UCHBURCHAKLARNI YECHISHDA STUART TEOREMASI

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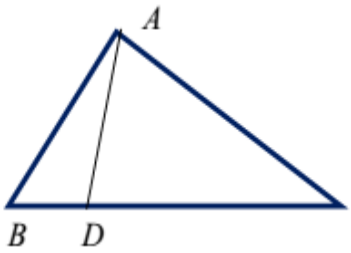
Annotatsiya: *Ushbu ilmiy maqola akademik litseylar chuqurlashtirilgan guruhlarning geometriya darslarida Stuart teoremasidan foydalanib, uchburchak medianasi, balandligi , bissektrisasi uzunliklarini topish formulalarini isbotlashda qo‘llaniladi. Shuningdek, matematika fanini bilish darajasini aniqlovchi Milly sertifikat olish uchun mustaqil tayyorlanuvchilarga yaqindan yordam beradi.*

Kalit so‘zlar: *Uchburchak, nisbatlar, kesmalar yo‘nalishi*

Stuart teoremasi (Isbotsiz). Agar ABC uchburchakning BC tomonida ichki D nuqta olingan bo‘lsa,

$AB^2 \cdot DC + AC^2 \cdot BD - AD^2 \cdot BC = BC \cdot DC \cdot BD$

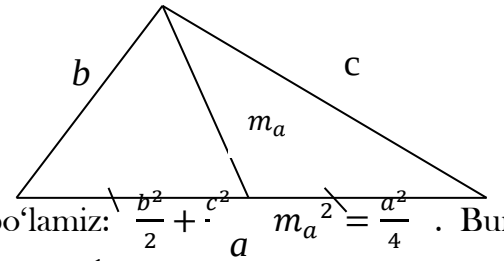
tenglik bajariladi (1-rasm).



1-rasm.

Stuart teoremasiga doir masalalar

1-masala. Tomonlari *a, b, c* uzunlikka teng bo‘lgan uchburchakning *a* tomoniga tushurilgan medianasi uzunligini topish formulasini keltirib chiqaring.



m_a =?

Yechilishi: Stuart teoremasiga ko‘ra

$b^2 \cdot \frac{a}{2} + c^2 \cdot \frac{a}{2} - {m_a}^2 \cdot a = a \cdot \frac{a}{2} \cdot \frac{a}{2}$

Tenglikning ikkala tomonini *a* ga bo‘lamiz: $\frac{b^2}{2} + \frac{c^2}{2} - \frac{a^2}{4} = {m_a}^2$. Bundan ${m_a}^2 = \frac{1}{4} \cdot (2b^2 + \angle c^2 - a^2)$ yoki $m_a = \frac{1}{2}\sqrt{2b^2 + 2c^2 - a^2}$. Isbot tugadi.

Javob: $m_a = \frac{1}{2}\sqrt{2b^2 + 2c^2 - a^2}$

2-masala. Uchburchakning ikkita tomoni uzunligi 15 va 25 ga teng. Uchunchi tomonga tushirilgan mediananing uzunligi 16 ga teng bo‘lsa, uchinchi tomon uzunligini toping.

Yechilishi: Stuart teoremasiga ko‘ra $15^2 \cdot \frac{a}{2} + 25 \cdot \frac{a}{2} - 16^2 \cdot a = a \cdot \frac{a}{2} \cdot \frac{a}{2}$

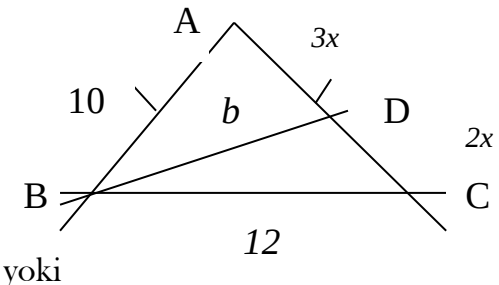
Tenglikning ikkala tomonini *a* ga bo‘lamiz: $\frac{15^2}{2} + \frac{25^2}{2} - 16^2 = \frac{a^2}{4}$

$\frac{a^2}{4} = \frac{225+625-2\cdot256}{2}$ yoki $a^2 = 676$ bundan $a = 26$.

Javob: $a = 26$

3-masala. Teng yonli uchburchakning asosi 12 cmga , yon tomoni 10cm ga teng. Yon tomonga tushirilgan *b* kesma yon tomonini uchburchakning uchidan boshlab hisoblaganda 3:2 nisbatda bo‘ladi. *b* kesma uzunligini toping.

Yechilishi: Berilgan ABC uchburchak teng yonli ekanligidan



AB= $3x + 2x = 10$

$x = 2.$

Bundan $AD = 6$ cm, $DC = 4$ cm.

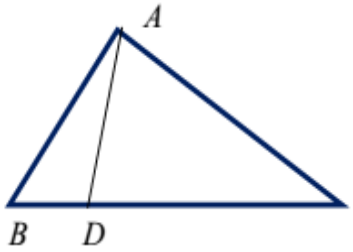
Stuart teoremasiga ko‘ra

$AB^2 \cdot DC + BC^2 \cdot AD - BD^2 \cdot AC = AC \cdot AD \cdot DC$ yoki

$10^2 \cdot 4 + 12^2 \cdot 6 - b^2 \cdot 10 = 10 \cdot 6 \cdot 4$

Javob: $b = \sqrt{\frac{512}{5}}$

4-masala. ABC uchburchakning AB=9, AC=12 ga teng. Agar AD kesma BC tomondan BD=5, DC=10 ga teng kesmalar ajratsa, AD kesma uzunligini toping.



Yechilishi: Stuart teoremasiga ko‘ra

$AB^2 \cdot DC + AC^2 \cdot BD - AD^2 \cdot BC = BC \cdot BD \cdot DC$

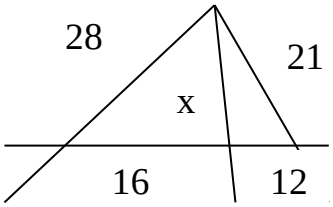
$9^2 \cdot 10 + 12^2 \cdot 5 - AD^2 \cdot 15 = 15 \cdot 5 \cdot 10$

$AD^2 = 52 \Rightarrow AD = 2\sqrt{13}.$

Javob: $2\sqrt{13}$

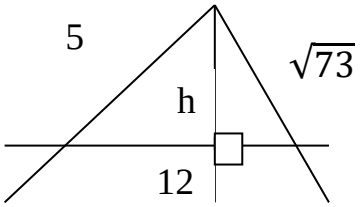
O‘zingizni sinab ko‘ring,

1-mashq. x=?



Javob: $2\sqrt{11}$

2-mashq. h=?



Javob: 3

FOYDALANILGAN ADABIYOTLAR:

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