# IMPORTANT JEE-NEET FORMULAS

## Ellipse Formula's

| Topics | Formulas |
|---|---|
| Standard Equation | $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$,<br>where $a >$ & $b^2=a^2(1-e^2)$ |
| Eccentricity | $e=\sqrt{1-\frac{b^2}{a^2}}, (0<e<1)$,<br>Directrices: $x=\pm\frac{a}{e}$ |
| Focii | $S=(\pm ae, 0)$.<br>Length of major axes $=2a$ and<br>Minor axes $=2b$ |
| Vertices | $A'=(-a,0)$ & $A=(a,0)$ |
| Latus Rectum | $\frac{2b^2}{a}=2a(1-e^2)$ |
| Auxiliary circle | $x^2+y^2 = a^2$ |
| Parametric Representation | $x=a\cos\theta$ & $y=b\sin\theta$ |
| Position of a Point w.r.t. an Ellipse | The point $P(x_1, y_1)$ lies outside, inside or on the ellipse according as;<br>$\frac{x_1^2}{a^2}+\frac{y_1^2}{b^2}-1 >< or = 0$. |
| Line and an Ellipse | The line $y=mx+c$ meets the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ in two points real, coincident or imaginary according as $c^2$ is < =or > $a^2m^2+b^2$. |
| Director Circle | $x^2+y^2=a^2+b^2$ |

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| **Tangents** | Slope form: $y = mx \pm \sqrt{a^2m^2 + b^2}$, point form: $\frac{xx_1}{a^2} + \frac{yy_1}{b^2} = 1$<br><br>Parametric form: $\frac{xcos\theta}{a} + \frac{ysin\theta}{b} = 1$ |
| **Normal** | $\frac{a^2x}{x_1} - \frac{b^2y}{y_1} = a^2 - b^2$,<br><br>$ax.sec\theta - by.cosec\theta = (a^2 - b^2)$, $y = mx - \frac{(a^2-b^2)m}{\sqrt{a^2+b^2m^2}}$ |