18. If the points $(0, 4)$ and $(0, 2)$ are respectively the vertex and focus of a parabola,then find the equation of the parabola.

Ans:

Given

Vertex $= (0, 4)$

Focus $= (0, 2)$

By definition of parabola:

$$\Rightarrow \left|\frac{0 + y - 6}{\sqrt{0 + 1}}\right| = \sqrt{(x - 0)^2 + (y - 2)^2}$$

$$\Rightarrow |y - 6| = \sqrt{x^2 + y^2 - 4y + 4}$$

$$\Rightarrow x^2 + y^2 - 4y + 4 = y^2 + 36 - 12y$$

$$\therefore x^2 + 8y = 32$$