

Answer on Question 64327, Physics, Other

Question:

A car is moving at 30 km/h when it accelerates at 2 m/s^2 for 3.6 seconds. What is the car's final speed?

Solution:

Let's first convert km/h to m/s :

$$v_i = 30 \frac{\text{km}}{\text{h}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ h}}{3600 \text{ s}} = 8.3 \frac{\text{m}}{\text{s}}.$$

Then, we can find the car's final speed from the kinematic equation:

$$v_f = v_i + at,$$

here, v_i is the car's initial speed, v_f is the car's final speed, a is the acceleration of the car, t is the time during which the car is accelerates.

Finally, we get:

$$\begin{aligned} v_f &= v_i + at = 8.3 \frac{\text{m}}{\text{s}} + 2 \frac{\text{m}}{\text{s}^2} \cdot 3.6 \text{ s} = 15.5 \frac{\text{m}}{\text{s}}, \\ v_f &= 15.5 \frac{\text{m}}{\text{s}} \cdot \frac{1 \text{ km}}{1000 \text{ m}} \cdot \frac{3600 \text{ s}}{1 \text{ h}} = 55.8 \frac{\text{km}}{\text{h}} \approx 56 \frac{\text{km}}{\text{h}}. \end{aligned}$$

Answer:

$$v_f = 15.5 \frac{\text{m}}{\text{s}} = 56 \frac{\text{km}}{\text{h}}.$$

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