Comprehension based questions-

Tangents are drawn from the point P(3, 4) to the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ touching the ellipse at points A and B. ***(2010)***

6. The coordinates of A and B are

(a) $(3,0)$ and $(0,2)$

(b) $\left(-\frac{8}{5},\frac{2\sqrt{161}}{15}\right)$ and $\left(-\frac{9}{5},\frac{8}{5}\right)$

(c) $\left(-\frac{8}{5},\frac{2\sqrt{161}}{15}\right)$ and $(0,2)$

(d) $(3,0)$ and $\left(-\frac{9}{5},\frac{8}{5}\right)$

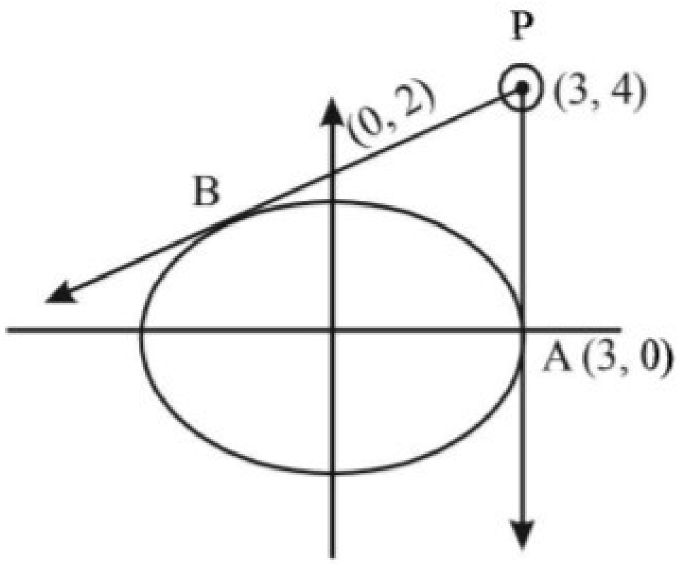
7. The orthocenter of the triangle PAB is

(a) $\left(5,\frac{8}{7}\right)$ (b) $\left(\frac{7}{5},\frac{25}{8}\right)$ (c) $\left(\frac{11}{5},\frac{8}{5}\right)$ (d) $\left(\frac{8}{25},\frac{7}{5}\right)$

Solution: -

6. **(d)** Tangent to $\frac{x^2}{3^2}+\frac{y^2}{2^2}=1$ at the point $(3\cos\theta, 2\sin\theta)$ is

$$\frac{x\cos\theta}{3}+\frac{y\sin\theta}{2}=1$$



As it passes throught (3,4), we get

$$\cos\theta+2\sin\theta=1$$

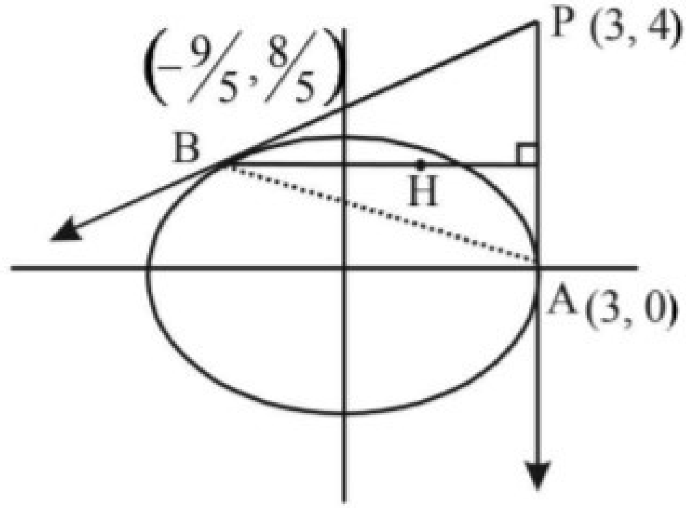
$$\Rightarrow 4\sin^2\theta=1+\cos^2\theta-2\cos\theta$$

$$\Rightarrow 5\cos^2\theta-2\cos\theta-3=0$$

$$\Rightarrow \cos\theta=1,-\frac{3}{5} \Rightarrow \sin\theta=0,\frac{4}{5}$$

$\therefore$ Required points are A (3,0) and B$\left(-\frac{9}{5},\frac{8}{5}\right)$

7. **(c)** Let H be the orthocentre of ΔPAB, then as $BH \perp AP$, BH is a horizontal line through B.



$\therefore$ y- cordinate of $B = 8/5$

Let H has coordinater $(\alpha, 8/5)$

Then slope of $PH = \dfrac{\frac{8}{5} - 4}{\alpha - 3} = \dfrac{-12}{5(\alpha - 3)}$

and slope of $AB = \dfrac{\frac{8}{5} - 0}{\frac{-9}{5} - 3} = \dfrac{8}{-24} = \dfrac{-1}{3}$