

## Hyperbola - Class XI

### Past Year JEE Questions

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#### Questions

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##### Question: 01

The locus of the point of intersection of the straight lines,

$$tx - 2y - 3t = 0$$

$x - 2ty + 3 = 0$  ( $t \in \mathbf{R}$ ), is :

- A. an ellipse with eccentricity  $\frac{2}{\sqrt{5}}$
- B. an ellipse with the length of major axis 6
- C. a hyperbola with eccentricity  $\sqrt{5}$
- D. a hyperbola with the length of conjugate axis 3

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#### Solutions

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##### Solution: 01

##### Explanation

Here,  $tx - 2y - 3t = 0$  &  $x - 2ty + 3 = 0$

On solving, we get;

$$y = \frac{6t}{2t^2-2} = \frac{3t}{t^2-1} \text{ \& \ } x = \frac{3t^2+3}{t^2-1}$$

Put  $t = \tan\theta$

$$\therefore x = -3 \sec 2\theta \text{ \& \ } 2y = 3(-\tan 2\theta)$$

$$\therefore \sec^2 2\theta - \tan^2 2\theta = 1$$

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

which represents a hyperbola

$$\therefore a^2 = 9 \text{ \& \ } b^2 = 9/4$$

$$\lambda(\text{T.A.}) = 6; e^2 = 1 + \frac{9/4}{9} = 1 + \frac{1}{4} \Rightarrow e = \frac{\sqrt{5}}{2}$$