

STEP III, 2008 Q3

- 3 The point $P(a \cos \theta, b \sin \theta)$, where $a > b > 0$, lies on the ellipse

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

The point $S(-ea, 0)$, where $b^2 = a^2(1 - e^2)$, is a focus of the ellipse. The point N is the foot of the perpendicular from the origin, O , to the tangent to the ellipse at P . The lines SP and ON intersect at T . Show that the y -coordinate of T is

$$\frac{b \sin \theta}{1 + e \cos \theta}.$$

Show that T lies on the circle with centre S and radius a .



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