

## Exemplar Problem

### Conic Section

21. Find the eccentricity of the hyperbola  $9y^2 - 4x^2 = 36$ .

**Solution:**

Given

$$9y^2 - 4x^2 = 36$$

Dividing the above equation by 36, we get

$$\frac{y^2}{4} - \frac{x^2}{9} = 1$$

The above equation can be written as

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

We know that equation of Hyperbola =  $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$

Now by comparing the equations, we get

$$a = 2 \text{ and } b = 3$$

$$b^2 = a^2 (e^2 - 1)$$

$$3^2 = (2)^2 [(e)^2 - 1]$$

$$9 = 4 (e^2 - 1)$$

$$e^2 - 1 = \frac{9}{4}$$

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$$e^2 = 1 + \frac{9}{4} = \frac{13}{4}$$

$$e = \frac{\sqrt{13}}{2}$$

Hence, the eccentricity of given hyperbola is  $\frac{\sqrt{13}}{2}$