

A cart rolls down a ramp with an acceleration of 4.2 m/sec^2 . If the cart starts from rest, how fast is it moving at the end of 4 seconds?

Solution

We are given

$$\begin{aligned} a &= 4.2 \frac{\text{m}}{\text{s}^2} \\ v_0 &= 0 \text{ (the cart starts from rest)} \\ t &= 4 \text{ s} \end{aligned}$$

Acceleration is uniform

(http://en.wikipedia.org/wiki/Acceleration#Uniform_acceleration)

So velocity depends on time as:

$$v(t) = v_0 + a * t$$

Velocity at the end of 4 seconds is:

$$v(4) = v_0 + a * 4 = 0 + 4.2 * 4 = 16.8 \text{ m/s}$$

Answer:

$$v(4) = 16.8 \text{ m/s}$$