

# Hyperbolas

Note Title

5/6/2009

Total

The current grade distribution

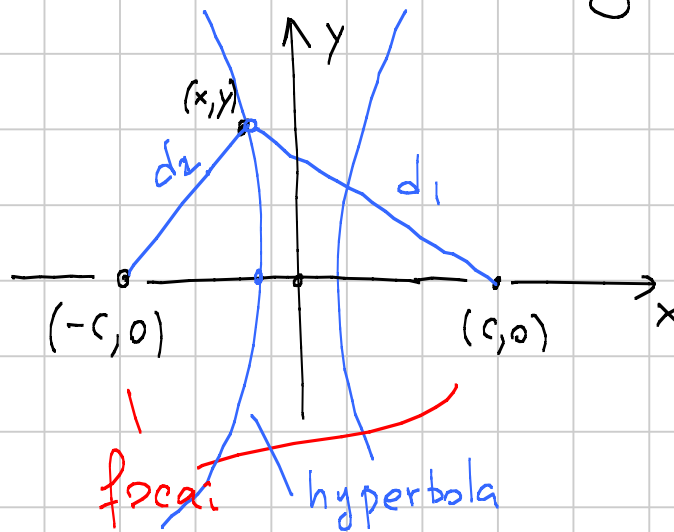
39 A

82 B

66 C

37 D

17 E



$$d_1 - d_2 = \pm k$$

$$0 < k < 2c$$

$$d_1 - d_2 = \pm k$$

$$\sqrt{(x-c)^2 + y^2} - \sqrt{(x+c)^2 + y^2} = \pm k$$

$$\sqrt{(x-c)^2 + y^2} = \pm k + \sqrt{(x+c)^2 + y^2}$$

$$(x-c)^2 + \cancel{y^2} = k^2 \pm 2k\sqrt{(x+c)^2 + y^2} + (x+c)^2 + \cancel{y^2}$$

$$-4xc - k^2 = \pm 2k\sqrt{(x+c)^2 + y^2}$$

$$(4xc + k^2)^2 = 4k^2((x+c)^2 + y^2)$$

$$k=2a \rightarrow (4k^2 - 16c^2)x^2 + 4k^2y^2 = k^4 - 4k^2c^2$$

$$k < 2c \quad \cancel{16}(a^2 - c^2)x^2 + \cancel{16}a^2y^2 = \cancel{16}a^2(a^2 - c^2)$$

$$\Downarrow$$

$$a < c$$

$$a^2 - c^2 = -b^2$$

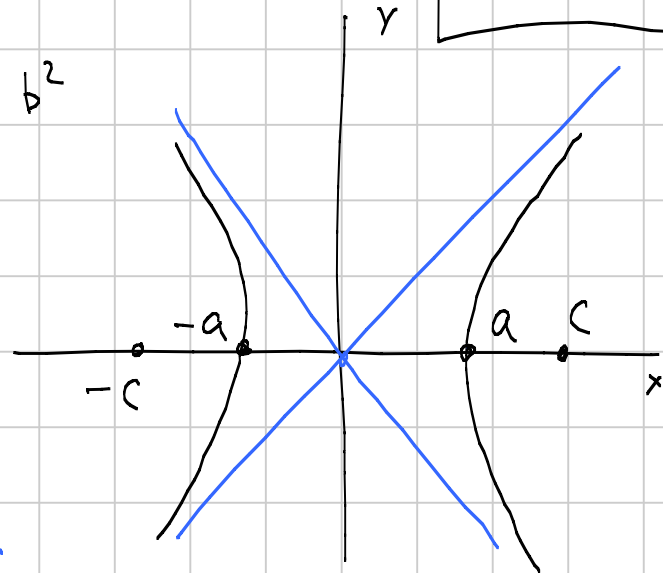
$$-b^2x^2 + a^2y^2 = -a^2b^2$$

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

For large  
x

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

$$y = \pm \frac{b}{a} x - \text{asymptotes}$$



$$\frac{(x-x_0)^2}{a^2} - \frac{(y-y_0)^2}{b^2} = 1$$

Eq. of hyperbola with the center at  $(x_0, y_0)$

Hyperbola with foci on the  $y$ -axis

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

