Answer on Question 77214, Physics, Other

Question:

A motor car traveling at $54\ km/h$ is brought to rest with uniform retardation in $5\ s$. Find its retardation and the distance travel in this time.

Solution:

a) We can find the retardation of the car from the kinematic equation:

$$v = v_0 + at,$$

here, v_0 is the initial velocity of the car, $v = 0$ is the final velocity of the car, a is the retardation of the car and t is the time.

Then, from this formula we can find the retardation of the car:

$$a = -\frac{v_0}{t} = -\frac{54\ \frac{km}{h} \cdot \frac{1000\ m}{1\ km} \cdot \frac{1\ h}{3600\ s}}{5\ s} = \frac{15\ \frac{m}{s}}{5\ s} = -3\ \frac{m}{s^2}.$$

The sign minus indicates that the car is slowing down.

b) We can find the distance travel in this time from another kinematic equation:

$$d = v_0 t + \frac{1}{2}at^2 = 15\ \frac{m}{s} \cdot 5\ s + \frac{1}{2} \cdot \left(-3\ \frac{m}{s^2}\right) \cdot (5\ s)^2 = 37.5\ m.$$

Answer:

a) $a = -3\ \frac{m}{s^2}$.

b) $d = 37.5\ m$.