

1, FOR FIGURE 12.3 (1)

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

$$S = \int v dt$$

$$S = \int \langle 4t - 3t^2 \rangle dt \\ = 2t^2 - t^3$$

When  $t = 4$

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

$$= 32 - 64$$

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

2, FOR FIGURE 12.4 (2)

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

$$A = dv/dt$$

$$dv/dt = 3(0.5)t^2 - 8 \\ = 1.5t^2 - 8$$

$$A = dv/dt |_{t=2}$$

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

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

3, FOR FIGURE 12.7 (3)

$$A = \langle 4t^2 - 2 \rangle \text{ m/s}^2$$

$$V = \int A dt$$

$$V = \int 4t^2 - 2$$

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

$$S = \int v dt$$

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

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

$$P = \frac{1}{3}t^4 - t^2 + Ct + K$$

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  $t = 4$

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

$$P = 28.7 \text{ m/s}^2$$

4, FOR FIGURE 12.8 (4)

$$V = \langle 20 - 0.5s \rangle \text{ m/s}$$

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

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

$$\frac{dv}{ds} = -0.15, \frac{ds}{dt} = (20 - 0.5s^2)$$

$$A = (-0.15)(20 - 0.05s^2)$$

when  $s = 15$

$$A = (-0.1 \times 15)(20 - 0.05(15^2))$$

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