

**KOORDINATALAR SISTEMASI ORQALI TO'G'RI CHIZIQ VA TEKISLIK  
ORASIDAGI MASOFALARNI TOPIHGA DOIR BA'ZI BIR AMALIY MASALALAR  
YECHIMLARI**

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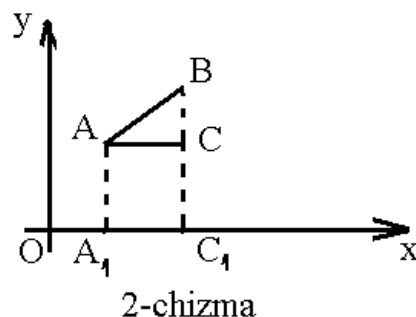
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**Annotasiya:** Ushbu maqolada to'g'ri chiziqdagi ikki nuqta orasidagi masofa, tekislikga ikki nuqta orasidagi masofa, kesmani berilgan nisbatda bo'lish, uchburchak medianalarini kesishgan nuqtasining koordinatalarini uchburchak uchlarining koordinatalari bo'yicha topish.

**To'g'ri chiziqdagi ikki nuqta orasidagi masofa.** To'g'ri chiziqdagi nuqtaning o'rnini aniqlash masalasini qaraymiz. Buning uchun biror to'g'ri chiziq olib, bu to'g'ri chiziqdagi ikki yo'nalishdan birini musbat yo'nalish deb qabul qilamiz. Shu bilan to'g'ri chiziq o'qqa aylanadi. Endi uzunlik birligi tanlab olamiz, u 1 santimetr bo'lsin. O'qdagi (1-chizma) ixtiyoriy O nuqtani sanoq boshlanadigan nuqta deb qabul qilamiz. Bu o'qni Ox o'q deb ataymiz. Bu Ox o'qdagi har qanday N nuqtaning o'rnini  $\overline{ON}$  kesmaning algebraik miqdori bilan aniqlanadi. O'qdagi koordinatalar sistemasida ikki  $A(x_1)$  va  $B(x_2)$  nuqtalar orasidagi masofa

$$|\overline{AB}| = |x_2 - x_1|$$

formula bilan topiladi.



**1-misol.** M(2) va N(-4) nuqtalar orasidagi masofa

$$|\overline{MN}| = |2 - (-4)| = 6$$

**Tekislikdagi ikki nuqta orasidagi masofa.** Dekart koordinatalar sistemasida  $A(x_1, y_1), B(x_2, y_2)$  nuqtalar berilgan bo'lsin. Bu nuqtalar orasidagi masofa

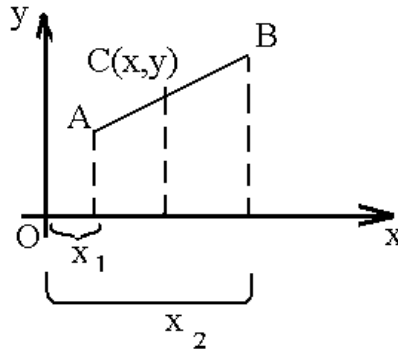
$$d = AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad (1)$$

formula bilan topiladi (2-chizma)

**Misol.** A(2;-3) va B(-1;1) nuqtalar orasidagi masofa (1) formulaga asosan :

$$AB = \sqrt{(-1 - 2)^2 + [1 - (-3)]^2} = \sqrt{9 + 16} = 5 \text{ birlik. (2-chizma).}$$

**Kesmani berilgan nisbatda bo'lish.** Tekislikda berilgan  $A(x_1, y_1), B(x_2, y_2)$  nuqtalarni tutashtiruvchi  $\overline{AB}$  kesma C(x,y) nuqta bilan  $\frac{AC}{BC} = \lambda$  nisbatda bo'linganbo'lsa, C nuqtaning koordinatalarini topish talab etiladi. (3-chizma)



3-chizma

C ning koordinatalari  $x = \frac{x_1 + \lambda x_2}{1 + \lambda}, y = \frac{y_1 + \lambda y_2}{1 + \lambda} \quad (2)$

formular bilan, agar C nuqta kesmaning o'rtasida bo'lsa, u holda  $\lambda = 1$  bo'lib,

$$\bar{x} = \frac{x_1 + \lambda x_2}{2}, \bar{y} = \frac{y_1 + \lambda y_2}{2} \quad (3) \text{ formulalarga ega bo'lamiz.}$$

**Misol.** MN kesma M dan N ga tomon yo'nalishda Q(2;3) nuqtada 3:4 nisbatda bo'linadi, Agar M nuqtaning koordinatalari (4;2) bo'lsa, N nuqtaning koordinatalari topilsin.

