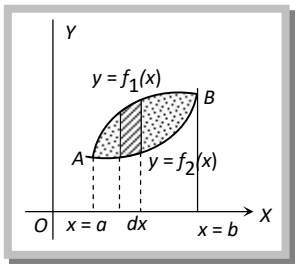
Area between Two curves.

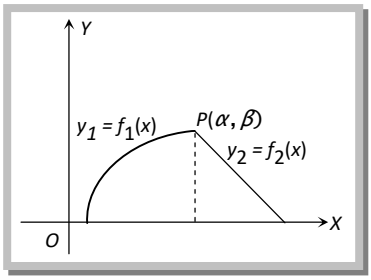
(1) **When both curves intersect at two points and their common area lies between these points:**



If the curves $y_1 = f_1(x)$ and $y_2 = f_2(x)$, where $f_1(x) > f_2(x)$ intersect in two points $A(x = a)$ and $B(x = b)$, then common area between the curves is $= \int_a^b (y_1 - y_2)\,dx$

$= \int_a^b [f_1(x) - f_2(x)]\,dx$

(2) **When two curves intersect at a point and the area between them is bounded by *x*-axis:**



Area bounded by the curves $y = f_1(x), y_2 = f_2(x)$ and $x-$axis is

$= \int_a^\alpha f_1(x)dx + \int_\alpha^b f_2(x)dx$

Where $P(\alpha, \beta)$ is the point of intersection of the two curves.

(3) **Positive and negative area :** Area is always taken as positive. If some part of the area lies above the *x*-axis and some part lies below *x*-axis, then the area of two parts should be calculated separately and then add their numerical values to get the desired area.

Important Tips

The area of the region bounded by $y^2 = 4ax$ *and* $x^2 = 4$ *by is* $\frac{16ab}{3}$ *square units.*

The area of the region bounded by $y^2 = 4ax$ *and* $y = mx$ *is* $\frac{8a^2}{3m^3}$ *square units*

The area of the region bounded by $y^2 = 4ax$ *and its latus rectum is* $\frac{8a^2}{3}$ *square units*

The area of the region bounded by one arch of sin (ax) or cos (ax) and x-axis is $\frac{2}{a}$ *sq. units*

Area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ *is* πab *sq. units.*

Area of region bounded by the curve y = sin x , x-axis and the line x =0 and x= 2π *is 4 unit.*