

EXAMPLE BASED ON KINEMATIC EQUATIONS OF MOTION

Example.1 The velocity acquired by a body moving with uniform acceleration is 20 m/s in first 2 sec and 40 m/s in first 4 sec. Calculate initial velocity.

Solution. $a = \frac{v_2 - v_1}{t_2 - t_1}$

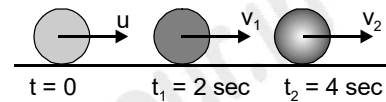
$$a = \frac{40 - 20}{4 - 2} = \frac{20}{2} = 10 \text{ m/s}^2$$

Now, $v = u + at$

$$v_1 = u + at_1$$

$$\Rightarrow 20 = u + 10 \times 2$$

$$\Rightarrow 20 = u + 20 \quad \Rightarrow \quad u = 0 \text{ m/s} \quad \text{Ans}$$



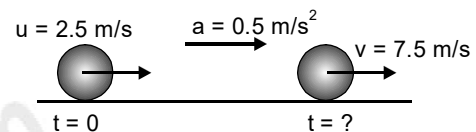
Example.2 A particle starts with initial velocity 2.5 m/s along the x direction and accelerates uniformly at the rate 50 cm/s². Find time taken to increase the velocity to 7.5 m/s.

Solution. $v = u + at$

$$7.5 = 2.5 + 0.5t$$

$$5.0 = 0.5t$$

$$t = \frac{50}{5} = 10 \text{ sec}$$



Example.3 A particle starts with a constant acceleration. At a time t second speed is found to be 100 m/s and one second later speed becomes 150 m/s. Find acceleration of the particle.

Solution. From equation (1) of motion $v = u + at$

$$100 = 0 + at$$

$$100 = at \quad \dots (1)$$

Now consider velocity one second later -

$$v' = 0 + a(t+1)$$

$$\Rightarrow 150 = a(t+1) \quad \dots (2)$$

On subtracting equation (1) from equation (2)

$$a = 50 \text{ m/s}^2$$