Differentiation and integration can help us solve many types of **real-world problems**.

This tool isn’t just limited to mathematical problems; it has a broad range of practical utility. Nothing is useless in this world, when we say something can’t be used, we actually don’t know how to use it. The one, who knows its utility, won’t stop thinking about it.

The uniqueness of this concept is its predictive ability to evaluate the change in quantities. Whether its speed, momentum, temperature and even the business speculations, all the variations can be worked out using derivative.

We use the **derivative** to determine the **maximum and minimum values** of particular functions (e.g. cost, strength, amount of material used in a building, profit, loss, etc.).

**Practical Applications:**

* **Use in Physics:**
* As we mentioned above, the example of a moving body’s relative position can help us calculate the velocity.
* In the same way, derivatives of acceleration and momentum can be found.
* **Use in Chemistry:**
* In chemistry, the concentration of an element involved in a reaction, the change in concentration can be predicted.
* Similarly, to measure the rate of chemical reactions and to check the contribution and loss of a compound during the reaction.
* **Use in Economics:**
* Nowadays, the decision making in economics has become more mathematical. Statistical and mathematical principles are applied in making decisions regarding possible gain or loss in investment.
* Confronted with massive statistical data, dependent on lots of variables, there was a need of some tool that could assist the analysts.
* Here, calculus proved to be beneficial. It implemented the derivative concepts to predict the results of different investment possibilities.
* Ultimately, this enabled the analysts to select the one possibility that might prove to be productive in terms of profitability.
* To calculate the profit and loss in business using graphs.
* To check the temperature variation.
* Derivatives are used to derive many equations in Physics.
* In the study of Seismology like to find the range of magnitudes of the earthquake.
* A car doesn’t leave from the factory without knowing where the center of its mass and weight and central axis, to determine the factors of security and safety on different roads and different speeds of the car. This is done only by calculus.
* The graphic engineer uses calculus to determine the difference and change of three-dimensional models and how it will change when exposed to multiple conditions. This helps him to create a very realistic environment in 3D movies or video games.In games like the Need 4 speed or GTA, all the statistics that the player sees during the race on the screen include the speed of the car and the distance between him and the contestants and the time between his car and each car of the participants in the race in the second and tenth of the second!! These calculations of differentiation and integration are done in the moment and moment while enjoying the game!! This principle applies to many games.
* Space engineers often use calculus when planning long missions to launch a probe because they need different speeds in the probe's orbit proportional to gravity and altitude. Calculus helps them to determine all these variables with infinite accuracy!!