Applications of Integrals

(1) The area of region bounded by the curve $y = f(x)$, x-axis and the lines $x = a$ and $x = b$ $(b > a)$ is given by

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

(2) The area of region bounded by the curve $x = \phi(y)$, y-axis and the lines $y = c$ and $y = d$ is

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

(3) Area enclosed between ; $y = f(x)$ and $y = g(x)$ and the lines ; $x = a$, $x = b$

$$\text{Area} = \int_a^b [f(x) - g(x)]\,dx \;;\; f(x) \geq g(x) \text{ in } [a, b]$$

(4) If $f(x) \geq g(x)$ in $[a, c]$ and $f(x) \leq g(x)$ in $[c\ b]$, $a < c < b$ then ;

$$\text{Area} = \int_a^c [f(x) - g(x)]\,dx + \int_c^b [g(x) - f(x)]\,dx$$