18/ENG02/065
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Computer ENG
ENG 234

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

$t = 0,\ S = 0,\ t = 4$

$v = \frac{ds}{dt} = (4t - 3t^2)$

$\therefore \frac{ds}{dt} = (4t - 3t^2)$

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

$S = \left[\frac{4t^2}{2} - \frac{3t^3}{3}\right]_0^4$

$S = [2t^2 - t^3]_0^4$

$S = [2t^2 - t^3]^4 - [2t^2 - t^3]^0$

$S = 2(4)^2 - (4)^3 - [0]$

$S = 32 - 64$

$S = 32\ m$ ∴

This means the position of the particle is on the left side to the origin.

2) $v = (0.5t^3 - 8t)\ m/s$

$t = 2s \quad a = ?$

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

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

$a = (1.5t^2 - 8)\ m/s^2$

at $t = 2s$

$1.5(2)^2 - 8$

$= (1.5 \times 4) - 8$

3) $a = (4t^2 - 2)$

$a = \frac{dv}{dt} = (4t^2 - 2)$

$\frac{dv}{dt} = (4t^2 - 2)$

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

$v = \left(\frac{4t^3}{3} - 2t + C_1\right) m/s$

$v = \frac{ds}{dt} = \left(\frac{4t^3}{3} - 2t + C_1\right)$

$\int ds = \int (4/3t^3 - 2t - C_1)\,dt$

$S = \left(\frac{4t^4}{3 \times 4} - \frac{2}{2}t^2 + C_1t + C_2\right)m$

$S = 1/3t^4 - t^2 + C_1t + C_2.$

at $t = 0,\ S = -2m$

$S = 1/3t^4 - t^2 + C_1t + C_2$

$-2 = 1/3(0)^4 - (0)^2 + C_1(0) + C_2$

$C_2 = -2$

at $t = 2,\ S = -20m$

$S = 1/3t^4 - t^2 + C_1t - 2$

$-20 = \frac{1}{3}(2)^4 - (2)^2 + C_1(2) - 2$

$-20 = \frac{16}{3} - 4 + 2C_1 - 2$

$-20 = \frac{-2}{3} + 2C_1$

$2C_1 = -20 + \frac{2}{3}$

$2C_1 = -19.33$

$C = \frac{-19.33}{2} = -9.67$

$C_1 = -9.67$

$C_2 = -2$

$S = 1/3t^4 - t^2 + C_1t + C_2$

$S = 1/3t^4 - t^2 - 9.67(4) - 2$

$S = 1/3(4)^4 - (4)^2 - 9.67(4) - 2$

$$S = \frac{256}{3} - 16 - 38.6668 - 2$$

$$S = \frac{256}{3} - 56.6668$$

$$S = 28.667\,m$$

The position of the particle is at 28.67m

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

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

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

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

$$\frac{dv}{ds} = -0.15$$

$$\therefore a = (20 - 0.5s^2)(-0.15)$$

at $s = 15m$

$$a = [20 - 0.05(15)^2][-0.1(15)]$$

$$a = (8.75)(-1.5)$$

$$a = (8.75)(-1.5)$$

$$a = -13.125\,m/s^2$$

$$\therefore a = -13.13\,m/s^2$$

The acceleration of the particle at $s = 15m$ is -13.13, which implies that the particle is decelerating.