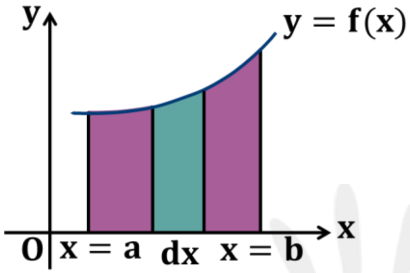
Area Under the Curve

1. Area Under the Curves

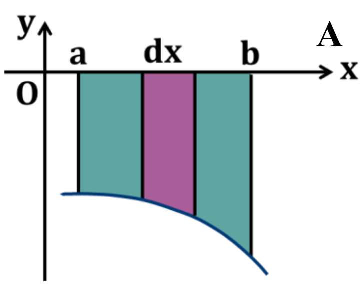
(1) Area bounded by the curve, the x – axis & the ordinates at (x = a, b) is given by : A

$$= \int_a^b y\,dx$$

Where, y = f (x) lies above the x−axis and (b > a)

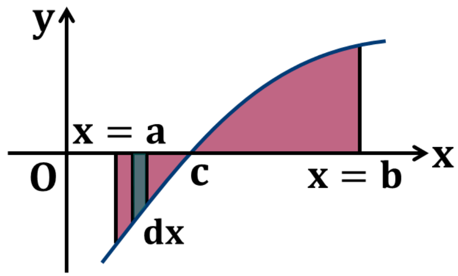


(2) If y = f (x) lies completely below the x−axis then,



$$A = \left| \int_a^b y\,dx \right|$$

(3) If curve crosses the x−axis at x = c then,



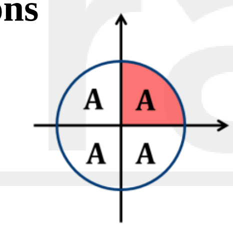
$$A = \left| \int_a^c y\,dx \right| + \int_c^b y\,dx$$

Note

If the curve be symmetric and suppose it has 'n' symmetric portions

Then,

Total Area = n (Area of symmetric portion)

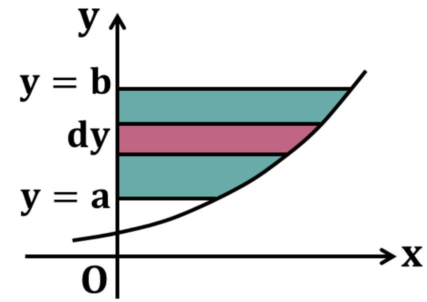


Total Area = 4A

(4) Area bounded by the curve, y−axis & the two abscissa at y = a & y = b is given by :

$$A = \int_a^b x\,dy \quad \text{(Integration w. r. t. 'y')}$$

$$= \int_a^b f(y)\,dy \quad \text{(dy : horizontal strip)}$$



2. Area Enclosed between two Curves

(1) Area bounded by two curves :

y = f (x) & y = g(x)

Such that, f (x) > g(x) is given by :

$$A = \int_{x_1}^{x_2} [f(x) - g(x)]dx$$

Where,

x_1 and x_2 are roots of equation f(x) = g(x)