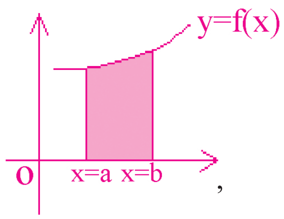
8 APPLICATION OF INTEGRALS

1 OMQ + 1 SAQ [1 M + 4M =5 M]

CONCEPTS & FORMULAS

1) Result: The area(A) bounded by the continuous curve y = f(x), X-axis and the two lines x=a & x = b, a < b is given by $A=\int_a^b f(x)dx=\int_a^b y\,dx$



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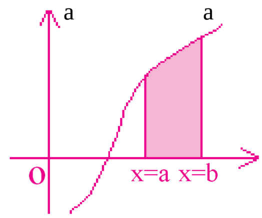
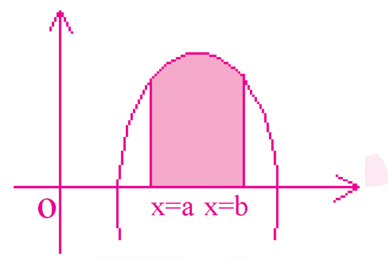
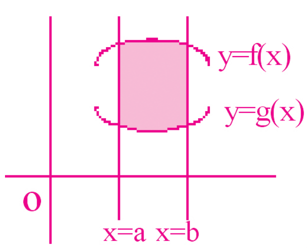


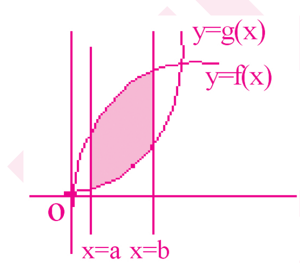


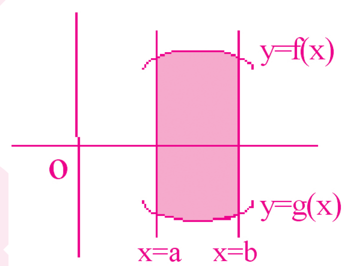
Note: The area bounded by the continuous curve x=f(y) , Y-axis and the lines y=a, y=b is $\int_a^b f(y)dy$

2) Standard results in evaluating the areas of various regions:

2.1) The area bounded by the upper boundary curve y = f(x) and the lower boundary curve y = g(x), between the lines x = a and x = b, is given by $A=\int_a^b (f(x)-g(x))dx$



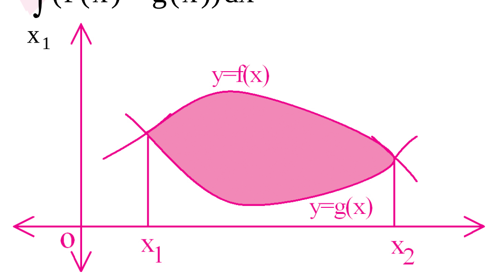




2.2) If the curves y = f(x) and y = g(x) intersect in two points (x_1, y_1) & (x_2, y_2) then the area enclosed between these two curves is given by $A=\int_{x_1}^{x_2} (f(x)-g(x))dx$

2.3) If f(x) is a continiuous function on [a, b] and f(x) ≥ 0 over [a,c] and f(x)≤0 over [c,b] for a<c<b then the area of the region bounded by y=f(x), X-axis and the lines x=a and x=b is

$$A=\int_a^b f(x)dx=\int_a^c f(x)dx-\int_c^b f(x)dx$$



2.4) If the graph of the given function f(x) is symmetric with respect to the coodinate axes then first find the area enclosed in the first quadrant and hence multiply the answer accordingly.