Chapter 5

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INTRODUCTION TO 2D MOTION

After studying motion along a straight path and its three equations, we now delve into motion within a plane. When discussing motion in a plane, we're essentially talking about movement across two directions because a plane consists of two dimensions. Hence, we consider two axes, typically the X-axis and Y-axis. To develop equations for such motion, understanding motion in one dimension is crucial.

The Equations of Motion in a Straight Line Are:

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

Where,

v = final velocity of the particle

u = initial velocity of the particle

s = displacement of the particle

a = acceleration of the particle

t = time interval in which the particle is in consideration

In a plane, we have to apply the same equations separately in both the directions: Y axis and Y-axis.

This would give us the equations for motion in a plane:

$$v_y = u_y + a_y t$$
$$s_y = u_y t + \frac{1}{2}a_y t^2$$
$$v_y^2 = u_y^2 + 2a_y s$$

Where

V_y = final velocity of the particle in y direction

u_y= initial velocity of the particle in y direction

s_y= displacement of the particle in y direction

a_y= acceleration of the particle in y direction

t = time interval in which the particle is in consideration

Similarly, for X-axis:

$$V_x = u_x + a_x t$$
$$S_x = u_x t + \frac{1}{2}a_x t^2$$
$$V_x^2 = u_x^2 + 2a_x s$$

Where,

v_x= final velocity of the particle in x direction

u_x= initial velocity of the particle in x direction

s_x= displacement of the particle in x direction
a_x= acceleration of the particle in x direction
t = time interval in which the particle is in consideration