15. Find the distance between the directrices of the ellipse $\dfrac{x^2}{36} + \dfrac{y^2}{20} = 1$

Ans:

Given

Equation of the ellipse $\dfrac{x^2}{36} + \dfrac{y^2}{20} = 1$

On comparing the equation with $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$, we get

$a = 6, b = 2\sqrt{5}$

$\because b^2 = a^2\left(1 - e^2\right)$

$\Rightarrow 20 = 36\left(1 - e^2\right)$

$\Rightarrow \dfrac{20}{36} = 1 - e^2$

$\therefore e = \sqrt{1 - \dfrac{20}{36}}$

$= \sqrt{\dfrac{16}{36}}$

$= \dfrac{4}{6}$

$= \dfrac{2}{3}$

$$\therefore \frac{a}{e} = \frac{6}{\frac{2}{3}} = 9$$

And $-\dfrac{a}{e} = -9$

Therefore, distance between the directrices $= \left| +\dfrac{a}{e} - \left(-\dfrac{a}{e} \right) \right|$

$= |9 - (-9)|$

$= 18$