

①

A particle's velocity is described by

$$v = kt^2 + \frac{4t}{3}. \text{ If you know that}$$

$$t_0 = 0.5 \quad x_0 = 25\text{m} \quad \text{and} \quad t_1 = 4.05 \quad x_1 = 77\text{m}$$

determine the value of k and units for k .

Solution

$$v = kt^2 + 4t$$

$$\int v = \int kt^2 + 4t$$

$$x = \frac{k}{3}t^3 + \frac{4}{2}t^2 + C$$

sub t_0 and x_0

$$25\text{m} = \frac{k}{3}(0.5)^3 + \frac{4}{2}(0.5)^2 + C$$

$$\underline{25\text{m} = C}$$

$$x = \frac{k}{3} t^3 + 2\frac{m}{s^2} t^2 + 25m$$

sub t, and x,

$$77m = \frac{k}{3} (4.0s)^3 + 2\frac{m}{s^2} (4.0s)^2 + 25m$$

$$77m = (21.3353)k + 32m + 25m$$

$$20m = 21.3353 k$$

$$0.938 \frac{m}{s^3} = k$$

$$0.94 \frac{m}{s^3} = k$$