Q 3. If the vertex of the parabola is the point $(-3, 0)$ and the directrix is the line $x + 5 = 0$, then the equation is

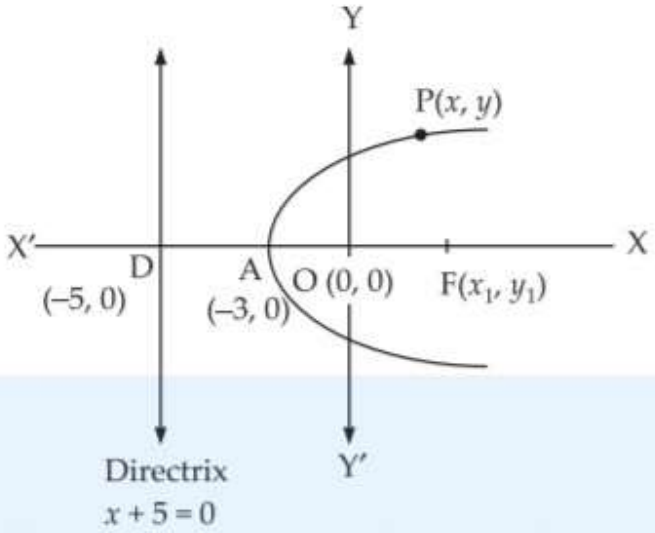
(a) $y^2 = 8(x + 3)$ (b) $x^2 = 8(y + 3)$

(c) $y^2 = -8(x + 3)$ (d) $y^2 = 8(x + 5)$

Sol. Given that vertex $= (-3, 0)$

$\therefore\ a = -3$

and directrix is $x + 5 = 0$



According to the definition of the parabola, we get

AF = AD i.e., A is the mid-point of DF

$$\therefore \qquad -3 = \frac{x_1 - 5}{2} \quad \Rightarrow \quad x_1 = -6 + 5 = -1$$

$$\text{and} \qquad 0 = \frac{0 + y_1}{2} \quad \Rightarrow \quad y_1 = 0$$

$$\therefore \qquad \text{Focus F} = (-1, 0)$$

$$\text{Now } \sqrt{(x+1)^2 + (y-0)^2} = \left| \frac{x + 5}{\sqrt{1^2 + 0^2}} \right|$$

Squaring both sides, we get

$$(x + 1)^2 + y^2 = (x + 5)^2$$

$$\Rightarrow \quad x^2 + 1 + 2x + y^2 = x^2 + 25 + 10x$$

$$\Rightarrow \quad y^2 = 10x - 2x + 24 \Rightarrow y^2 = 8x + 24$$

$$\Rightarrow \quad y^2 = 8(x + 3)$$

Hence, the correct option is (a).