Answer on Question 68586, Physics, Other

Question:

A car starts from rest and moves along the x-axis with constant accelerations $5\ m/s^2$ in $8\ s$. If it then continues with constant velocity, what distance will the car covers in $12\ s$ since it started from rest?

Solution:

Let's first find the distance covered by the car in $8\ s$ from the kinematic equation:

$$d_1 = v_0 t + \frac{1}{2} a t^2,$$

here, d_1 is the distance covered by the car in $8\ s$, $v_0 = 0$ is the initial velocity of the car (since the car starts from rest it will be equal to zero), $a = 5\ m/s^2$ is the acceleration of the car and t is the time.

Then, we get:

$$d_1 = \frac{1}{2} a t^2 = \frac{1}{2} \cdot 5\ \frac{m}{s^2} \cdot (8\ s)^2 = 160\ m.$$

We can find the constant velocity of the car after $8\ s$ from another kinematic equation:

$$v = v_0 + at,$$

$$v = at = 5\ \frac{m}{s^2} \cdot 8\ s = 40\ \frac{m}{s}.$$

Then, we can find the distance covered by the car in the last $4\ s$:

$$d_2 = vt = 40\ \frac{m}{s} \cdot 4\ s = 160\ m.$$

Finally, we can find the distance covered by the car in $12\ s$ since it started from rest:

$$d = d_1 + d_2 = 160\ m + 160\ m = 320\ m.$$

Answer: $d = 320\ m.$