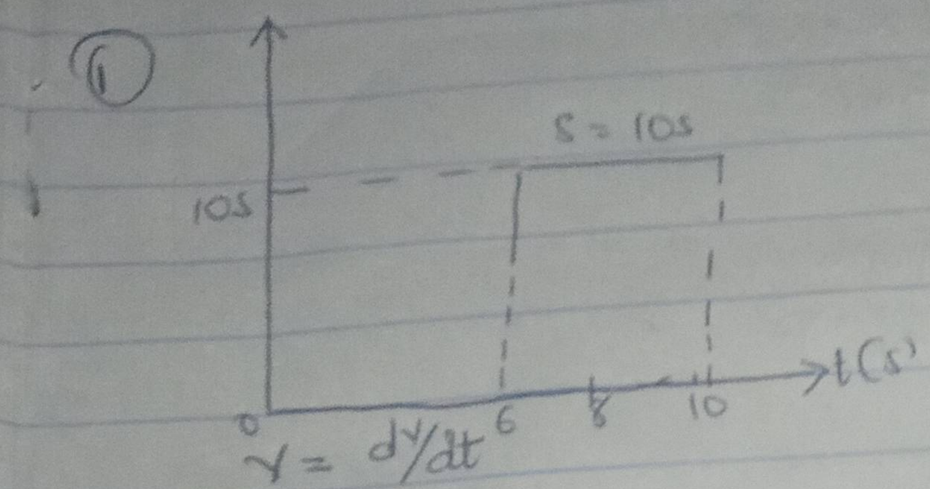
LEGHEMO SOLOMON
18/ENG08/010
BIOMEDICAL ENGINEERING

