Acceleration Formula

One may have perceived that pushing a terminally ill bus can give it a sudden start. That's because lift provides upward push when it starts. Here Velocity changes and this is acceleration! Henceforth, the frame accelerates. Acceleration is described as the rate of change of velocity of an object. A body's acceleration is the final result of all the forces being applied on the body, as defined by Newton's Second Law. Acceleration is a vector quantity that is described as the frequency at which a body's velocity changes.

Acceleration is the rate of change in velocity to the change in time. It is denoted by symbol a and is articulated as-

$$a = \frac{change\,in\,velocity}{Time\,taken}$$

meter per second squared or m/s^2 is the **S.I** unit for Acceleration,

If t (time taken), v (final velocity) and u (initial velocity) are provided. Then the acceleration is given by formula

$$v = u + at$$

$$v^2 = u^2 + 2as$$

$$s = ut + \frac{1}{2}at^2$$

Where,
Final Velocity = v
Initial velocity = u
acceleration = a
time taken = t
distance traveled = s

Acceleration Solved Examples

Underneath we have provided some sample numerical based on acceleration which might aid you to get an idea of how the formula is made use of:

Problem 1: A toy car accelerates from 3m/s to 5m/s in 5 s. What is its acceleration?
Answer:

Given: Initial Velocity u = 3m/s,
Final Velocity v = 5m/s,
Time taken t = 5s.

$$The\ Acceleration\ is\ given\ by\ a\ = \frac{v-u}{t}$$

$$= \frac{5-3}{5}$$

$$= \frac{2}{5}$$

$$0.4\,m/s^2$$

Problem 2: A stone is released into the river from a bridge. It takes 4s for the stone to touch the river's water surface. Compute the height of the bridge from the water level.

Answer:

(Initial Velocity) u = 0 (because the stone was at rest),
t = 5s (t is Time taken)
a = g = 9.8 m/s^2, (a is Acceleration due to gravity)
distance traveled by stone = Height of bridge = s
The distance covered is articulated by

$$s = ut + \frac{1}{2}gt^2$$

$$s = 0 + \frac{1}{2} \times 9.8m/s^2 \times (5s^2)$$

$$= 122.5\,m$$