

Answer on Question#53388 - Physics - Mechanics - Kinematics - Dynamics

The Speed of train is reduced from $v = 60 \frac{\text{km}}{\text{h}}$ at the same time as it travels a distance of $l = 450 \text{ m}$. If the retardation is uniform, find how much further it will travel (approximately) before coming to rest?

Solution:

The time needed for the train moving at the speed v to path the distance l is given by

$$t = \frac{l}{v}$$

Since it took the same time for it to stop, the acceleration is given by

$$a = -\frac{v}{t} = -\frac{v^2}{l}$$

The distance traveled by the train is given by

$$L = vt + \frac{at^2}{2} = v \frac{l}{v} - \frac{v^2 \left(\frac{l}{v}\right)^2}{2l} = \frac{l}{2} = 225 \text{ m}$$

Answer: 225 m.