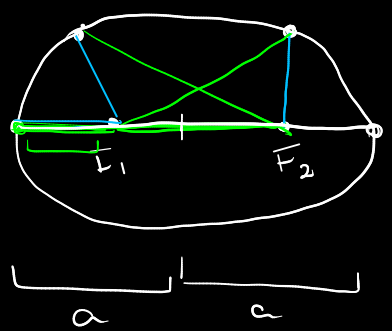
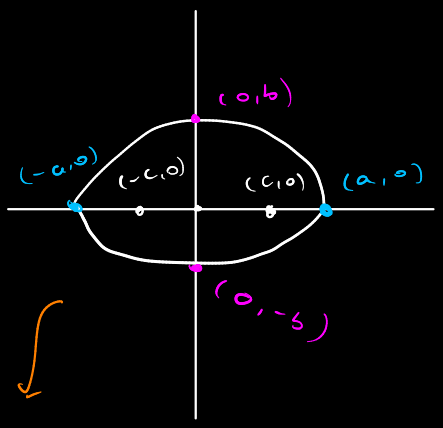
ELLIPSE



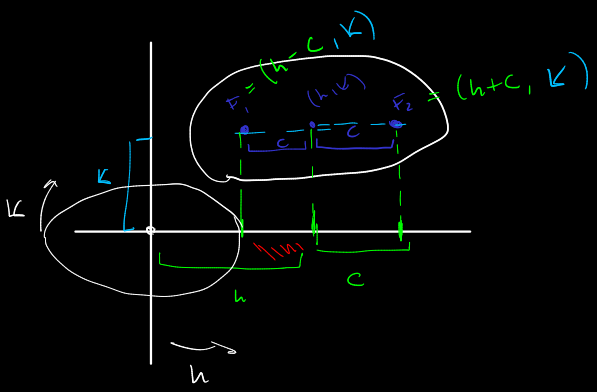
$\square + \square = 2a$



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

EQUATION OF ELLIPSE WITH FOCUS POINTS IN $(-c,0)$ AND $(c,0)$

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



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

EQUATION OF AN ELLIPSE WITH CENTER IN (h,k).

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EXAMPLE

$$4x^2 - 16x + 9y^2 + 18y = 11$$

$$4(x^2 - 4x) + 9(y^2 + 2y) = 11$$

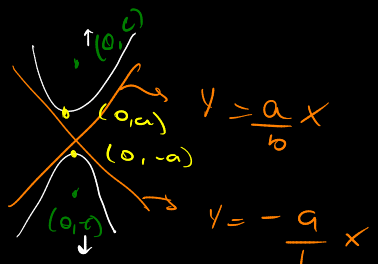
$$4(x^2 - 4x + 4) + 9(y^2 + 2y + 1) = 11 + 16 + 9$$

$$4(x-2)^2 + 9(y+1)^2 = 36$$

$$\frac{4(x-2)^2}{36} + \frac{9(y+1)^2}{36} = \frac{36}{36}$$

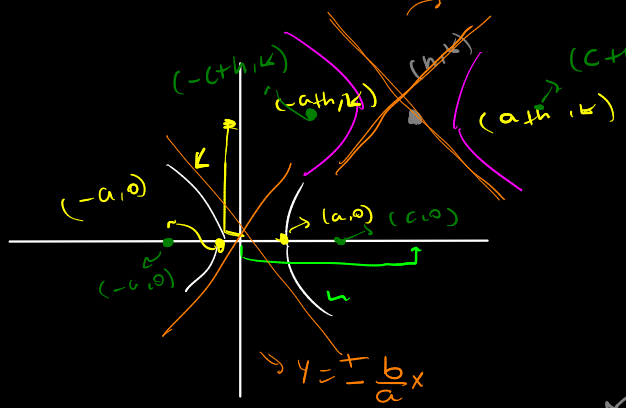
$$\frac{(x-2)^2}{9} + \frac{(y+1)^2}{4} = 1 \quad \rightsquigarrow \quad \frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

$$\frac{(x-2)^2}{3^2} + \frac{(y-(-1))^2}{2^2} = 1$$



$\rightarrow \quad \frac{x^2}{a^2} - \frac{x^2}{b^2}$

$y - k = \pm \frac{b}{a}(x-h) \rightarrow y = \pm \frac{b}{a}(x-h) + k$



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

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

EQUATION FOR HYPERBOLE WITH CENTRE IN (h,k)

EXAMPLE

$4x^2 + 16x - 9y^2 + 18y = 29$

$4(x^2 + 4x) - 9(y^2 - 2y) = 29$

$4(x^2 + 4x + 4) - 9(y^2 - 2y + 1) = 29 + 16 - 9$

$4(x+2)^2 - 9(y-1)^2 = 36$

$h = -2$ ($-h$) $\quad k = 1$ ($-k$)

$\frac{(x+2)^2}{9} - \frac{(y-1)^2}{4} = \frac{36}{4 \cdot 9} = 1$

$a^2 = 9 \quad b^2 = 4$

$a = 3 \quad b = 2$

CENTRE $= (-2, 1)$

$c^2 = b^2 + a^2 = 4 + 9 = 13 \rightarrow c = \sqrt{13}$

$F_1: (-\sqrt{13} - 2, 1)$ $\quad V_1: (-3-2, 1) = (-5, 1)$

$F_2: (\sqrt{13} - 2, 1)$ $\quad V_2: (3-2, 1) = (1, 1)$

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