Answer on Question #46358, Physics, Mechanics | Kinematics | Dynamics

Brakes are applied to a train travelling at 75km/hr.after passing over 200m, its velocity is reduced to 36km/hr.at the same rate of retardation,how much further it will go before coming at rest.

Solution

Velocities in m/s are: $v_0 = 75km/hr \approx 20.8\,m/s$, $v_1 = 36km/hr = 10\,m/s$.

Lets find deceleration. We need two equations: for distance and for velocity. Here they are:

$$s = v_0 t - at^2/2$$

$$v = v_0 - at$$

From those we can first time of first part of way:

$$s_1 = v_0 t_1 - (v_1 - v_0)t_1/2$$

$$t_1 = \frac{s_1}{v_0/2 - v/2} = \frac{200}{20.8/2 - 10/2} \approx 37\,s$$

Hence deceleration is

$$a = \frac{v - v_0}{t} = \frac{20.8 - 10}{37} \approx 0.29\,m/s^2$$

Hence, it will take time:

$$t_2 = \frac{10}{0.29} \approx 34.5\,s$$

to decelerate to