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① $v = 4t - 3t^2$

$$S = \int v\, dt$$

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

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

$$S = 0, \quad t = 0$$

$$0 = 2(0)^2 - (0)^3 + c$$

$$c = 0$$

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

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

$$S = 32 - 64 + 0$$

$$S = -32$$

$$= 32n \text{ left of the zaxis}$$

② $a = 4t^2 - 2$

$$v = \int a\, dt$$

$$v = \frac{4t^3}{3} - \frac{2t}{1} + c$$

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

$$= \int v\, dt$$

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

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

at $t = 2s$ and $S = 20$

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

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

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

$$C = \sqrt{\frac{112}{3}}$$

$$C = 6.11$$

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

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

If $t = 4s$

$$S = \frac{(4)^4}{3} - 4^2 - \frac{156}{3}$$

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

$$= \frac{256 - 48 + 56}{3}$$

3) $v = (0 \cdot 5t^2 - 3t)$ m/s

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

$\therefore a = 1 \cdot 5t^2 = 8$

Where $t = 2s$

$a = 1 \cdot 5(2)^2 - 8$

$a = 6 - 8$ (m/s).

$a = -2$ m/s

4) $v = (20 - 0.05s^2)$ m/s

where $s = 15$

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

$v = 20 - (0.05 \times 225)$.

$v = 20 - 11.25$

$v = 8.75$ m/s

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

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

$30a = 76.5625$

$30a = 76 = 9 \qquad a = \frac{76.5625}{80}$

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