

GEBERBOLA TENGLAMALARINING BA'ZI TADBIQLARI

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Annotatsiya: *Giperbola – kanonik kesmalar turkumi bo'lib, uning geometrik va matematik ta'rifi ko'plab ilmiy soxalarda, jumladan, fizika, astronomiya va muhandislikda qo'llaniladi. Giperbola tekislikdagi nuqtalar to'plamidir. Giperbolaning muhim xususiyatlaridan biri uning asimtotalarga ega bo'lishi va bu chiziqlarga yaqinlashib borishi, lekin hech qachon ularga tegmasligidir. Giperbola ko'plab ilmiy nazariyalarning asosida turadi va matematik modellashirishda muhim o'rin tutadi.*

Kalit so'zlar: *giperbola, giperbola tenglamasi, fokuslari, fokuslari orasidagi masofa, fokal radiuslar, direkrisa, aniqlanish sohasi, qiymatlar sohasi, nazariya, natija, xulosa.*

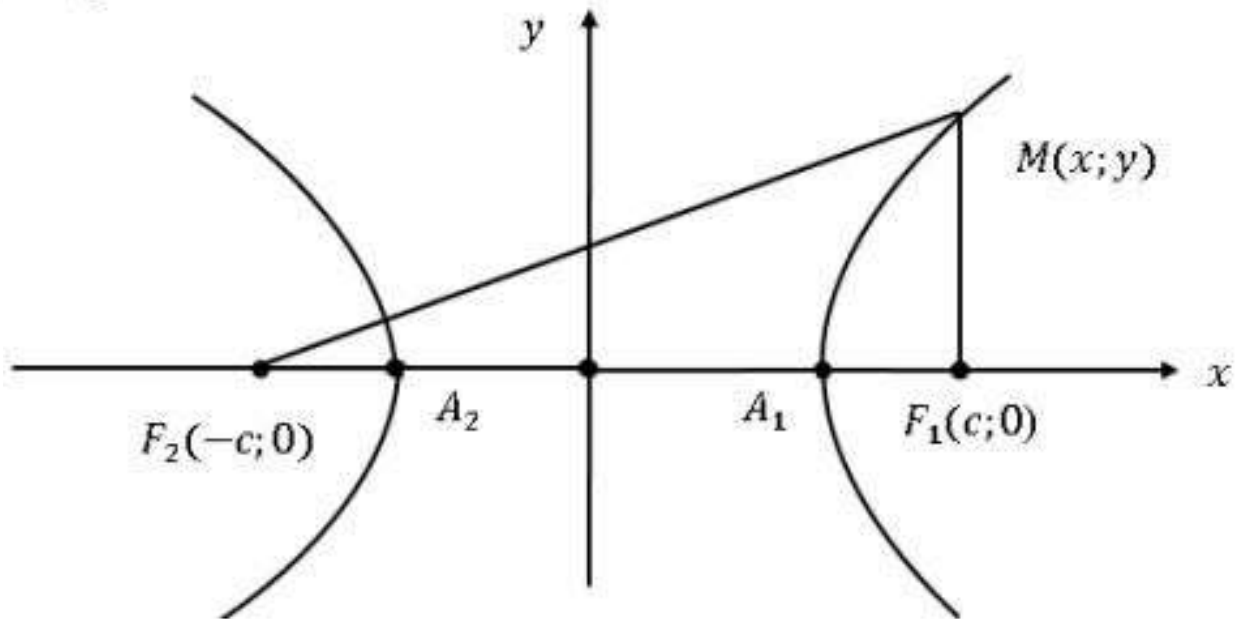
Аннотация: *Гипербола – это серия канонических сечений, геометрическое и математическое определение которых используется во многих научных областях, включая физику, астрономию и технику. Гипербола – это множество точек на плоскости. Одним из важных свойств гиперболы является то, что она имеет асимптоты и приближается к этим прямым, но никогда не касается их. Гипербола лежит в основе многих научных теорий и играет важную роль в математическом моделировании.*

Ключевые слова: *гипербола, уравнение гиперболы, фокусы, расстояние между фокусами, фокальные радиусы, директриса, поле определения, поле значений, теория, результат, вывод.*

Abstract: *A hyperbola is a series of canonical sections whose geometric and mathematical definition is used in many scientific fields, including physics, astronomy and engineering. A hyperbola is a set of points in a plane. One of the important properties of a hyperbola is that it has asymptotes and approaches these lines but never touches them. The hyperbola is the basis of many scientific theories and plays an important role in mathematical modeling.*

Key words: *hyperbola, hyperbola equation, foci, distance between foci, focal radii, directrix, field of definition, field of values, theory, result, conclusion.*

