

Answer on Question #48273, Physics, Mechanics | Kinematics | Dynamics

The speed of a train is reduced from 60 km/h to 15 km/h at the same time as it travel a distance of 450 m. If the retardation is uniform find how much further it will travel before coming to rest.

Solution:

The initial speed is

$$v_i = 60 * \frac{5}{18} = \frac{50}{3} = 16.67 \text{ m/s}$$

The final speed is

$$v_f = 15 * \frac{5}{18} = \frac{25}{6} = 4.17 \text{ m/s}$$

Kinematics equation

$$2ad = v^2 - v_i^2$$

where a is acceleration, d is distance, v_i is initial velocity and v is final velocity.

Thus,

$$a = \frac{v_f^2 - v_i^2}{2d} = \frac{4.17^2 - 16.67^2}{2 * 450} = -0.289 \text{ m/s}^2$$

If d_2 is the further distance travelled before coming to rest then,

$$d_2 = \frac{0 - v_f^2}{2a} = \frac{4.17^2}{2 * 0.289} = 30 \text{ m}$$

Answer: $d_2 = 30 \text{ m.}$