Question

A particle of mass m is acted upon by a force F given by the empirical law F = $\dfrac{R}{t^2}$ v(t). If this law is to be tested experimentally by observing the motion starting from rest, the best way is to plot :

A log v(t) against $\dfrac{1}{t}$

B v(t) against t^2

C log v(t) against $\dfrac{1}{t^2}$

D log v(t) against t

Solution

Correct option is A)

$F = \dfrac{R}{t^2} v(t)$

$F = \dfrac{R}{t^2} v(t)$

$\Rightarrow m \dfrac{dv}{dt} = \dfrac{R}{t^2} v(t)$

$\Rightarrow \int \dfrac{dv}{v} = \int \dfrac{Rdt}{mt^2}$

$\ln v = -\dfrac{R}{mt}$

$\Rightarrow \ln v \propto \dfrac{1}{t}$