

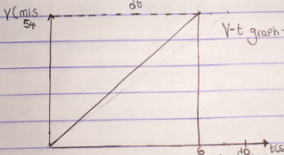
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 CIVIL ENGINEERING.
 18/ENG031050
 ENGINEERING MECHANICS (ENG 234)

1) Given that: $S = 0.5t^3 \text{ m}$. $V = \frac{dS}{dt} = V_1 = 1.5t^2$

So at $t=6$

$V = 1.5(6)^2 = 54 \text{ m/s}$

$S_2 = 108 \text{ m}$ $V = \frac{dS}{dt} = 0$, $V = 0 \text{ m/s}$

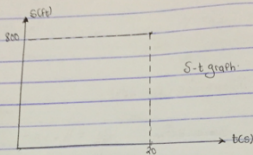


2) Given that $V = -4t + 80$. $S = \int v dt = \int_0^{20} (-4t + 80) dt$

$S = [-2t^2 + 80t] \Big|_0^{20}$

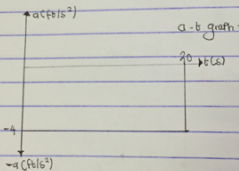
\therefore At $t=20$

$S = [-2(20)^2 + 80(20)]$ $S = -800 + 1600$
 $\therefore S = 800 \text{ ft}$



$V = (-4t + 80) \text{ ft/s}$

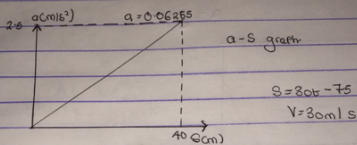
$a = dv/dt$ $a = -4 \text{ ft/s}^2$



3) $V = (0.25) \text{ m/s}$ $a = v \left(\frac{dv}{ds} \right)$ $a = 0.255 (0.25)$

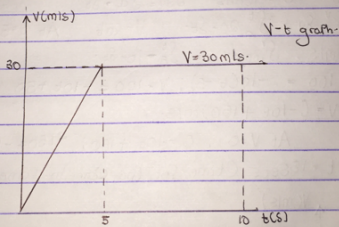
At $S = 40 \text{ m}$

$a = (0.0625 \times 40)$ $a = 2.5 \text{ m/s}^2$



$A \sim S$

4) $S = 3t^2$ $V = 6t$ At $t = 5$. $V = 6 \times 5$ $V = 30 \text{ m/s}$.

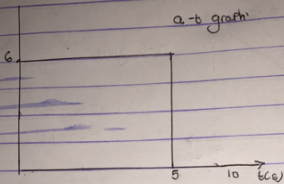


$V = 6t \text{ m/s}$

$a = 6 \text{ m/s}^2$

$V = 30 \text{ m/s}$

$a = 0 \text{ m/s}^2$



5) $a = 20 \text{ m/s}^2$ $a = -10 \text{ m/s}^2$ $\int dv = \int a \cdot dt$

$\int_0^V dv = \int_0^t 20 \cdot dt$ $V = 20t$ At $t = 5s$

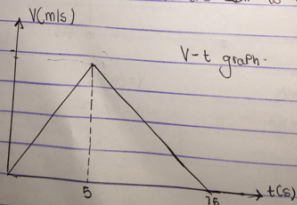
$V = 100 \text{ m/s}$, $\int_{100}^V dv = \int_5^t -10 \cdot dt$

$V - 100 = -10(t - 5)$; $V - 100 = -10t + 50$

$V = (-10t + 150) \text{ m/s}$

At $V = 0$, $0 = -10t + 150$; $-150 = -10t$

$t = 15 \text{ secs}$ (time for the car to come to rest)



$$6. v = 30t$$

$$\int ds = \int v dt$$

$$\int_0^s ds = \int_0^t (30t) dt$$

$$s = 15t^2$$

$$\text{At } t = 5s$$

$$s = 15(5)^2$$

$$s = 375m.$$