F12-3

① $V = (4t - 3t^2)$ m/s

determine the position

$t = 4$ sec

$S = 0$ when $t = 0$

$v = \frac{ds}{dt}$

$= 4t - 3t^2$

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

$S = \frac{4t^2}{2} - t^3$

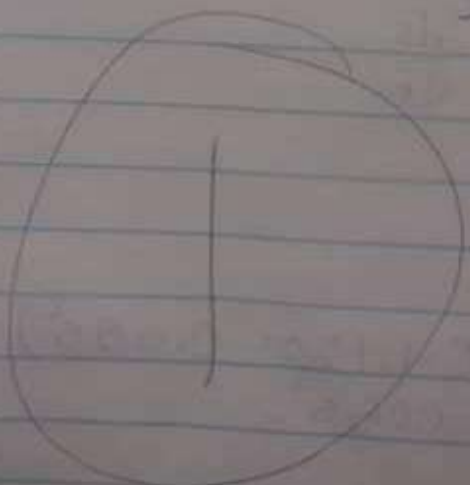
Recall $t = 4$s

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

$S = 32 - 64$

$S = -32$m

Question



A) F12-7

$a = (4t^2 - 2)$

$V = 4/3 t^3 - 2t + C_1$

$s = \frac{4}{12}t^4 - t^2 = \frac{1}{3}t^4 - t^2 + C_2$

When $t = 0$ located 2m to the left

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

$-2 = C_2$

$C_2 = -2$

When $t = 2$ $s = 20m$

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

$-18 = \frac{8}{12} - 4 + 2C_1$

$C_1 = -9.667 \simeq -9.67$

Using C_1 and C_2

$\frac{4}{12}4^4 - 4^2 = (4.967) - 2$

$= 28.667$

$s = 28.667 m$

(2) F12-4

$v = (0.5t^3 - 8t)\,m/s$

$t = 2s$

Determine the acceleration

$$a = \frac{dv}{dt} = \frac{d}{dt}(0.5t^3 - 8t)$$

$$= 1.5t^2 - 8$$

Recall $t = 2\,s$

$$a = 1.5(2)^2 - 8$$

$$a = 6 - 8$$

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

(3) F12-8

$a = [20 - 0.05s^2]\,m/s^2$

$s = 15m$

Determine the acceleration

$$a = \frac{dv}{dt} = -0.1s\frac{ds}{dt}$$

$$\frac{ds}{dt} = v$$

$$\therefore a = -0.1s \times v = 0.1s(2.0 - 0.05s^2)$$

$$a = -2s + 0.005s^3$$

At $s = 15$

$$a = -2(15) + 0.005(15^3)$$

$$a = -30 + 16.875$$

$$a = -13.125\,m/s^2 \quad -13.13\,m/s^2$$