

China wisdom earlychte  
18/EN10104/02-5  
Elect Lect  
Enla

① velocity =  $v = (4t - 3t^2) \text{ m/s}$

$$S = \int v$$

$$S = \int 4t - 3t^2$$

$$S = \frac{4t^2}{2} - \frac{3t^3}{3} + S_0$$

$$S = 2t^2 - t^3 + S_0$$

$$S = 2(4)^2 - 4^3 + 0$$

$$S \text{ when } t = 4 \text{ is:}$$

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

②

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

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

$$\therefore a = 1.5t^2 - 8$$

$$\text{acceleration at } t = 2 \text{ s is:}$$

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

$$a = -2 \text{ m/s}^2 = \text{deceleration}$$

③

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

$$v = \int a \quad \int S = \int v$$

$$\therefore v = \frac{4t^3}{3} - 2t + v_0 \quad \int S = \frac{t^4}{3} - t^2 + v_0 t + S_0$$

When  $t = 0$ ,  $S = 2$  & When  $t = 2 \text{ s}$ ,  $S = -20 \text{ m}$

$$\therefore -20 = \frac{2^4}{3} - 2^2 + v_0(2) + (-2)$$

$$v_0 = -9.7$$

$\therefore$  Position at  $t = 4 \text{ s}$

$$S = \frac{4^4}{3} - 4^2 + (-9.7 \times 4) + (-2) = 28.7 \text{ m}$$

④ Velocity =  $v = (20 - 0.05s^2) \text{ m/s}$

we know

$$v = \frac{ds}{dt}, \quad a = \frac{dv}{dt}$$

$$dt = \frac{ds}{v}, \quad dt = \frac{dv}{a}$$

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

$$v dv = a ds$$

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

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

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

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

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

$\therefore$  acceleration when particle at  $s=15$

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

$$a = -30 + 16.875$$

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