①



$v = dy/dt$

$v = 1.5t^2$

at $t = 6s$

$v = 1.5 \times 6^2$

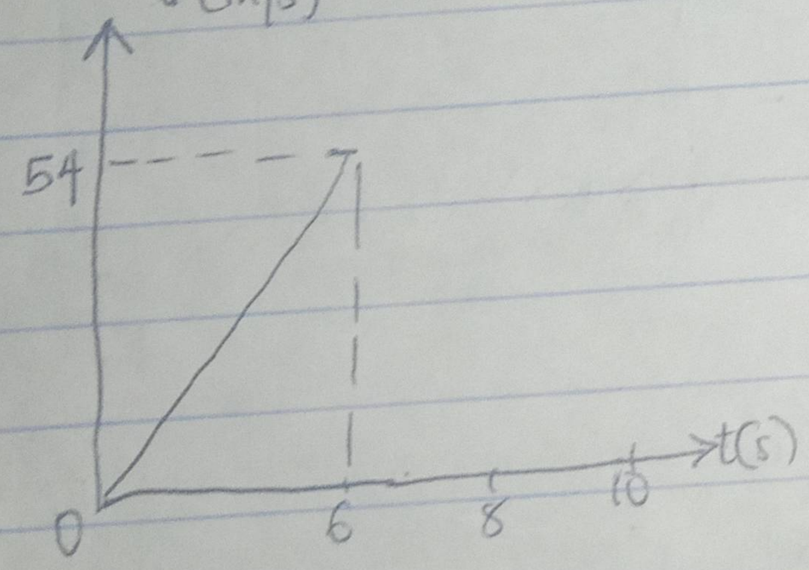
$= 1.5 \times 36$

$v = 54 m/s$ from t

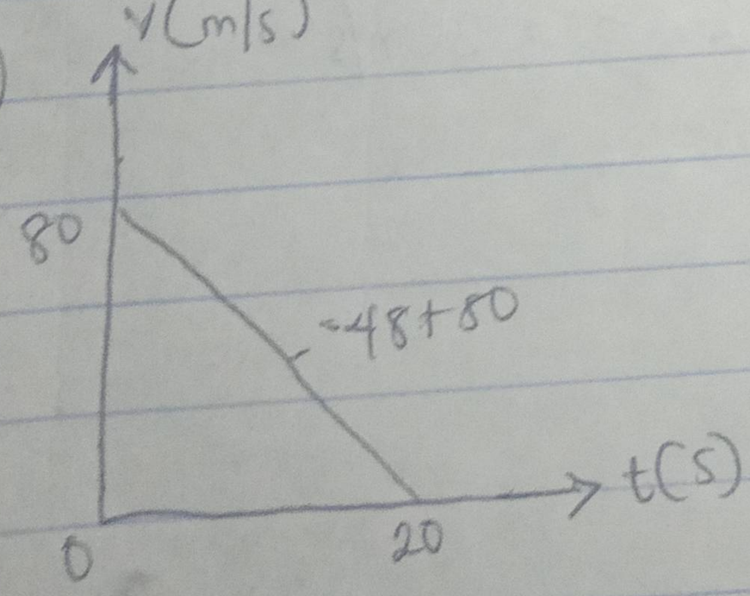
6s - 10s, S = 10.

