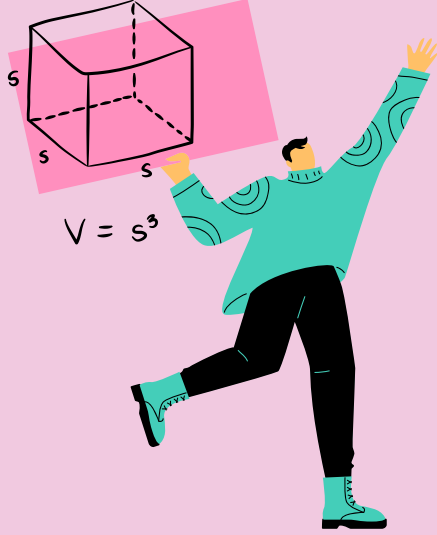


Applications of Integration

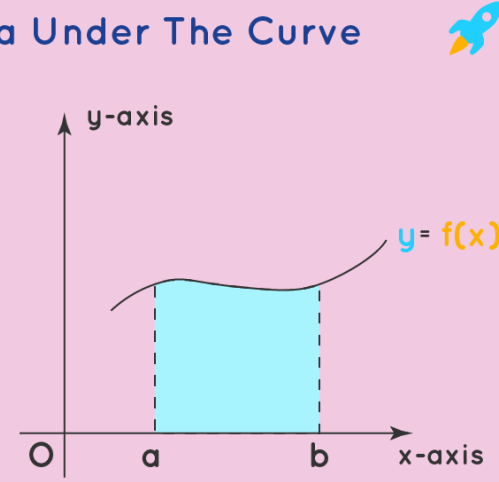
Integration, a fundamental concept in calculus, has numerous applications across various fields. Here are some common applications of integration:

Calculating Areas:

Integration allows for the calculation of areas under curves and between curves. By integrating a function over a specific interval, you can determine the area between the curve and the x-axis or between two curves. This application is useful in geometry, physics, and engineering.



Area Under The Curve

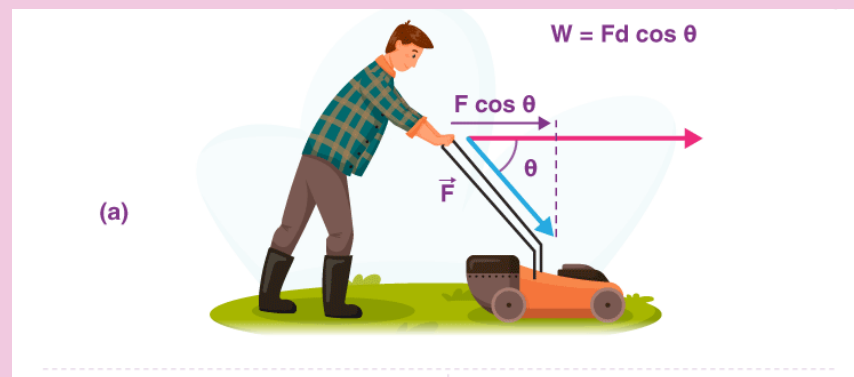


Finding Volume:

Integration helps determine the volume of solid objects. By integrating a function over a given interval, you can find the volume of a solid of revolution, such as a sphere, cone, or cylinder. This application is crucial in physics, engineering, and 3D modeling. By integrating a function over a given interval, you can find the volume of a solid of revolution, such as a sphere, cone, or cylinder.

Computing Work and Energy:

In physics, integration is used to calculate work done by a force or energy expended in a system. By integrating the product of a force and displacement, you can determine the work done or the potential and kinetic energy of a system. This application is essential in mechanics and thermodynamics.



Probability and Statistics:

Integration is used to compute probabilities and perform statistical analyses. The area under a probability density function represents the probability of an event occurring within a given interval. Integration is also used in statistical modeling and estimation, such as finding expected values and calculating moment.

Center of Mass and Moment of Inertia:

Integration is employed to determine the center of mass and moment of inertia of objects. By integrating a mass distribution function, you can find the coordinates of the center of mass or calculate the moment of inertia for rotational motion. This application is crucial in mechanics and engineering.

