Answer on Question #48671, Physics, Mechanics | Kinematics | Dynamics

A particle projected with initial velocity U along X axis such that it suffers deceleration given by Ax^3 (where A is constant). The distance X at which the particle is...

Solution:

$$a(x) = \frac{dv}{dt} = \frac{dv}{dx}\frac{dx}{dt} = v\frac{dv}{dx}$$

Thus, integrating

$$a(x)dx = vdv$$

$$\int_0^x -Ax^3 dx = \int_u^0 vdv$$

$$-A\frac{x^4}{4} = -\frac{u^2}{2}$$

$$x^4 = 2Au^2$$

$$x = (2Au^2)^{\frac{1}{4}}$$

Answer: $x = (2Au^2)^{\frac{1}{4}}$