

USE OF TRIGONOMETRIC FUNCTIONS IN MEASURING DISTANCE

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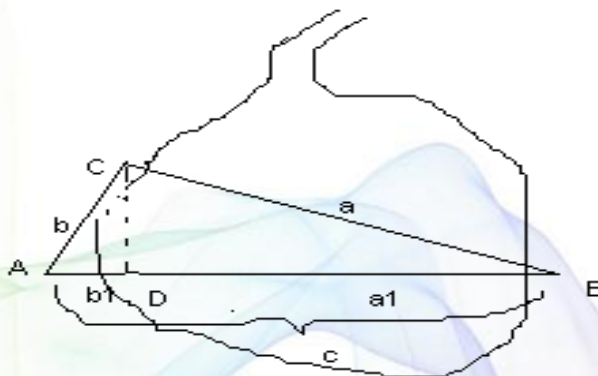
Fergana for people with disabilities

Specialized vocational school

Mathematics teacher

Annotation: The article describes the problems of measuring the distance to an inaccessible point on the earth's surface, the speed of an object moving at an inaccessible distance, the atmospheric pressure at an inaccessible altitude, and the methods of execution.

Key words: Sea level, altitude, length, short, distance, speed



O'quvchilarga berilayotgan ma'lumotlarni amaliyotga tadbqiqini ko'rstish maqsadga muvofiqdir
1-masala: rasmda ko'rsatilgan ko'lni AB kengligini aniqlang. A va C nuqtalarga borish mumkin. B nuqtaga borib bo'lmaydi. Bu masalalni yechisda quyidagi belgilashlarni kiritamiz: $\angle ACD = \alpha$ $\angle DCB = \beta$. AC ni va α , β , $\angle CAB$ ni o'lchash imkoniyati bor. $AB=c$ ni aniqlash kerak. $\triangle ABC$ uchun sinuslar teoremasini yozsak

$$\frac{c}{\sin(\alpha + \beta)} = \frac{a}{\sin(90^\circ - \alpha)} = \frac{b}{\sin(90^\circ - \beta)} = 2R;$$

$$\triangle ACD \text{ va } \triangle BCD \text{ dan } b_1 = b \sin \alpha = 2R \cos \beta \sin \alpha$$

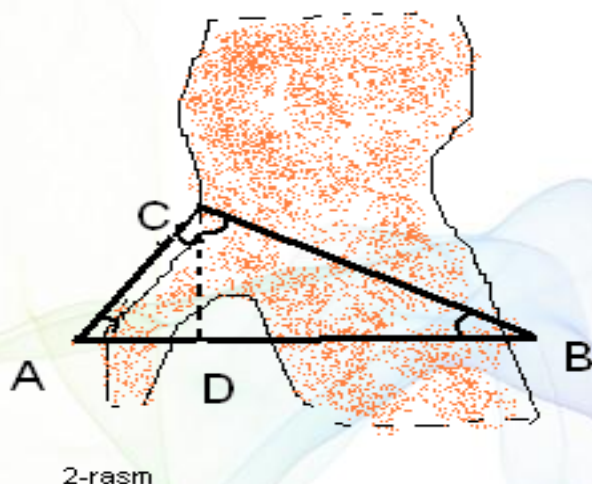
$$a_1 = a \sin \beta = 2R \cos \alpha \sin \beta;$$

$$\text{rasmdan } c = a_1 + b_1; c = 2R(\cos \alpha \sin \beta + \sin \alpha \cos \beta) = \frac{b}{\cos \beta} \sin(\alpha + \beta)$$

bo'ladi.

Martematika fanini o'qitishda amalda qo'llanilishini ko'zda tutib dars o'tish, ayniqsa geometriyada amaliy ishlar sifatida, darsni bevosita yer maydonida masofalarni o'lchashga bog'lab olib borish, o'quvchilarni

