Answer on Question #70100, Physics / Mechanics | Relativity

A sports car approaches a highway on-ramp at a velocity of 20.0 m/s. If the car accelerates at a rate of 3.2 m/s² for 5.0s, what is the displacement of the car?

Solution:

The kinematic equation of motion is

$$x = x_0 + v_o t + \frac{1}{2}at^2$$

where

x_0 is initial position

$v_0 = 20\ m/s$ is initial speed

$a = 3.2\ m/s^2$ is acceleration

time t = 5.0 s

The displacement is

$$d = x - x_0 = v_o t + \frac{1}{2}at^2$$

$$d = (20.0\ m/s)\times(5.0\ s) + \frac{1}{2}\times(3.2\ m/s^2)\times(5.0\ s)^2 = 140\ m$$

Answer: $140\ m$