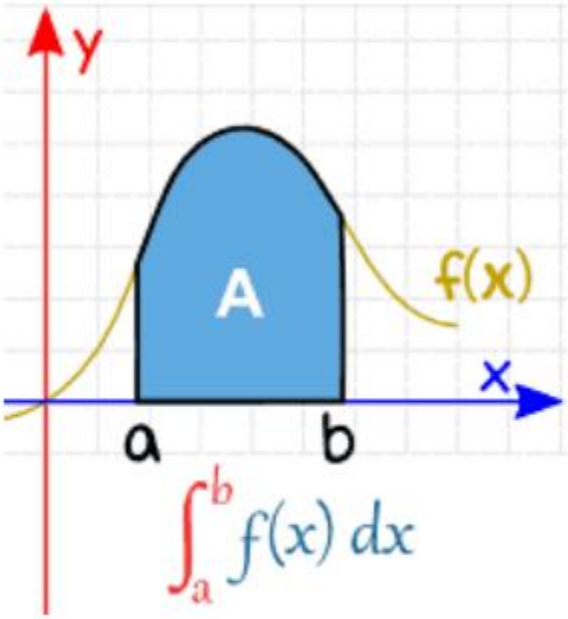
This lesson is on the **definite integral** also called the **Fundamental Theorem of Calculus**.

Definite Integral

A **Definite Integral** has start and end values: in other words there is an **interval** [a, b].

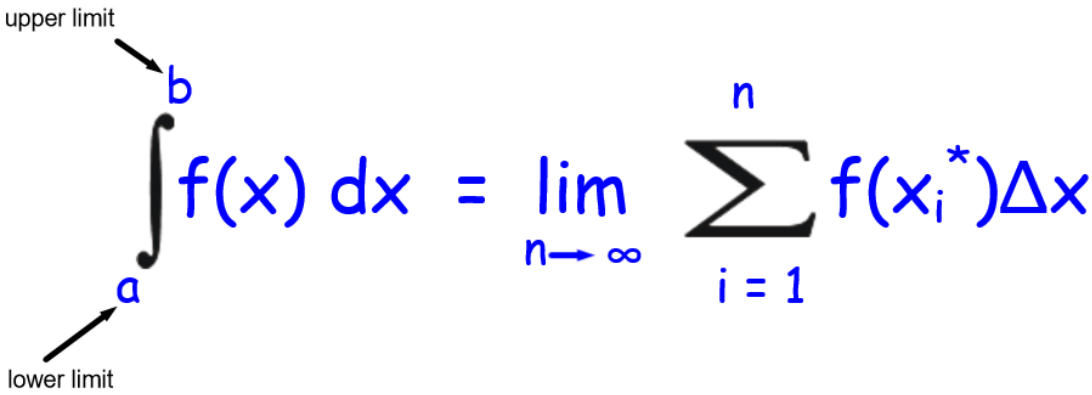
a and b (called limits, bounds or boundaries) are put at the bottom and top of the "S", like this:



Definite Integral
(from **a** to **b**)

Definite Integral

- has limits or boundaries



Definite Integral (The Fundamental Theorem of Calculus)

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

Ex. $\int_{1}^{2} (x^2+2x^3)\,dx$

Ex. $\int_{1}^{2}(5x^4-6x+1)dx$

Ex. $\int_{\ln 2}^{\ln 4} e^x \, dx$

Ex. $\int_0^{\frac{\pi}{4}} \sec^2 x \, dx$

** If an answer is undefined and you are not sure why, check upper and lower limits.

** The definite integral $\int_{-2}^{4} \frac{1}{x^3}\,dx$

is undefined because the function is undefined at x = 0.

**can not do integral

$$\int_2^6 \frac{1}{x-4}\,dx$$

⟶ undefined at x =4

⟶ cannot do integral

$$\int_5^6 \frac{1}{x-4}\,dx$$

⟶ undefined at x =4, but you can do the integral

X = 4 is not contained in the boundaries