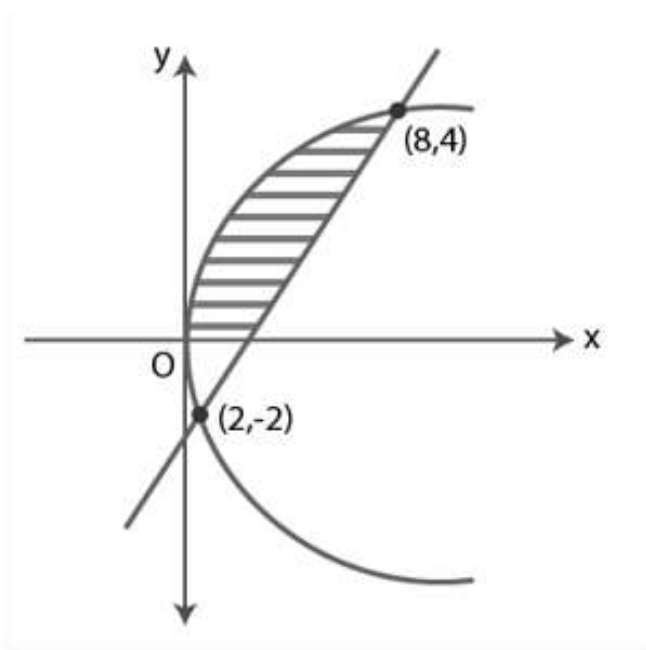


**Question 3:** Find the area of the region  $A = \{(x, y) ; y^2/2 \leq x \leq y + 4\}$ .

**Solution:**



Consider equations from the given inequalities,

$$y^2 = 2x \text{ and } x - y = 4$$

Here,  $y^2 = 2x$  is equation of parabola open towards the +ve x-axis and having focus  $(1/2, 0)$

and  $x - y = 4$ , is a straight line.

Solving above equations, we get

$$y^2 = 2(y + 4)$$

$$\text{or } y^2 - 2y - 8 = 0$$

$$\text{or } y = 4 \text{ or } y = -2$$

Therefore, point of intersection of line and curve are  $(2, -2)$  and  $(8, 4)$ .

Required Area =

$$\int_{-2}^4 [(y + 4) - \frac{y^2}{2}] dy$$

=

$$\left[ \frac{(y+4)^2}{2} \right]_{-2}^4 - \frac{1}{2} \left[ \frac{y^3}{3} \right]_{-2}^4$$

$$= 1/2[64 - 4] - 1/6(64 + 8)$$

$$= 18 \text{ sq. units.}$$