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Civil Eng



1) for figure 12-3 (1)

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

$$s = \int v dt$$

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

when $t = 4 \text{ s}$

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

$$32 - 64$$

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

2) for figure 12-4 (2)

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

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

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

$$= 1.5t^2 - 8$$

$$a = \frac{dv}{dt} = 2$$

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

$$6 - 8 = -2 \text{ m/s}^2$$

3) for figure 12-7 (3)

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

$$v = \int a dt$$

$$v = \int (4t^2 - 2) dt$$
$$= \frac{4}{3}t^3 - 2t$$

$$s = \int v dt$$

$$= \int 4t^2/3 - 2t + c$$

$$\frac{4t^3}{12} - \frac{2t^2}{2} + ct$$

$$p = \frac{1}{3}t^3 - t^2 + ct + k$$

when $t=0, p=2$

$$-2 = \frac{1}{3}(0)^3 - (0)^2 + (0) + k$$

$$k = -2$$

when $t=2, p=20, k=-2$

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

$$-20 = -0.7 + 2c$$

$$c = -9.7$$

$$p = \frac{1}{3}t^3 - t^2 - 9.7t - 2$$

when $t=4$

$$\frac{1}{3}(4)^3 - 4^2 - (9.7 \times 4) - 2$$

$$p = 28.7 \text{ m/s}$$

4) for figure 12.8(4)

$$v = (20 - 0.55s) \text{ m/s}$$

$$dt = ds/v \text{ and } dt = dv/a$$

$$a = dv/dt = dv/ds \cdot ds/dt$$

$$dv/ds = 0.55, ds/dt = (20 - 0.55s)$$

$$A = (0.55)(20 - 0.55s)$$

when $s=15$

$$A = (0.55 \times 15)(20 - 0.55 \times 15)$$

$$A = 13.125 \text{ m/s}^2$$