

# Motion Under Gravity

The movement of an item whose vertical motion is altered by the presence of gravity is referred to as motion under gravity. GRAVITY is the force that pulls things downward. In actuality, gravity pulls objects toward the Earth's center. The gravitational force's strength is determined by the object's mass and the gravitational constant.

## Motion Under Gravity Formula

The basic formula of the body with some weight experiencing some gravitation force as:

$$\text{Weight} = \text{Mass} \times \text{Gravity}$$

$$(w=mg)$$

Weight is a force that is measured in Newtons. Gravity is measured in meters per second ( $m/s^2$ ) and mass in kilograms (kg). Gravity is estimated to be  $9.8 m/s^2$  for objects relatively close to the Earth's surface.

## Equation of Motion Under Gravity

When an object moves owing to the influence of gravity, there are certain standard equations of motion that are used to analyze the motion of the object. The equation of motion for normal horizontal forces is the same as the equation of motion for gravity, which is shown below.

$$v = u + gt$$

$$h = ut + (1/2)gt^2$$

$$v^2 = u^2 + 2gh$$

There is a sign convention for the acceleration due to gravity that is followed in all of the given equations relating to the concept of equations of motion under gravity. It is interpreted as suitable for downward movement and negative for upward movement.

## Velocity of a Body Having Motion Under Gravity

When an object is dropped from a given height, it is referred to as "h." Since the object is initially at rest before being dropped from that height, its initial velocity is zero. There must be some final body velocity when the object reaches the ground.

As a result, the equation of motion that is being discussed is as follows:

$$v^2 = u^2 + 2gh$$

The value of "g" will be interpreted as positive, which represents an item moving downward.

$$v^2 = (0)^2 + 2gh$$

$$v^2 = 2gh$$

$$v = \sqrt{2gh}$$

## Motion Under Gravity Forces Examples

Check out a few examples of the body having motion under Gravity:

- Every time a ball is thrown upward, gravity will cause the ball to fall back to the ground.
- The movement of the person on the ground will be caused solely by the gravitational force that holds the person in place.
- Tides are regulated by gravitational forces in terms of their short-term periodic movement caused by the rise and fall of water in bodies of water.
- Jumping, sliding, walking, jogging, dancing, and other common daily actions are all governed by the forces of gravity.
- Gravitational forces govern the motion of celestial bodies around the sun to ensure appropriate alignment and rotation around their axes.