

1) For figure 12.3c1)

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

$$S = \int v dt$$

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

$$= 2t^2 - t^3$$

when $t = 4.5$

$$S = 2(4.5)^2 - (4.5)^3$$

$$= 32 - 64$$

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

2) For figure 12.4c1)

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

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

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

$$= 1.5t^2 - 8$$

$$A = \frac{dv}{dt} \bigg|_{t=2}$$

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

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

3) For figure 12.7c3)

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

$$V = \int A dt$$

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

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

$$S = \int v dt$$

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

$$= \frac{4t^4}{12} - \frac{2t^2}{2} + Ct$$

$$P = \frac{4}{12} t^4 - t^2 + Ct + K$$

When $t = 0, P = 2$

$$-2 = \frac{1}{3}(0)^4 - (0)^2 + C(0) + K$$

$$K = -2$$

when $t = 2, P = 20, K = -2$

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

$$-20 = -0.7 + 2C$$

$$C = -9.7$$

$$P = \frac{1}{3}t^4 - t^2 - 9.7t - 2$$

when $t = 4$

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

$$P = 28.7 \text{ m}$$

4) For figure 12.3c2)

$$V = (20 - 0.5s) \text{ m/s}$$

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

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

$$\frac{dv}{ds} = -0.5 \frac{ds}{dt} = (20 - 0.5s)^2$$

$$A = (-0.5)(20 - 0.5s^2)$$

when $s = 15$

$$A = (-0.5 \times 15)(20 - 0.5(15)^2)$$

$$A = 13.725 \text{ m/s}^2$$