7-mavzu:

Darsda yechiladigan misollar

1-masala. Dekart koordinatalar sistemasida *A(7, -7), N(-5, 12), P(3, 0)* nuqtalar berilgan. Ularning qutb koordinatalarini toping?

Yechish Bu masalani yechishda (17.2) formuladan foydalanamiz.

$A(7,\ -7),\ \rho=\sqrt{7^2+(-7)^2}=7\sqrt{2}$ $\qquad tg\varphi=\frac{-7}{7}=-1,\quad \varphi=\frac{3\pi}{4}$

$N(-5;\ 12),\ \rho=\sqrt{(-5)^2+12^2}=13$ $\qquad tg\varphi=-\frac{12}{5},\quad \varphi=arctg(-\frac{12}{5})$

$P(3;\ 0),\quad \rho=\sqrt{3^2}=3$ $\qquad tg\varphi=\frac{0}{3}=0,\quad \varphi=0$

2-masala. Uchlarini $A(5;\ \frac{\pi}{2})$, $B(8;\ \frac{5\pi}{6})$ va $C(3;\ \frac{7\pi}{6})$ nuqtalarda joylashgan uchburchakning muntazam ekanligini isbotlang.

Yechish Uchburchakning muntazam ekanligini isbotlash uchun *AB=BC=AC* ni isbotlash etarli. Buning uchun (18.1) formuladan

$$AB=\sqrt{5^2+8^2-2\cdot5\cdot8\cdot\cos(\frac{5\pi}{6}-\frac{\pi}{2})}=\sqrt{25+64-80\cdot\cos\frac{\pi}{3}}=\sqrt{89-80\frac{1}{2}}=\sqrt{49}=7$$

$$AC=\sqrt{5^2+3^2-2\cdot5\cdot3\cdot\cos(\frac{7\pi}{6}-\frac{\pi}{2})}=\sqrt{25+9-30\cdot\cos(-\frac{2\pi}{3})}=\sqrt{25-30(-\frac{1}{2})}=\sqrt{49}=7$$

$$BC=\sqrt{64+9-2\cdot8\cdot3\cdot\cos\frac{\pi}{3}}=\sqrt{73-24}=\sqrt{49}=7$$

Demak, *AB=AC=BC* ekan, *ABC* uchburchak muntazam.

3-masala. Dekart koordinatalar sistemasida *A(7, -7), N(-5, 12), P(3, 0)* nuqtalar berilgan. Ularning qutb koordinatalarini toping?

Yechish Bu masalani yechishda (17.2) formuladan foydalanamiz.

$A(7,\ -7),\ \rho=\sqrt{7^2+(-7)^2}=7\sqrt{2}$ $\qquad tg\varphi=\frac{-7}{7}=-1,\quad \varphi=\frac{3\pi}{4}$

$N(-5;\ 12),\ \rho=\sqrt{(-5)^2+12^2}=13$ $\qquad tg\varphi=-\frac{12}{5},\quad \varphi=arctg(-\frac{12}{5})$

$P(3;\ 0),\quad \rho=\sqrt{3^2}=3$ $\qquad tg\varphi=\frac{0}{3}=0,\quad \varphi=0$

4-masala. Uchlarini $A(5;\ \frac{\pi}{2})$, $B(8;\ \frac{5\pi}{6})$ va $C(3;\ \frac{7\pi}{6})$ nuqtalarda joylashgan uchburchakning muntazam ekanligini isbotlang.

Yechish Uchburchakning muntazam ekanligini isbotlash uchun *AB=BC=AC* ni isbotlash etarli. Buning uchun (18.1) formuladan

$$AB=\sqrt{5^2+8^2-2\cdot5\cdot8\cdot\cos(\frac{5\pi}{6}-\frac{\pi}{2})}=\sqrt{25+64-80\cdot\cos\frac{\pi}{3}}=\sqrt{89-80\frac{1}{2}}=\sqrt{49}=7$$

$$AC=\sqrt{5^2+3^2-2\cdot5\cdot3\cdot\cos(\frac{7\pi}{6}-\frac{\pi}{2})}=\sqrt{25+9-30\cdot\cos(-\frac{2\pi}{3})}=\sqrt{25-30(-\frac{1}{2})}=\sqrt{49}=7$$

$$BC=\sqrt{64+9-2\cdot8\cdot3\cdot\cos\frac{\pi}{3}}=\sqrt{73-24}=\sqrt{49}=7$$

Demak, *AB=AC=BC* ekan, *ABC* uchburchak muntazam.

Tekshirish uchun savollar va mashqlar.

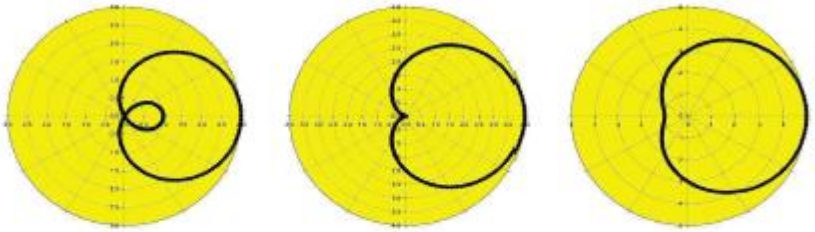
1. Qutb koordinatalar sistemasini kiritishdan maqsad nima?
2. Qutb koordinatalar sistemasini ta'riflang.
3. Nuqtaning qutb koordinatalaridan dekart koordinatalariga o'tish formulasini yozing.
4. Nuqtaning dekart koordinatalardan qutb koordinatalarga o'tish formulasini yozing.
5. Ikki nuqta orasidagi masofani topish formulasini chiqaring.
6. Quyidagi nuqtalar orasidagi masofani aniqlang.

   a) $\left(5;\ \frac{\pi}{6}\right), \left(3; -\frac{\pi}{6}\right)$ *b*) $\left(4;\ \frac{11\pi}{6}\right), \left(3, \frac{\pi}{9}\right)$ *v*) $\left(4;\ \frac{\pi}{5}\right), \left(6, \frac{6\pi}{5}\right)$

   Javob: *a*) $\sqrt{19}$; *b*) 5; *v*) *10*

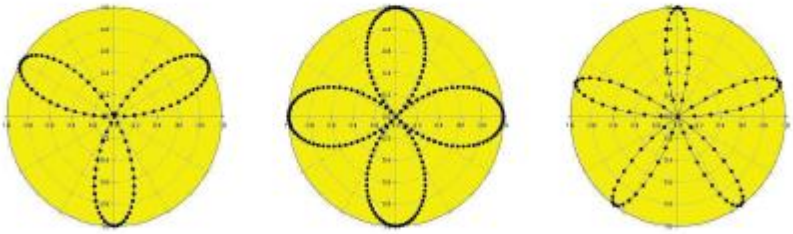
7. Uchlari $A\ \left(2\sqrt{3};\ \frac{\pi}{3}\right), B\left(\sqrt{3};\frac{2\pi}{3}\right)\ C\left(4+\sqrt{3};\ \frac{2}{3}\pi\right)$ nuqtalarda bo'lgan uchburchak to'g'ri burchakli uchburchak ekanligini isbotlang.

Some well known polar curves are illustrated in the following figures.



b=-a b=2a b=3a

Figure 1-12. The limaçon curves $r = 2a\cos\theta + b$



$r = a\sin 3\theta$ $r = a\cos 2\theta$ $r = a\sin 5\theta$

Figure 1-13. The rose curves $r = a\cos n\theta$ and $r = a\sin n\theta$

If n odd, curve has n-loops and if n is even, curve has $2n$ loops.