geometriyaga nisbatan qiziqishini tobora oshirib boradi. Natijada ularning teorema va uni isbotlash nima uchun kerak? Degan savollar kamayib, tegishli javoblarni olib boradilar. Geometriya hayotiy geyometriya bo'lishi, o'quvchilar o'z atrofidagi geometriyani ko'rishlari kerak. shunday ekan yer yuzasida borib bo'lmaydigan nuqtagacha bo'lgan masofani, borib bo'lmaydigan masofada harakatlanayotgan jismni tezligini, borib bo'lmaydigan balandlikdagi atmosfera bosimini o'lchashdan iborat masalalarni qo'yish va ularni birgalikda yechish, algebraik qonunlar, geometrik formulalarni ishlatishga, geometrik shakllarni yer yuzida fikran tasavvur etishga, tiklab ko'rishga o'rgatib, trigonometrik funksiyalarni, sinuslar teoremasi, qo'shish teoremlari, kosinuslar teoremasi va boshqa teoremlarni qo'llashga da'vat etadi. Bunday masalalarni yechishda o'quvchilar yer ustida hosil qilingan geometrik shakllar mustahkam o'nashib qoladi. quyidagi masalalarni ko'rib chiqamiz.



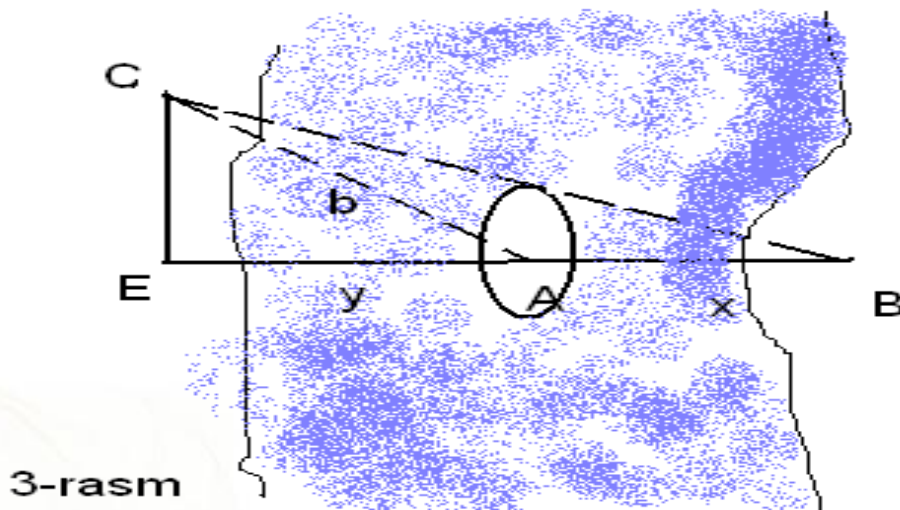
2- masala: 2- rasmda ko'rsatilgan yarim orolda joylashgan D nuqtadan ikkinchi sohildagi B nuqtagacha bolgan masofani toping.

YECHILISHI. Masalani yechisda quyidagi belgilashlarni kiritamiz: $\angle ACD = \alpha$ $\angle DCB = \beta$. AC ni va α , β burchaklarni o'lchash imkoniyati bor. $DB = x$ ni aniqlash kerak. $\triangle ABC$ ucun sinuslar teoremasini yozsak

$$\frac{b}{\sin(90^\circ - \beta)} = 2R; \quad 2R = \frac{b}{\cos \beta}; \quad \frac{AB}{\sin(\alpha + \beta)} = 2R; \quad AB = 2R \sin(\alpha + \beta);$$

$$\triangle ACD \text{ dan } b_1 = b \sin \alpha$$

$$\text{rasmdan } x = AB - b_1 = 2R \sin(\alpha + \beta) - b \sin \alpha = b \cdot \cos \alpha \cdot \operatorname{tg} \beta.$$

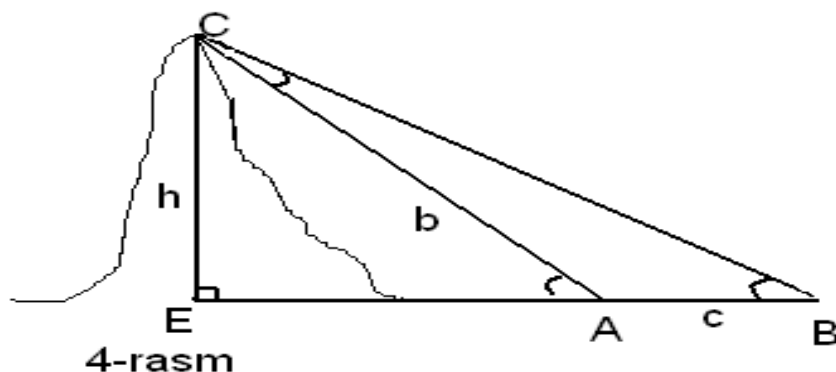


3- masala. 3-rasmda ko'rsatilgan oroldagi A nuqtadan ikkinchi sohildagi B nuqttagacha bo'lgan masofani va o'zimiz turgan sohildagi E nuqtadan oroldagi A nuqttagacha bo'lgan masofani toping.

