Answer on Question #53586, Physics Mechanics Kinematics Dynamics

A body starts from rest in a straight line under a force causing a constant acceleration of 2 m s–2. After 10s the force is removed and the body comes to rest in 20 seconds. Find the distance travelled by the body in the last 20s.

Solution

After 10s the force is removed the speed of the body is $v_1 = a_1 \cdot t_1$.

In the last 20s. $v_1 + a_2 t_2 = 0$

The second acceleration is $a_2 = -v_1 / t_2 = -a_1 t_1 / t_2$

The distance travelled by the body in the last 20s is

$$s = v_1 t_2 + \frac{a_2 t_2^2}{2} = \left(a_1 \cdot t_1\right) t_2 + \frac{\left(-a_1 t_1 / t_2\right) t_2^2}{2} = a_1 t_1 t_2 - a_1 t_1 t_2 / 2 = a_1 t_1 t_2 / 2 = 2\left(m / s^2\right) \cdot 10s \cdot 20s = 400m$$

Answer: $s = a_1 t_1 t_2 / 2 = 400m$