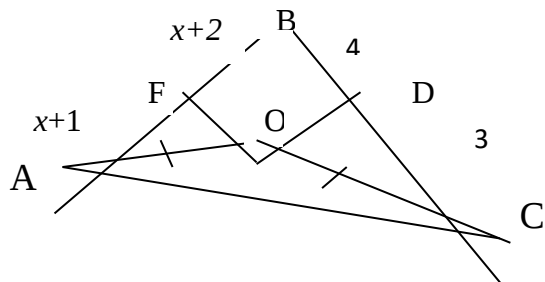
$AB \perp OF$ ,  $BC \perp OD$ ,  $AO = OC$

$AF = x+1$  cm,  $FB = x+2$  cm,

$BD = 4$  cm,  $DC = 3$  cm

Topish kerak:  $AB = ?$

Javob: 7



### FOYDALANILGAN ADABIYOTLAR:

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