

A car accelerates uniformly from standstill to 60 mi/hr in 4s. What is its acceleration? How far does it travel during this time interval?

Solution:

We write the general equation for the speed and the distance that depend on time.

$$\vec{v} = \vec{v}_0 + \vec{a}t$$

$$\vec{r} = \vec{r}_0 + \vec{v}_0 t + \frac{\vec{a}t^2}{2}$$

In this case, the velocity and acceleration have the same direction.

Therefore, given that  $v_0 = 0, r_0 = 0$

$$v = at, s = \frac{at^2}{2} \rightarrow a = \frac{v}{t} = \frac{60 * \frac{1600 \text{ m}}{3600 \text{ s}}}{4 \text{ s}} = 6.67 \frac{\text{m}^2}{\text{s}} \rightarrow s = \frac{6.67 * 4^2}{2} = 53.36 \text{ m}$$

Answer:  $a=6.67 \frac{\text{m}^2}{\text{s}}, S=56.36 \text{ m}$