

Answer on Question #46958-Physics-Mechanics-Kinematics-Dynamics

An automobile with an initial speed of $4.47 \frac{\text{m}}{\text{s}}$ accelerates uniformly at the rate of $3.0 \frac{\text{m}}{\text{s}^2}$. Find the final speed and the displacement after 5.0 s.

Solution

So first we solve for the displacement. We used this formula.

$$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2,$$

where: $v_i = 4.47 \frac{\text{m}}{\text{s}}$, $\Delta t = 5.0 \text{ s}$, $a = 3.0 \frac{\text{m}}{\text{s}^2}$.

So,

$$\Delta x = 4.47 \cdot 5.0 + \frac{1}{2} 3.0 \cdot 5.0^2 = 59.85 \text{ m.}$$

Then, the final speed is

$$v_f = v_i + a \Delta t = 4.47 + 3.0 \cdot 5.0 = 19.47 \frac{\text{m}}{\text{s}}.$$

Answer: $19.47 \frac{\text{m}}{\text{s}}$ and 59.85 m.