

Definitions

Distance: The total length travelled by a moving object irrespective of direction. Its SI unit is meter (m).

Displacement: The distance travelled in a specific direction. Its SI unit is meter (m).

Speed: It is the rate of change of distance or distance travelled per unit time. Its SI unit is meters per second (m/s).

Velocity: It is the rate of change of displacement. It is speed in a specific direction. Its SI unit is meters per second (m/s).

Acceleration: It is the rate of change in velocity. Its SI unit is meters per second per second (m/s^2).

Formulae

Distance: Speed x Time, [In case of constant acceleration]: $\frac{\{\text{Final Speed} + \text{Initial Speed}\}}{2} \times \text{Total Time Taken}$.

Displacement: Velocity x Time, [In case of constant acceleration]: $\frac{\{\text{Final Velocity} + \text{Initial Velocity}\}}{2} \times \text{Total Time Taken}$.

Speed: Distance Travelled/Time Taken.

Average Speed (in case of constant acceleration): $\frac{\{\text{Final Speed} + \text{Initial Speed}\}}{2}$.

Velocity: Displacement/Time Taken.

Acceleration: $\frac{\text{Final Velocity} - \text{Initial Velocity}}{\text{Time Taken}}$.

Acceleration of Free Fall

It is the acceleration due to gravity.

It is given the symbol g .

The acceleration due to gravity is 10m/s^2 .

The direction of this acceleration is towards the centre of the Earth.

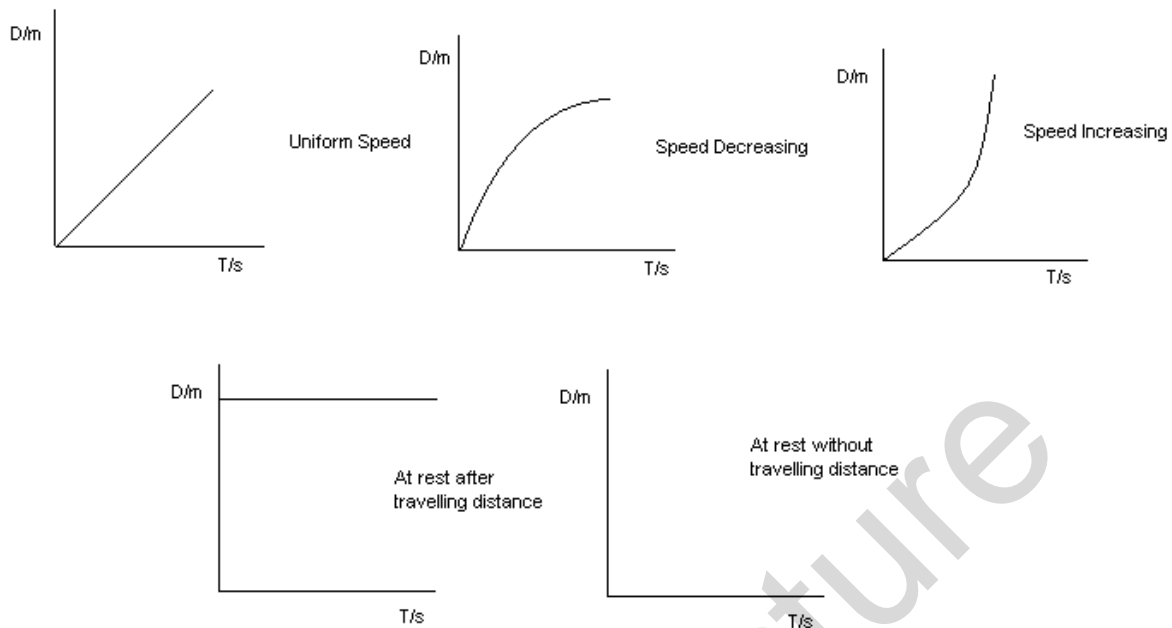
This acceleration does not depend on the masses or weights of objects.

During free fall motion there is an opposing force to the motion known as air resistance.

When an object falls in a uniform gravitational field, it accelerates until air resistance is equal to the pull of gravity. It then continues at a constant velocity which is known as terminal velocity.

