$a = -2s + 0.05s^3$

$a(5) = -2(15) + 0.05(15)^3$

$a = -13.12 m/s^2$

$$-20 + 2 = \frac{16}{3} + 4 = 2c_1$$

$$-19.33 = 2c_1$$

$$c_1 = \frac{-19.33}{2}$$

$$= -9.67 \text{ adding } c_1 = -9.67$$

$c_2 = -2m$

$$S_{at\,4} = \frac{1}{3}(4)^4 - 4^2 + (-9.67 \times 4) + (-2)$$

$$S = 85.33 - (16 + (-38.64)) - 2$$

$$S = 28.69m$$

4. $ds = v\,dt$

$$dt = ds/v \quad --- (*)$$

$a = dv/dt$

$dt = dv/a$ --- (**)

Equating 1 & 2

$$\frac{ds}{v} = \frac{dv}{a}$$

$$a = \frac{v\,dv}{ds} \qquad dv = (20 - 0.05s^2)\,ds$$

$$dv = -0.15\,ds$$

$$a = \frac{(20 - 0.05s^2) \cdot [-0.15]\,ds}{ds}$$

3. $a = (4t^2 - 2)\,m/s$

when $t = 0$, $S = 2m$

when $t = 2s$, $S = 20m$

when $t = 4s$, $S = ?$

$$\int a = \int \frac{dv}{dt}$$

$$v = \int a\,dt$$

$$v = \int (4t^2 - 2)\,dt$$

$$v = \frac{4t^3}{3} - 2t + C_1 \quad --(1)$$

$$\int = \int v\,dt$$

$$S = \frac{4}{3} \cdot \frac{1}{4}t^4 - \frac{2t^2}{2} + C_1 t + C_2$$

$$S = \frac{1}{3}t^4 - t^2 + C_1 t + C_2 \quad ---(2)$$

when $t = 0$, $S = 0$

$$-2 = \frac{1}{3}0^4 - 0^2 + C_1 \times 0 + C_2$$

$$C_2 = -2$$

when $t = 2$, $S = -20$, & $C_2 = -2$

$$-20 = \frac{1}{3}(2)^4 - 2^2 + C_1 \times 2 + (-2)$$

$$-20 = \frac{16}{3} - 4 + 2C_1 - 2$$

Attah-christian Attahtuwoma
18/ENG03/017
civil-Engineering.
mechanics

1. $V = (4t - 3t^2)m/s$

when $t = 0secs, s = 0, t = 4s, S = ?$

$$\int_0^s ds = Vdt$$

$$\int_0^s ds = \int_0^4 (4t - 3t^2)dt$$

$$= \left[\frac{4t^2}{2} - \frac{3t^3}{3}\right]_0^4$$

$$S = [2t^2 - t^3]_0^4$$

$$S = 2(4)^2 - 4^3$$

$$S = -32m$$

2. $V = (0.5t^3 - 8t)m/s$

$$a = \frac{dv}{dt} = vdt$$

$$a = (0.5t^3 - 8t)$$

$$a = 1.5t^2 - 8$$

when $t = 2s$

$$a = 15(2)^2 - 8$$

$$a = -2m/s^2$$