59. Equation of the hyperbola with eccentricity $\dfrac{3}{2}$ and foci at $(\pm2, 0)$ is

(a) $\dfrac{x^2}{4} - \dfrac{y^2}{5} = \dfrac{4}{9}$

(b) $\dfrac{x^2}{9} - \dfrac{y^2}{9} = \dfrac{4}{9}$

(c) $\dfrac{x^2}{4} - \dfrac{y^2}{9} = 1$

(d) None of these

Ans:

Given that $e = \dfrac{3}{2}$

and foci $= (\pm ae, 0) = (\pm2, 0)$

$\therefore ae = 2$

$a \times \dfrac{3}{2} = 2 \Rightarrow a = \dfrac{4}{3}$

Now we know that $b^2 = a^2\left(e^2 - 1\right)$

$b^2 = \dfrac{16}{9}\left(\dfrac{9}{4} - 1\right) \Rightarrow b^2 = \dfrac{16}{9} \times \dfrac{5}{4}$

$\Rightarrow b^2 = \dfrac{20}{9}$

So, the equation of the hyperbola is

$$\dfrac{x^2}{\left(\dfrac{4}{3}\right)^2} - \dfrac{y^2}{\dfrac{20}{9}} = 1$$

$$\Rightarrow \dfrac{9x^2}{16} - \dfrac{9y^2}{20} = 1 \Rightarrow \dfrac{x^2}{16} - \dfrac{y^2}{20} = \dfrac{1}{9}$$

$$\Rightarrow \dfrac{x^2}{4} - \dfrac{y^2}{5} = \dfrac{4}{9}$$

Hence, the correct option is (a).