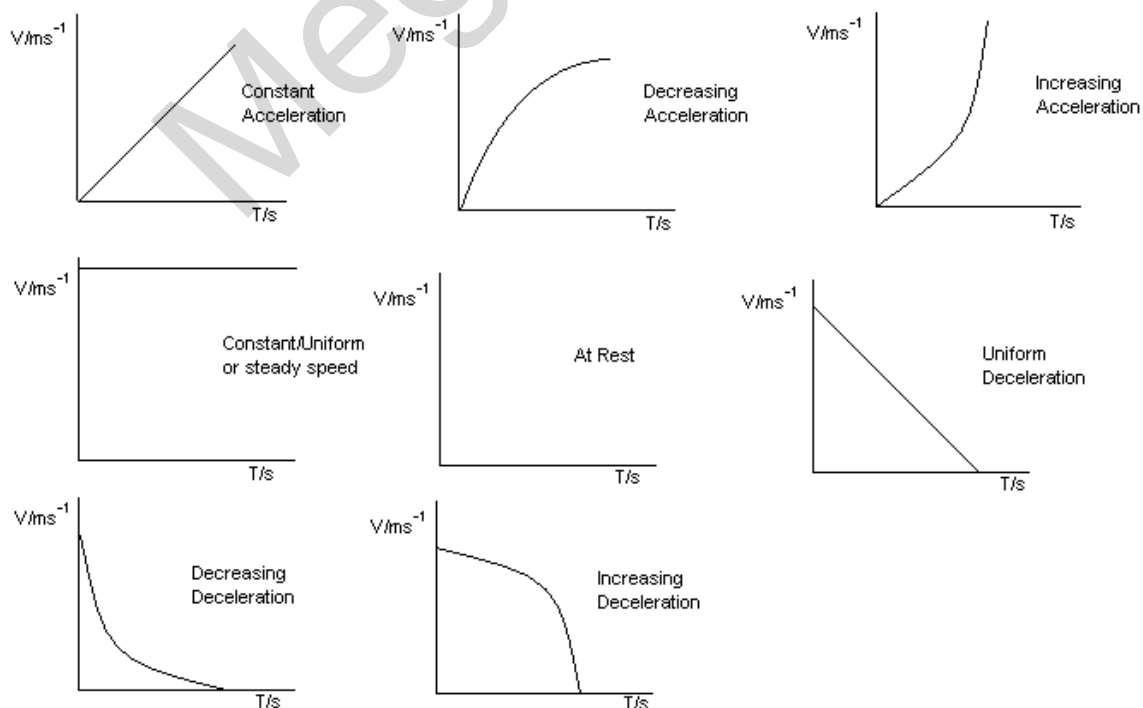
Distance-Time Graph

The gradient of distance time graph gives us speed.

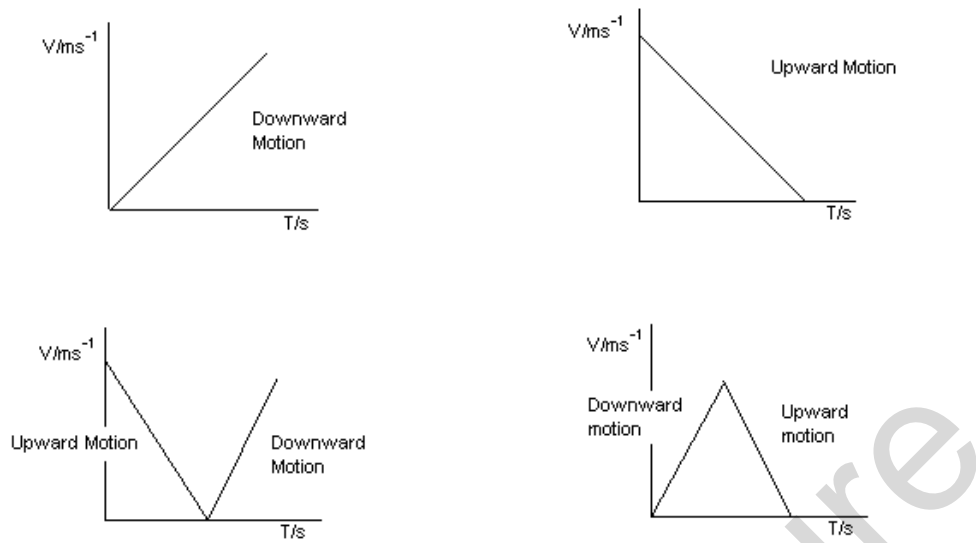


Speed-Time Graph

The gradient of speed-time graph gives us acceleration.



Graph of Free Fall Motion



Graph of Free Fall Motion with a Parachute

