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GIPERBOLA VA UNGA DOIR MASALALARNING SODDA ISHLANISH USULLARI URUNMA TENGLAMASINING TADBIQI

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Annotatsiya: Ushbu maqolada Giperbola — bu ikkita doira yoki elipsning kesishishidan hosil bo'ladigan konik shakl bo'lib, uni matematikada ko'plab turli sohalarda, jumladan, optika, astronomiya va fizikada qo'llaniladi. Maqolada giperbolaning umumiy ta'rifi, uning asosiy tenglamalari, simmetriyasi, va xususiyatlari, shuningdek, giperbolaning doimiy yoriqlari va tangensial chiziqlari haqida ma'lumotlar berilgan. Giperbolaning amaliy qo'llanilishi ham ko'rib chiqiladi, masalan, uning yoritish tizimlari, elektromagnit to'lqinlar va boshqa ilmiy tadqiqotlarda qanday ahamiyatga ega ekanligi haqida. Maqola, shuningdek, giperbolaning tasviriy misollarini va geometrik shaklini o'rganishni qiziqarli va tushunarli qilib taqdim etilgan

Kalit so'zlar: giperbola, asimptota, radius-vektor, ekstsentrisiteti, mavhum o'q, haqiqiy o'q, tenglama, fokus, ordinata, absissa.

ПРОСТЫЕ МЕТОДЫ РАБОТЫ С ГИПЕРБОЛОЙ И СВЯЗАННЫМИ С НЕЙ ЗАДАЧАМИ, ПРИМЕНЕНИЕ УРАВНЕНИЯ ПРОИЗВЕДЕНИЯ

Аннотация: В этой статье гипербола представляет собой коническую форму, образованную пересечением двух кругов или эллипсов, и используется во многих различных областях математики, включая оптику, астрономию и физику. В статье дано общее определение гиперболы, ее основные уравнения, симметрия и свойства, а также сведения о сплошных трещинах и касательных гиперболы. Также рассматриваются практические применения гиперболы, например, насколько она важна в системах освещения, электромагнитных волнах и других научных исследованиях. Также в статье в интересной и понятной форме представлены наглядные примеры гиперболы и ее геометрической формы.

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Ключевые слова: гипербола, асимптота, радиус-вектор, эксцентриситет, абстрактная ось, вещественная ось, уравнение, фокус, ордината, абсцисса.

SIMPLE WORKING METHODS OF HYPERBOLA AND PROBLEMS RELATED TO IT, APPLICATION OF PRODUCT EQUATION

Abstract: In this article, a hyperbola is a conic shape formed by the intersection of two circles or ellipses, and is used in many different areas of mathematics, including optics, astronomy, and physics. The article provides a general definition of a hyperbola, its basic equations, symmetry, and properties, as well as information about continuous cracks and tangent lines of a hyperbola. Practical applications of the hyperbola are also considered, such as how it is important in lighting systems, electromagnetic waves, and other scientific research. The article also presents illustrative examples of the hyperbola and its geometric shape in an interesting and understandable way.

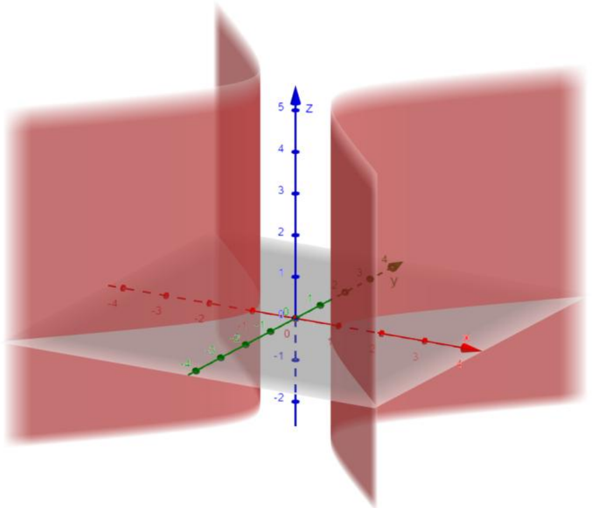
Key words: hyperbola, asymptote, radius-vector, eccentricity, abstract axis, real axis, equation, focus, ordinate, abscissa

Giperbolaning ta'rifi: Har bir nuqtasidan berilgan ikki nuqtagacha masofalarining ayirmasi o‘zgarmas miqdor bo‘lgan geometrik o‘rin giperbola deyiladi.