Yechilishi. Quyidagicha belgilsh kiritib olaylik $\angle ACE = \alpha$ $\angle ACB = \beta$, $EA = y, AB = x$. Sohilda CE masofani va α, β burchaklarni o'lchay olamiz. $\triangle CAE$ dan $b = \frac{d}{\cos \alpha}$; $\triangle CAB$ dan $\frac{x}{\sin \beta} = \frac{b}{\sin(90^\circ - (\alpha + \beta))}$;

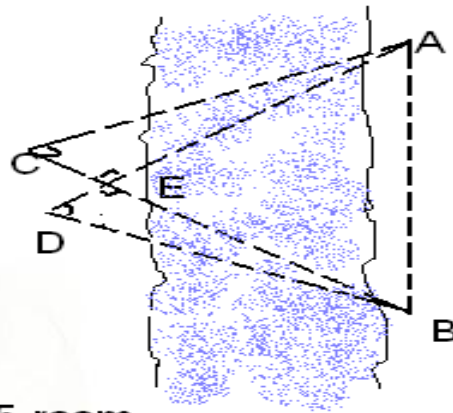
$$x = \frac{b \sin \beta}{\cos(\alpha + \beta)}; \Delta CAE \text{ dan } y = dtg.$$

4-masala: 4-rasmdagi tog' cho'qqisidagi atmosfera bosimini aniqlang.



Yechilishi. Biz turgan joy dengiz sathidan 2 km balandlikda bo'lsa, tog'ning balandligini aniqlab qo'shamiz. Quyidagicha belgilash kiritib olaylik: $\angle CAE = \alpha$ $\angle EBC = \beta$. Biz A nuqtada β burchakni B nuqtada α burchakni aniqlab $AB=c$ ni o'lchaymiz va $\triangle ABC$ uchun sinuslar teoremasini yozamiz. β

$$\frac{c}{\sin(\alpha - \beta)} = \frac{b}{\sin \alpha} = 2R; \quad b = 2R \sin \alpha.$$



5-rasm

$\triangle CEA$ dan $h = b \sin \alpha = 2R \sin \alpha \sin \beta$.

Dengiz sathidan choqqigacha bo'lgan balandlik $H = h + 2$ km bo'ladi. H balandlikdagi bosimni jadvaldan toppish qoldi.

5-masala. 5- rasmda ifodalangan daryoning ikkinchi sohilidagi A va B nuqtalar orasidagi masofani aniqlang.

Yechilishi. Usturlob yordamida $\triangle CEA$, $\triangle BCA$, $\triangle BDA$ burchaklarni aniqlaymiz, va EC va ED masofalarni

aniqlaymiz. $\triangle CEA$ uchun sinuslar teoremasini yozsak $\frac{EA}{\sin \alpha} = \frac{CE}{\sin(\alpha + \beta)}$; $EA = \frac{CE \sin \alpha}{\sin(\alpha + \beta)}$

$\triangle DEB$ uchun sinuslar teoremasini yozsak $\frac{EB}{\sin \gamma} = \frac{DE}{\sin(\gamma + \beta)}$; $EB = \frac{CE \sin \gamma}{\sin(\gamma + \beta)}$.

$$AB = \sqrt{EA^2 + EB^2 + 2EA \cdot EB \cdot \cos \beta}.$$

Bu yerda $\alpha = \angle C$, $\beta = \angle CEA$, $\gamma = \angle D$.

6-masala: 5-masaladan foydalanib daryoning ikkinchi sohilida harakatlanayotgan avtomobilni tezligini toping.

Yechilishi. Avtomobilni A nuqtadan B nuqtagacha o'tgan vaqtini soatga qarab aniqlaymiz. 5-masaladagi

usuldan foydalanib bosib o'tilgan yo'l AB ni aniqlaymiz. U holda tezlik $v = \frac{S}{t}$ fo'rmla yordamida topiladi.

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