Giperbola-bu analitik geometriyada asimptotli ikki tarafga cho'zilgan ochiq egri chiziqdir. Fokus deb ataladigan ikki nuqtagacha bo'lgan masofalarining ayirmasi o'zgarmas songa teng bo'lgan nuqtalarning geometrik o'rniga giperbola deyiladi. Fokuslar F_1, F_2 , ular orasidagi masofa $|F_1F_2| = 2c$. Fokuslar yotgan to'g'ri chiziqqa yo'nalish berib absissa o'qi deylik. Absissa o'qini 2 ta fokusdan o'tkazaylik. Fokuslarning o'rtasidan absissa o'qiga perpendikulyar qilib ordinata o'qini o'tkazaylik.



$$|F_1M| - |F_2M| = 2a \quad \text{tenglikdan} \quad \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1;$$

ekanligi kelib chiqadi. Ushbu tenglama giperbolaning kanonik tenglamasi deyiladi.

Bu yerda $2a$ -haqiqiy o'q, $2b$ -mavhum o'q, $2c$ -fokuslar orasidagi masofa.

Giperbolaning eksentrisiteti deb, giperbola fokuslar orasidagi masofaning haqiqiy o'qqa nisbatiga aytiladi.

$$\varepsilon = \frac{2c}{2a} = \frac{c}{a} \rightarrow c^2 - a^2 = b^2 \rightarrow c > a \rightarrow \varepsilon > 1$$

Giperbolaning mavhum o'qiga parallel va uning markazidan

$$x = \frac{c}{\varepsilon} = \frac{a}{\frac{c}{a}} = \frac{a^2}{c}$$

Masofada yotuvchi ikki to'g'ri chiziqqa direkrisalari deyiladi.

Giperbolaning xossalari:

1) Giperbola koordinata o'qlariga nisbatan simmetrik bo'lgan egri chiziqdir.

2) $y = \pm \frac{b}{a}x$ to'g'ri chiziqlar giperbolaning asimptotalari bo'ladi, ya'ni bu to'g'ri

chiziq x ning cheksiz kattalashib borishi bilan giperbolaga borgan sari yaqinlashib boradi.

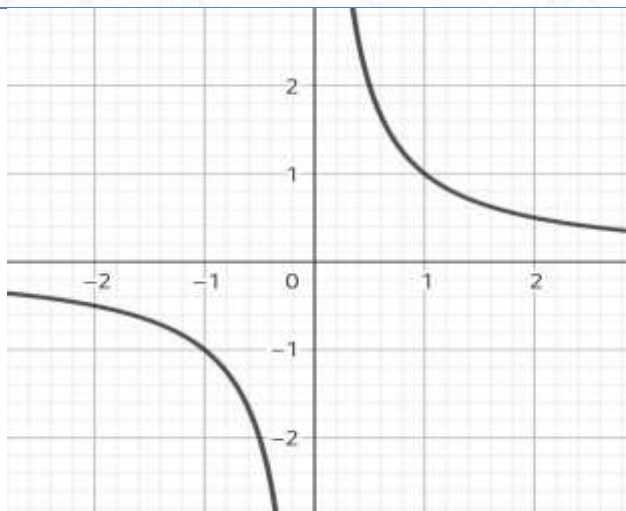
Giperbolani koordinatlar sistemasida ifodalash.

Bizga $y = \frac{k}{x}$ funksiya berilgan bo'lsin.

1. $k > 0$

Aniqlanish sohasi $x \neq 0$ yoki $x \in (-\infty; 0) \cup (0; \infty)$

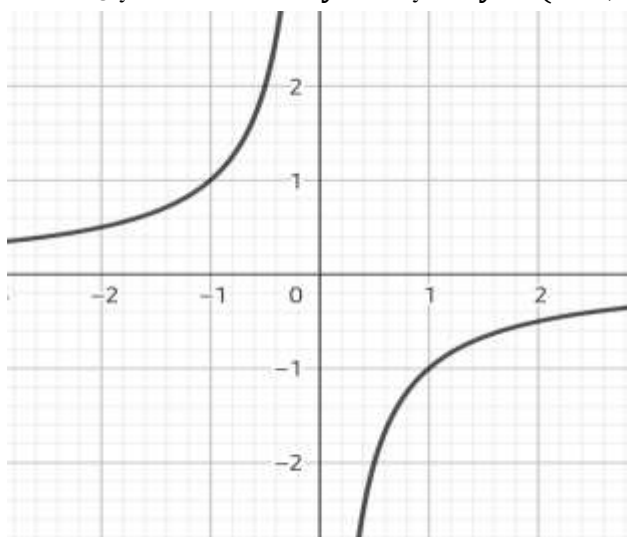
Qiymatlar sohasi $y \neq 0$ yoki $y \in (-\infty; 0) \cup (0; \infty)$



