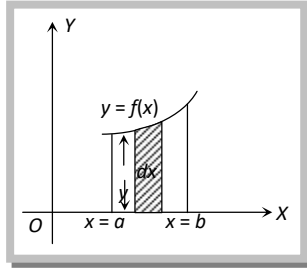# Area of Bounded Regions.

(1) The area bounded by a Cartesian curve $y = f(x)$, x-axis and ordinates $x = a$ and $x = b$ is given by

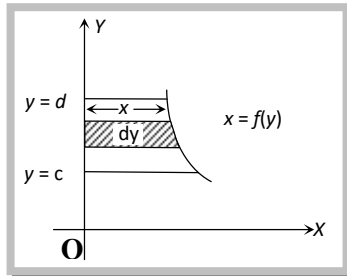$$\text{Area} = \int_a^b y \, dx = \int_a^b f(x) dx$$

(2) If the curve $y = f(x)$ lies below x-axis, then the area bounded by the curve $y = f(x)$, the x-axis and the ordinates $x = a$ and $x = b$ is negative. So, area is given by $\left| \int_a^b y \, dx \right|$

(3) The area bounded by a Cartesian curve $x = f(y)$, y-axis and abscissa $y = c$ and $y = d$ is given by

$$\text{Area} = \int_c^d x \, dy = \int_c^d f(y) dy$$

(4) If the equation of a curve is in parametric form, say $x = f(t), y = g(t)$ then the area

$$= \int_a^b y \, dx = \int_{t_1}^{t_2} g(t) f'(t) dt$$ where t_1 and t_2 are the values of t respectively corresponding to the values of a and b of x.