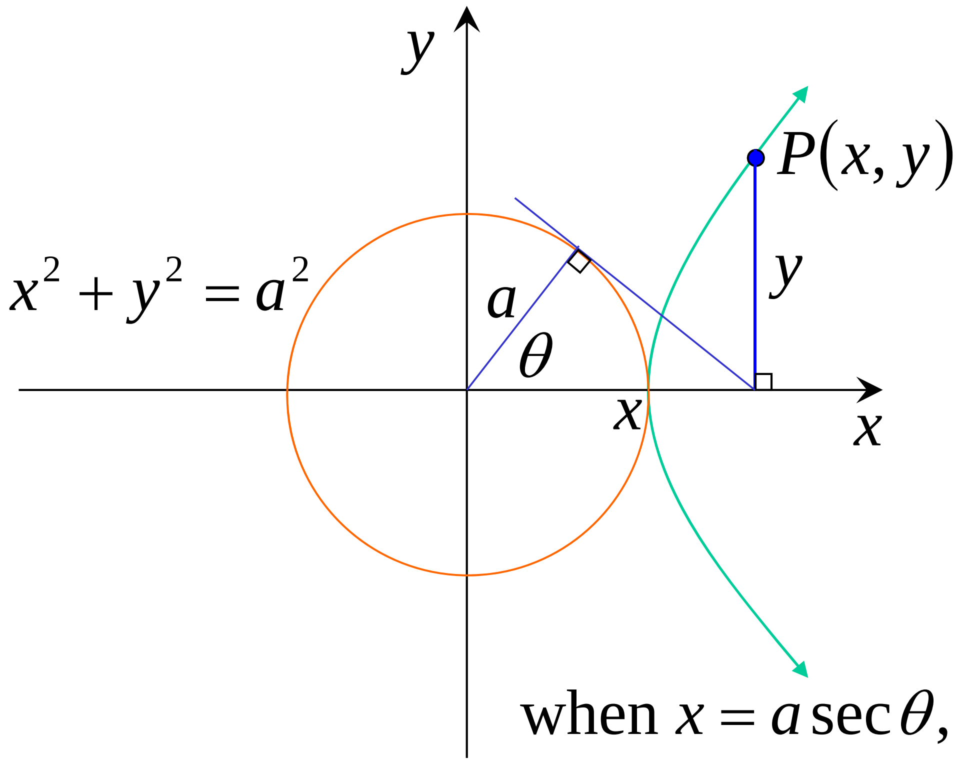
Conics & Parameters

3) **Hyperbola**



when $x = a\sec\theta$, $\dfrac{a^2\sec^2\theta}{a^2} - \dfrac{y^2}{b^2} = 1$

$$\frac{y^2}{b^2} = \sec^2\theta - 1$$

$$y^2 = b^2\tan^2\theta$$

$$y = b\tan\theta$$

$$\frac{x}{a} = \sec\theta$$

$$x = a\sec\theta \qquad y = b\tan\theta$$

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

tangent at (x_1, y_1)	normal at (x_1, y_1)
$\frac{x_1 x}{a^2}-\frac{y_1 y}{b^2}=1$	$\frac{a^2 x}{x_1}+\frac{b^2 y}{y_1}=a^2+b^2\left(=a^2 e^2\right)$
tangent at $(a\sec\theta, b\tan\theta)$	normal at $(a\sec\theta, b\tan\theta)$
$\frac{x\sec\theta}{a}-\frac{y\tan\theta}{b}=1$	$\frac{ax}{\sec\theta}+\frac{by}{\tan\theta}=a^2+b^2\left(=a^2 e^2\right)$

$y=\sec f(x)$	$y=\tan f(x)$
$\frac{dy}{dx}=f'(x)\sec f(x)\tan f(x)$	$\frac{dy}{dx}=f'(x)\sec^2 f(x)$

The chord of contact of the hyperbola also mimics the equation of the hyperbola;

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

***Patel:* Exercise 6C; 5, 7, 9, 16, 17**

***Cambridge*: Exercise 3E; 1, 3, 4, 5b, 6, 7, 8b, 9a, 11, 12a, 14, 16, 17a**