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \qquad (1)$$

(a- haqiqiy yarim o‘q, b-mavhum yarim o‘q)

Giperbolaning ko‘rinishi



Giperbola asimptotalari: $y = \pm\frac{b}{a}x$

Giperbolaning radius vektorlari:

$$\begin{cases} r = ex - a \\ r_1 = ex + a \end{cases}$$

Giperbolaga o’tkazilgan urinma tenglamasi: $\frac{x_1 \cdot x}{a^2} - \frac{y \cdot y_1}{b^2} = 1$

Giperbolaning ekstsentrisiteti:

$$e = \frac{2c}{2a} = \frac{c}{a} = \frac{\sqrt{a^2+b^2}}{a}$$

Giperbolaning direktrisalari: $x = \pm\frac{a^2}{c} = \pm\frac{a}{e}$

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MISOLLAR

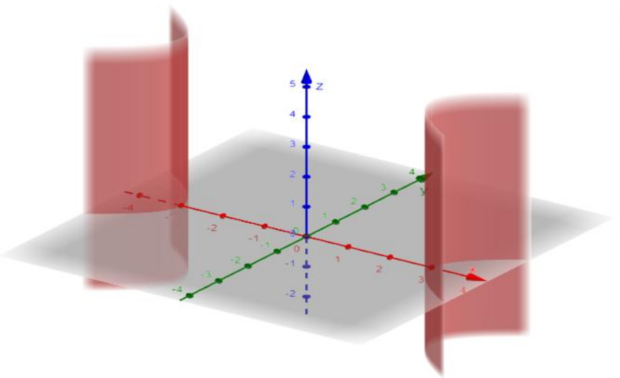
1) Fokuslari orasidagi masofa $2\sqrt{11}$ bo‘lib , o‘zi (9 ; -4) nuqtadan o‘tgan giperbolaning tenglamasi tuzilsin.

Yechish: $2c = 2\sqrt{11}$ $c = \sqrt{11}$

$a^2 - c^2 = -b^2$ (1) ,

$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (2)

c ning qiymatini (1) ga va berilgan nuqtani (2) ga qo‘yib Sistema hosil qilamiz.

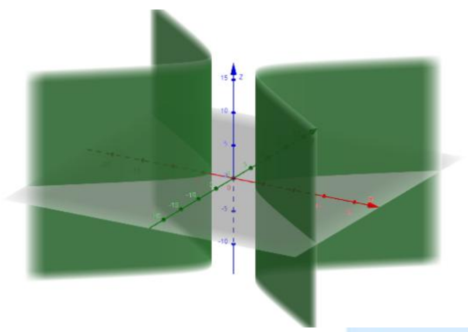


$\begin{cases} a^2 - \sqrt{11}^2 = -b^2 \\ \frac{81}{a^2} - \frac{16}{b^2} = 1 \end{cases} \Rightarrow$ $\begin{cases} a^2 + b^2 = 11 \\ 81b^2 - 16a^2 = (ab)^2 \end{cases} \Rightarrow a^2 = 11 - b^2 \Rightarrow 81b^2 - 16(11 - b^2) = b^2(11 - b^2) \Rightarrow 81b^2 - 176 + 16b^2 = 11b^2 - b^4$ oxirgi tenglamadan b^2 ni topamiz. $b^2 = 2$ *bundan* $a^2 = 9$ ga teng ekanligi kelib chiqadi. Qiymatlarni o‘z o‘rniga qo‘ysak giperbola tenglamsi kelib chiqadi.

Javob: $\frac{x^2}{9} - \frac{y^2}{2} = 1$

2) Giperbolaning tenglamasi $9 \cdot x^2 - 16 \cdot y^2 = 144$. Buning $x = 8$ nuqtasining radius vektorlari aniqlansin.

