

18/ENG07/007

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①

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

$$V = \frac{ds}{dt}$$

$$ds = v dt$$

$$\int_0^s ds = \int_0^t (4t - 3t^2) dt$$

$$s \Big|_0^s = \frac{4t^2}{2} - \frac{3t^3}{3} \Big|_0^t$$

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

where $t = 4\text{s}$

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

$$s = 32 - 64$$

$$s = \underline{\underline{-32\text{m to the } x\text{-axis}}}$$

②

$$a = 4t^2 - 2$$

$$v = \int a dt$$

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

$$ds = \int v dt$$

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

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

where $t = 2\text{s}$ and $s = 20$

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

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

$$\frac{56}{3} = \frac{C^2}{2}$$

$$C^2 = \frac{112}{3} = 37.33$$

$$C = \sqrt{37.33}$$

$$C = 6.11$$

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

$$s = \frac{t^4}{3} - t^2 + \frac{56}{3}$$

where $t = 4s$

$$s = \frac{(4)^4}{3} - (4)^2 + \frac{56}{3}$$

$$= \frac{256}{3} - 16 + \frac{56}{3}$$

$$s = \underline{\underline{88m}}$$

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

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

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

where $t = 2s$

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

$$a = 6 - 8$$

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

$$\textcircled{4} \quad V = (20 - 0.05s^2) \text{ m/s}$$

$$2t + s = 15$$

$$V = 20 - 0.05(15)^2$$

$$V = 20 - (0.05 \times 225)$$

$$V = 20 - 11.25$$

$$V = 8.75 \text{ m/s}$$

Using $v^2 = u^2 + 2as$

$$8.75^2 = 0^2 + (2a \times 15)$$

$$\frac{302}{30} = \frac{76.5625}{30}$$

$$a = 76.5625 / 30$$

$$a = \underline{\underline{2.55 \text{ m/s}^2}}$$