$\therefore v = 0$

v-t graph



②



① $s = \int v dt$

$s = \int (-4t + 80)$

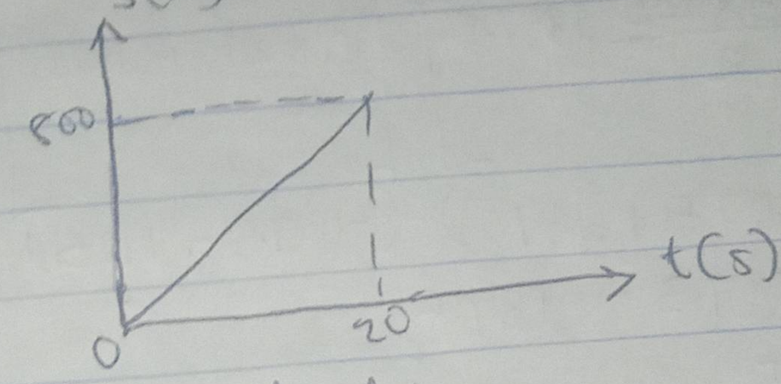
$s = -2t^2 + 80t$

at $t = 20s$

$s = -2(20)^2 + 80(20)$

$s = 1600 - 800 = 800m$

s-t graph



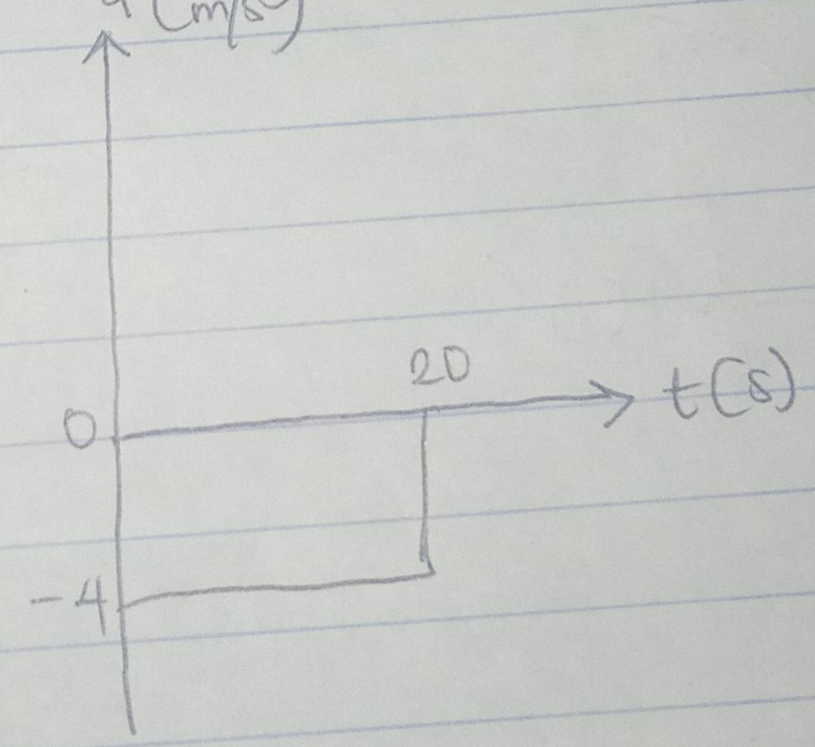
(ii) - Acceleration

$a = dv/dt$

$\therefore a = \pm 4 m/s^2$

at $t = 20s$, $a = -4 m/s^2$

a-t graph



Contd ⑥

$$\int_{375}^{S} dS = \int_{5}^{15} (-15t + 225)\,dt$$

$$S - 375 = \frac{-15t^2}{2} + 225t \Big|_{5}^{15}$$

$$S - 375 = \left[\frac{-15(15)^2}{2} + 225(15)\right] - \left[\frac{-15(5)^2}{2} + 225(5)\right]$$

$$S - 375 = \left[\frac{-15\times225}{2} + 337.5\right] - \left[\frac{15\times25}{2} + 1125\right]$$

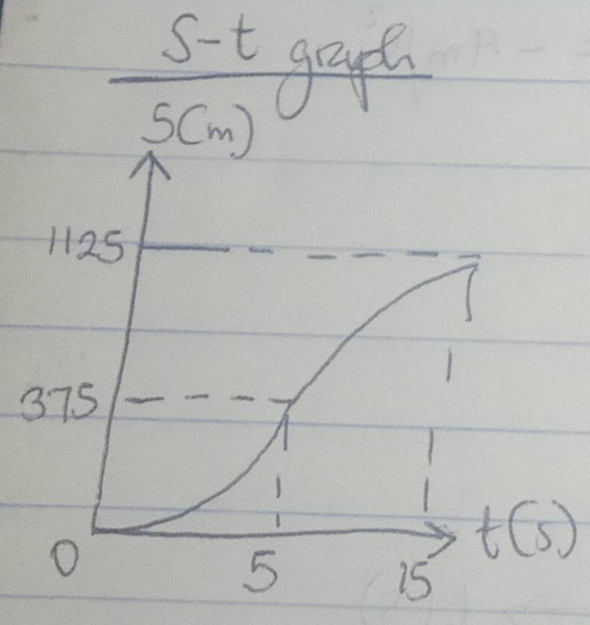
$$S - 375 = (-1687.5 + 3375) - (-187.5 + 1125)$$

$$S - 375 = -71687.5 - 937.5$$

$$S - 375 = 750$$

$$S = 1125\,m$$

S-t graph



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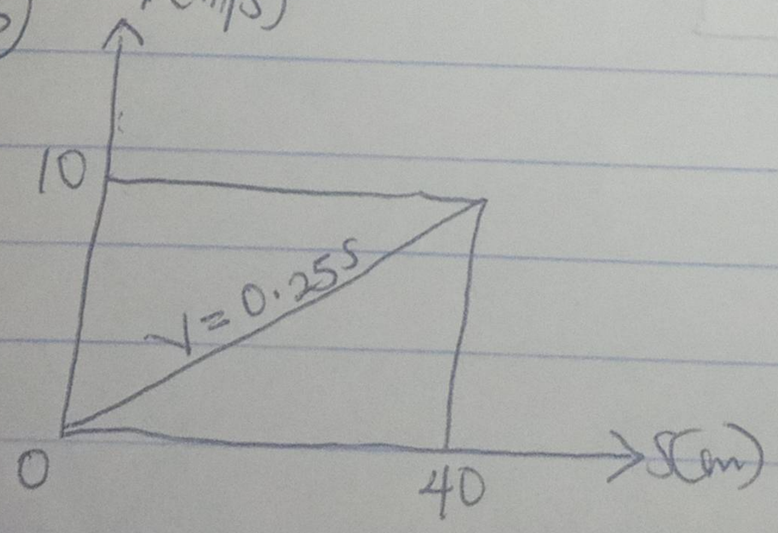


