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Online Assignment

F12-3

$$v = (4t - 3t^2) \text{ m/s}$$

$$s = ? \text{ at } t = 4s \quad \text{NB: } s = 0 \text{ at } t = 0$$

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

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

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

$$s = 2t^2 - t^3 + C$$

$$\text{at } s = 0, t = 0, \quad A + C = 0$$

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

$$= 32 - 64$$

$$= \underline{\underline{-32 \text{ m}}}$$

F12-4

$$v = (0.5t^3 - 8t) \text{ m/s}$$

$$a = ? \text{ when } t = 2s$$

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

$$a = \frac{d(0.5t^3 - 8t)}{dt} = 3(0.5)t^2 - 8$$

$$= 1.5t^2 - 8$$

$$\text{at } t=2$$

$$a = 1.5(2)^2 - 8 \\ = -2 \text{ m/s}^2$$

F12-7

$$a = (4t^2 - 2) \text{ m/s}^2$$

$$\text{at } t=0, s = -2 \text{ m}$$

$$\text{at } t=2, s = -20 \text{ m}$$

$$s = ? \quad \text{at } t=4$$

$$v = \int 4t^2 - 2 \cdot dt$$

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

$$s = \int \frac{4t^3}{3} - 2t \cdot dt$$

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

$$= \frac{t^4}{3} - t^2 + Ct + A$$

$$\text{at } t=0, s = -2$$

$$-2 = \frac{0^4}{3} - 0 + C(0) + A$$

$$\therefore A = -2$$

$$s = \frac{t^4}{3} - t^2 + Ct + 2$$

$$\text{at } t=2, s = -20$$

$$-20 = \frac{2^4}{3} - 2^2 - 2 + 2C$$

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

$$-20 = 5.33 - 6 + 2C$$

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

$$C = -9.67$$

$$\therefore \text{at } t = 4, s = ?$$

$$s = \frac{4^4}{3} - 4^2 + 4(-9.67) - 2$$

$$= \frac{47.9}{3} \text{ m} \quad \underline{\underline{28.65 \text{ m}}}$$

F12-8

$$v = (20 - 0.05s^2) \text{ m/s}$$

$$a = ? \quad \text{at } s = 15 \text{ m}$$

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

$$v = 20 - 0.05s^2$$

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

$$a = v \left(\frac{dv}{ds} \right)$$

$$a = -20s + 0.05s^3$$

$$a = -20(15) + 0.05(15)^3$$

$$a = (20 - 0.05s^2) (-0.1s)$$

$$= -20 + 0.00$$

$$a = (20 - 0.05s^2) (-0.1s)$$

$$= -2s + 5 \times 10^{-3} s^3$$

$$= -2(15) + 5 \times 10^{-3} (15)^3$$

$$= \underline{\underline{-13.13 \text{ m/s}^2}}$$