Answer on Question #47321, Physics, Mechanics | Kinematics | Dynamics

Question:

A body moving with uniform acceleration travels a distance Sn=(0.4n+9.8)m in nth sec. find the initial velocity of the body in ms-1?

Answer:

Distance covered during n^{th} second equals:

$$S_n = \left(v_0 t_n + \frac{a t_n^2}{2}\right) - \left(v_0 t_{n-1} + \frac{a t_{n-1}^2}{2}\right)$$

where

$$t_n = 1s \cdot n, \;\; t_{n-1} = 1s \cdot (n-1)$$

Therefore:

$$S_n = v_0 \cdot 1s + a \cdot n \cdot (1s)^2 - \frac{a(1s)^2}{2} = \left(v_0 - \frac{a}{2}\right) + an$$

Comparing with Sn=(0.4n+9.8)

$$a = 0.4$$

$$v_0 = \frac{a}{2} + 9.8 = 10\frac{m}{s}$$

Answer: 10 m/s