2. $k < 0$

Aniqlanish sohasi $x \neq 0$ yoki $x \in (-\infty; 0) \cup (0; \infty)$

Qiymatlar sohasi $y \neq 0$ yoki $y \in (-\infty; 0) \cup (0; \infty)$

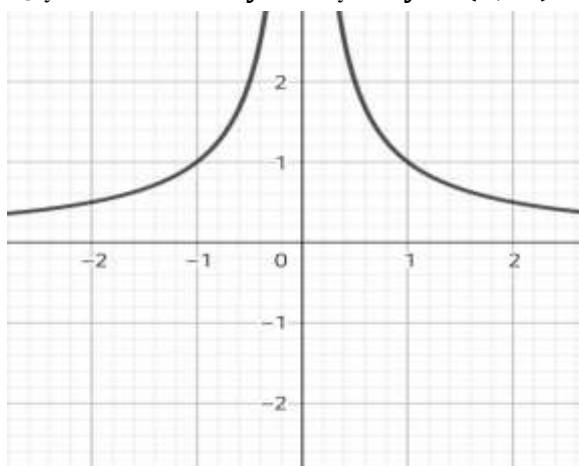


Bizga $y = \frac{k}{|x|}$ funksiya berilgan bo'lsin.

1. $k > 0$

Aniqlanish sohasi $x \neq 0$ yoki $x \in (-\infty; 0) \cup (0; \infty)$

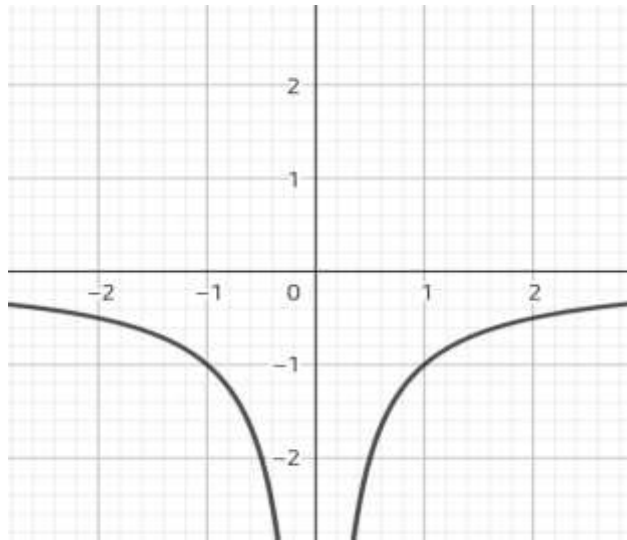
Qiymatlar sohasi $y > 0$ yoki $y \in (0; \infty)$



2. $k < 0$

Aniqlanish sohasi $x \neq 0$ yoki $x \in (-\infty; 0) \cup (0; \infty)$

Qiymatlar sohasi $y < 0$ yoki $x \in (-\infty; 0)$



Misol:

- 1) O'qlari koordinata o'qlari bilan ustma-ust tushgan va
 - a) uchlari orasidagi masofa 8 ga, fokuslari orasidagi masofa 10 ga teng bo'lgan;
 - b) haqiqiy o'qi 6 ga teng va (9 ; -4) nuqtadan o'tgan;

Yechish:

a) $2a = 8 \rightarrow a = 4$

$$2c = 10 \rightarrow c = 5$$

$$c^2 = a^2 + b^2 \rightarrow b^2 = c^2 - a^2$$

$$b^2 = 25 - 16 \rightarrow b^2 = 9$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \rightarrow \frac{x^2}{16} - \frac{y^2}{9} = 1$$

b) $2a = 6 \rightarrow a = 3$

$$2a_e = c_g = 13$$

$$2c_e = 2a_g$$

$$c_e = a_g = 5$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \rightarrow \frac{81}{9} - \frac{16}{b^2} = 1 \rightarrow b^2 = 2$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \rightarrow \frac{x^2}{9} - \frac{y^2}{2} = 1$$

- 2) Giperbolaning $F_1(10;0)$ va $F_2(-10;0)$ fokuslarini va nuqtalaridan biri $M(12;3.5)$ ni bilan holda, uning tenglamasini tuzing.

Yechish:

Giperbolaning fokuslari berilganligidan foydalanib uning katta va kichik yarim o'qlarini topamiz va giperbola tenglamasini tuzamiz:

$$c = 10$$

$$\begin{aligned}
 c^2 &= a^2 + b^2 \rightarrow c^2 = 100 - b^2 \\
 \frac{144}{a^2} - \frac{45}{b^2} &= 1 \rightarrow \frac{144}{100 - b^2} - \frac{45}{b^2} = 1 \rightarrow b = 6 \\
 a^2 &= 100 - 36 \rightarrow a^2 = 64 \rightarrow a = 8 \\
 \frac{x^2}{64} - \frac{y^2}{36} &= 1
 \end{aligned}$$

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