The sum

$$\sum_{k=a}^{b} g(k)$$

may be regarded as a discrete analogue of the integral

$$\int_a^b g(x)dx$$

We can evaluate the integral by finding a function $f(x)$ such that $\frac{d}{dx}f(x) = g(x)$, since the fundamental theorem of calculus yields

$$\int_a^b g(x)dx = f(b) - f(a).$$