**Yechish:** Masalani yechish uchun (2) formuladan foydalanamiz. Masala shartiga ko'ra  $\lambda = \frac{3}{4}$ ; M nuqta kesmaning bosimi bo'lgani uchun

$$x_1 = 4, y = 2. \quad Q \text{ nuqta kesmani } \lambda \text{ nisbatda bo'lgani uchun } x=2; y=3.$$

Demak (2) formulaga ko'ra

$$2 = \frac{4 + \frac{3}{4}x_2}{1 + \frac{3}{4}}; \quad 3 = \frac{2 + \frac{3}{4}y_2}{1 + \frac{3}{4}}$$

yoki

$$\begin{cases} 14 = 16 + 3x_2 \\ 21 = 8 + 3y_2 \end{cases}; \quad x_2 = -\frac{2}{3}; \quad y_2 = \frac{13}{3}$$

$$\text{Sunday qilib } B\left(-\frac{2}{3}; \frac{13}{3}\right).$$

**Uchburchak medianalarini kesishgan nuqtasining koordinatalarini uchburchak uchlarning koordinatalari bo'yicha topish.** Uchburchak uchlari

$A(x_A, y_A), B(x_B, y_B), va C(x_C, y_C)$  nuqtalarda bo'lsa, uning medianalari kesishgan nuqta  $M\left(\frac{x_A+x_B+x_C}{3}; \frac{y_A+y_B+y_C}{3}\right)$  bo'ladi.

**Misol.** Agar uchburchakning uchlari  $A(7;-4), B(-1;8)$  va  $C(-12;-1)$  nuqtalarda bo'lsa, uchburchak medianalarining kesishgan nuqtasi topilsin.

**Yechish:**  $M = \left(\frac{7-1-12}{3}; \frac{-4+8-1}{3}\right) = (-2; 1)$

$A(x_A, y_A), B(x_B, y_B), va C(x_C, y_C)$  nuqtalarda  $m_A, m_B, m_C$  massalar to'plangan. Bu sistemaning massalar markazi

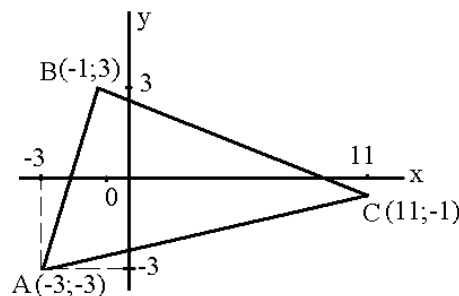
$$M\left(\frac{m_A x_A + m_B x_B + m_C x_C}{m_A + m_B + m_C}; \frac{m_A y_A + m_B y_B + m_C y_C}{m_A + m_B + m_C}\right) \text{ bo'ladi.}$$

**Misol.**

$A(-1;3); B(4;3); C(6;-5)$  nuqtalarda mos ravishda 2; 3 va 5 kg massalar to'plangan. Bu sistemaning massalar markazini toping:

$$\begin{aligned} M &= \left(\frac{-1 \cdot 2 + 4 \cdot 3 + 6 \cdot 5}{2 + 3 + 5}; \frac{3 \cdot 2 + 3 \cdot 3 + (-5) \cdot 5}{2 + 3 + 5}\right) = \\ &= \left(\frac{-2 + 12 + 30}{10}; \frac{6 + 9 - 25}{10}\right) = (4; -1) \end{aligned}$$

**Uchburchakning yuzi.** Koordinatalar sistemasiga nisbatan uchburchak uchlarning koordinatalari  $A(x_1, y_1), B(x_2, y_2)$  va  $C(x_3, y_3)$  bo'lsa,



(4-chizma)

uning yuzi  $S = \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$  yoki

determinant tushunchasidan foydalanib,

$$S = \pm \frac{1}{2} \left[ \begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix} + \begin{vmatrix} x_2 & y_2 \\ x_3 & y_3 \end{vmatrix} + \begin{vmatrix} x_3 & y_3 \\ x_1 & y_1 \end{vmatrix} \right].$$

**Misol.** Uchlari  $A(-3;-3), B(-1;3), va C(11;-1)$  nuqtalarda bo'lsa, uning yuzini toping!

**Yechish.**

$$\begin{aligned} S &= \pm \frac{1}{2} \left[ \begin{vmatrix} -3 & -3 \\ -1 & 3 \end{vmatrix} + \begin{vmatrix} -1 & 3 \\ 11 & -1 \end{vmatrix} + \begin{vmatrix} 11 & -1 \\ -3 & -3 \end{vmatrix} \right] = \\ &= \pm \frac{1}{2} [-9 - 3 + 1 - 33 - 33 - 3] = \pm \frac{1}{2} (-80) = 40 \end{aligned}$$

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