Yechish: $9 \cdot x^2 - 16 \cdot y^2 = 144$ avval giperbola tenglamasini kanonik holatga keltirib olamiz. $9 \cdot x^2 - 16 \cdot y^2 = 144 \backslash : 144$ $\frac{9 \cdot x^2}{144} - \frac{16 \cdot y^2}{144} = 1$ $\frac{x^2}{16} - \frac{y^2}{9} = 1$



Giperbolaning radius vektorlari: $\begin{cases} r = ex - a \\ r_1 = ex + a \end{cases}$

Ekstsentrisiteti: $e = \frac{\sqrt{a^2+b^2}}{a}$ $e = \frac{\sqrt{16+9}}{4}$

Qiymatlarni o‘z o‘rniga qo‘yib qo‘ysak $\begin{cases} r = \frac{5}{4} \cdot 8 - 4 = 6 \\ r_1 = \frac{5}{4} \cdot 8 + 4 = 14 \end{cases}$

Javob: $\begin{cases} r = 6 \\ r_1 = 14 \end{cases}$

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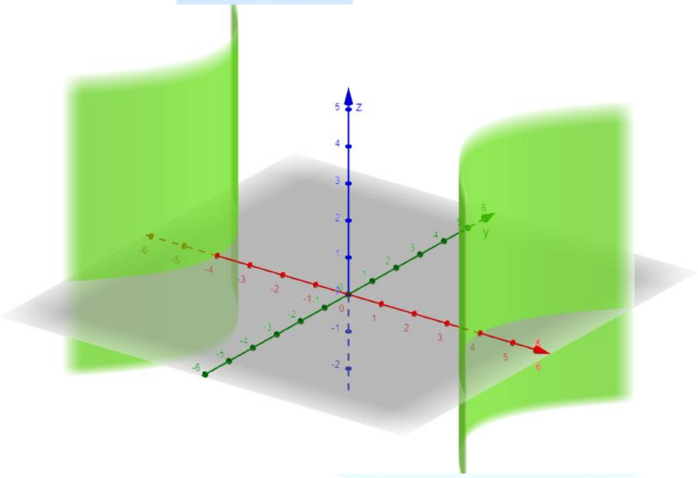
3) Giperbolaning tenglamasi $9x^2 - 16y^2 = 144$. Buning direktrisalarining tenglamalari topilsin.

Yechish: Avval giperbola tenglamasini kanonik holatga keltirib olamiz. $9x^2 - 16y^2 = 144 \backslash : 144$ $\frac{9x^2}{144} - \frac{16y^2}{144} = 1$ $\frac{x^2}{16} - \frac{y^2}{9} = 1$ $a = 4$ $b = 3$



Giperbola direktrisasi: $x = \pm\frac{a^2}{c}$ $a^2 + b^2 = c^2$ $x = \pm\frac{16}{\sqrt{16+9}} = \pm\frac{16}{5}$

Javob: $x = \pm\frac{16}{5}$

4) Giperbolaning asimptotalari $y = \pm\frac{2}{3}x$. Tenglamasi $x - 4 = 0$ bo‘lgan chiziq bunga urinma bo‘lmoqda. Giperbolaning tenglamasi tuzilsin.

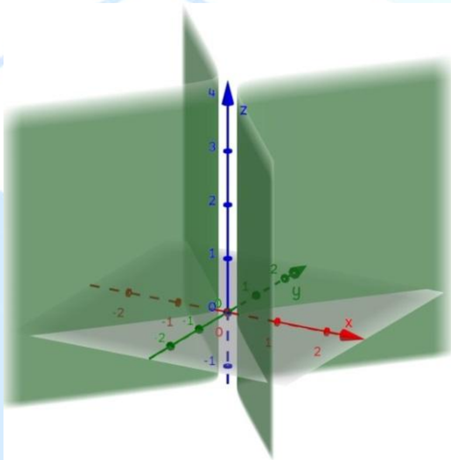
Yechish: $\frac{x_1 \cdot x}{a^2} - \frac{y \cdot y_1}{b^2} = 1$ $x = a^2 * x_1 = 4$ $x_1 = 4 * a^2,\ y_1 = 0,$

$y = \pm\frac{b}{a}x = \pm\frac{2}{3}x,$ $\frac{b}{a} = \frac{2}{3}$ $b = \frac{2}{3}a\,,$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \quad \frac{16a^4}{a^2} = 1 \quad 16a^2 = 1$$

$a^2 = \frac{1}{16}$ $b^2 = \frac{1}{12}$ $16x^2 - 12y^2 = 1$

Javob: $16x^2 - 12y^2 = 1$



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