

Q1 i) $v = 4t + 3$

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

Initial conditions

$$\text{at } t=0, s=0$$

$$s(0) = 2(0) + 3(0) + C$$

$$0 = C$$

$$s = 2t^2 + 3t$$

ii) $v = 6t^3 - 2t^2 + 1$

$$s = \frac{6t^4}{4} - \frac{2t^3}{3} + t + C$$

initial conditions $t=0, s=1$

$$s(0) = \frac{6(0)^4}{4} - \frac{2(0)^3}{3} + 0 + C$$

$$1 = C$$

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

iii) $v = 7t^2 - 5$

$$s = \frac{7t^3}{3} - 5t + C$$

$$t=0, s=2$$

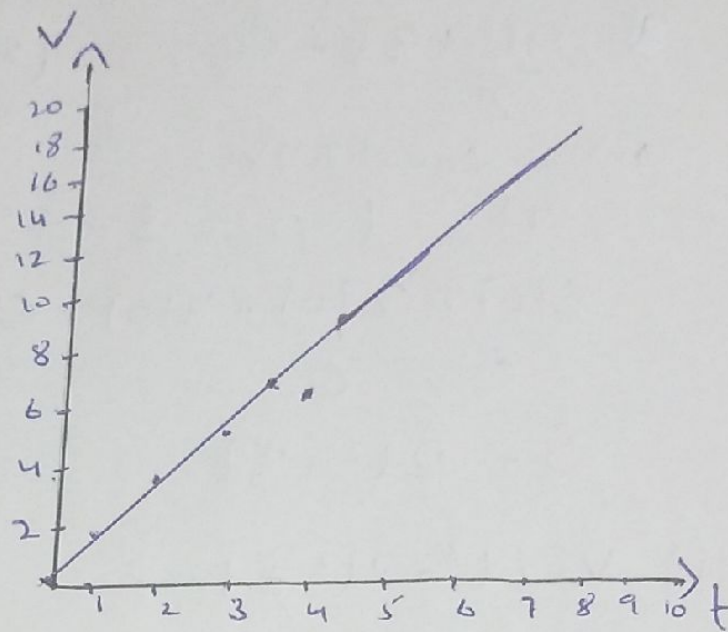
$$s(0) = \frac{7(0)^3}{3} - 5(0) + C$$

$$2 = C$$

$$s = \frac{7t^3}{3} - 5t + 2$$

Pg 7 Q2 i) $v = 1.7t$

t	v
0	0
1	1.7
2	3.4
3	5.1
4	6.8
5	8.5
6	10.2
7	11.9
8	13.6
9	15.3
10	17



ii) $v = 1.7t$

$$s = \frac{1.7t^2}{2} + C$$

at $t = 0, s = 0$ (distance covered by the ball = 0 initially at rest)

$$C = 0$$

$$s = \frac{1.7t^2}{2}$$

at $t = 10s$

$$s = \frac{1.7(10)^2}{2} = 85m$$

Q3 $v = 216 \cdot t^3$

i) Bullet stop $\Rightarrow v = 0$

$$216 \cdot t^3 = 0 \Rightarrow t = 6$$

$$ii) s = 216t - \frac{t^4}{4} + C$$

at $t = 0, s = 0$ (Bullet did not fire)

$$s(0) = 216(0) - \frac{0}{4} + C \Rightarrow C = 0$$

$$s = 216t - \frac{t^4}{4}$$

$$\text{at } t = 6 \Rightarrow s = 216(6) - \frac{(6)^4}{4} = 1296 - \frac{1296}{4} = 972m$$

Pg 8a

Q4

$$v = 40 - 2t^2$$

$$v = 0$$

$$40 - 2t^2 = 0$$

$$40 = 2t^2$$

$$t^2 = 20 \Rightarrow t = 4.475$$

$$s = 40t - \frac{2t^3}{3} + C_1$$

$$\text{at } t = 0 \quad s = 0$$

$$s(0) = 40(0) - \frac{2(0)^3}{3} + C_1$$

$$C_1 = 0$$

$$s = 40t - 2t^3$$

$$s = 40(4.47) - \frac{2(4.47)^3}{3}$$

$$= 178.8 - 59.54$$

$$s = 119 \text{ m}$$

$$i) a = 10 + 3t - t^2$$

$$V = 10t + \frac{3t^2}{2} - \frac{t^3}{3} + C_1$$

$$t=0, V=0$$

$$V(0) = 10(0) + \frac{3(0)^2}{2} - \frac{(0)^3}{3} + C_1$$

$$C_1 = 0$$

$$V = 10t + \frac{3t^2}{2} - \frac{t^3}{3}$$

$$S = \frac{10t^2}{2} + \frac{3t^3}{3 \cdot 2} - \frac{t^4}{3 \cdot 4} + C_2$$

$$\text{at } t=0, S=0$$

which give $C_2 = 0$

$$S = 5t^2 + \frac{1}{2}t^3 - \frac{t^4}{12}$$

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

$$V = \frac{4t^2}{2} - \frac{2t^3}{3} + C_1 = 2t^2 - \frac{2}{3}t^3 + C_1$$

$$\text{at } t=0, V=2$$

$$V(0) = \frac{4(0)^2}{2} - \frac{2(0)^3}{3} + C_1 \Rightarrow C_1 = 2$$

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

$$S = \frac{2t^3}{3} - \frac{2}{3} \frac{t^4}{4} + 2t + C_2$$

$$S = \frac{2}{3}t^3 - \frac{1}{6}t^4 + 2t + C_2$$

$$t=0, S=1$$

$$S(0) = \frac{2}{3}(0) - \frac{1}{6}(0) + 2(0) + C_2$$

$$1 = C_2$$

$$S = \frac{2}{3}t^3 - \frac{1}{6}t^4 + 2t + 1$$

Pg 9
iii)

$$a = 10 - 6t$$

$$V = 10t - \frac{6t^2}{2} + C_1$$

$$V = 10t - 3t^2 + C_1$$

$$\text{at } t = 1, V = 5$$

$$V(1) = 10(1) - 3(1)^2 + C_1$$

$$5 = 10 - 3 + C_1$$

$$C_1 = -12$$

$$V = 10t - 3t^2 - 12$$

$$S = \frac{10t^2}{2} - \frac{3t^3}{3} - 12t + C_2$$

$$S = 5t^2 - t^3 - 12t + C_2$$

$$S = 0 \text{ at } t = 1$$

$$S(1) = 5(1)^2 - (1)^3 - 12(1) + C_2$$

$$0 = 5 - 1 - 12 + C_2$$

$$C_2 = 8$$

$$S = 5t^2 - t^3 - 12t + 8$$