$a = (dV/ds)V$

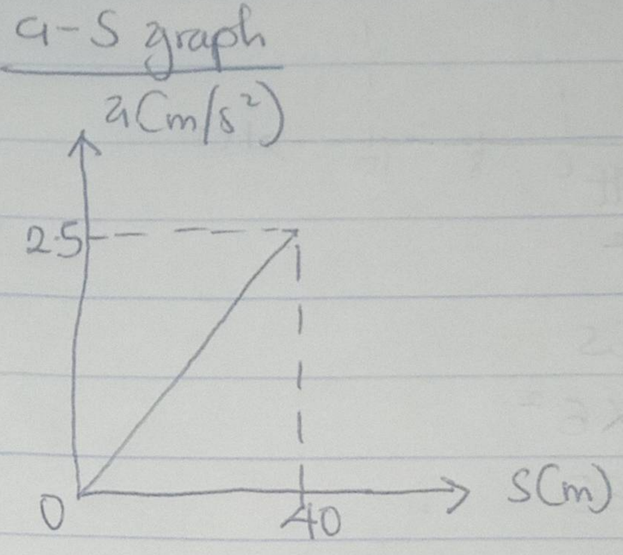
$V = 0.25S$

$a = 10 \times d(0.25S)/ds$

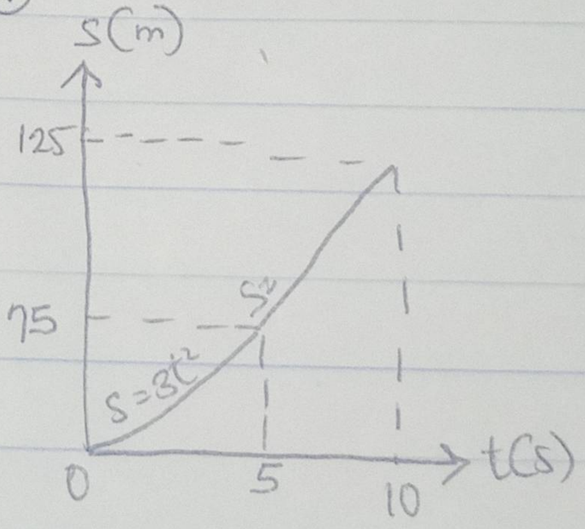
$a = 10 \times 0.25$

$a = 2.5\,m/s^2$

a-S graph



④



(i) $V = ds/dt$

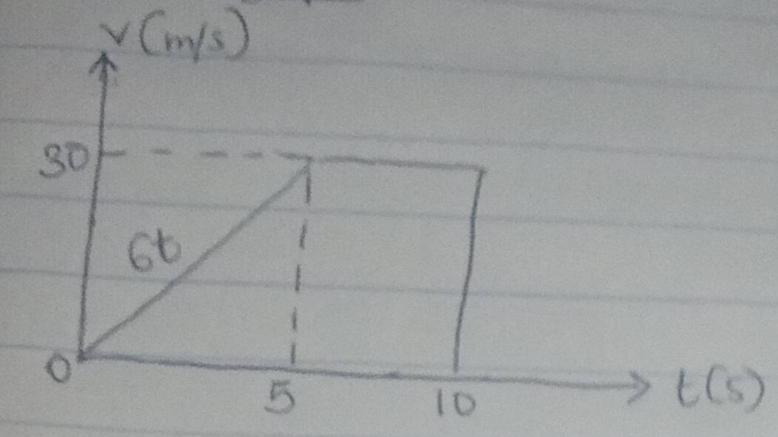
at $t = 5s$

$V = 6t = 6\times5 = 30\,m/s$

at $t = 10s$

$V = 30\,m/s$

V-t graph



(ii) $a = dv/dt$

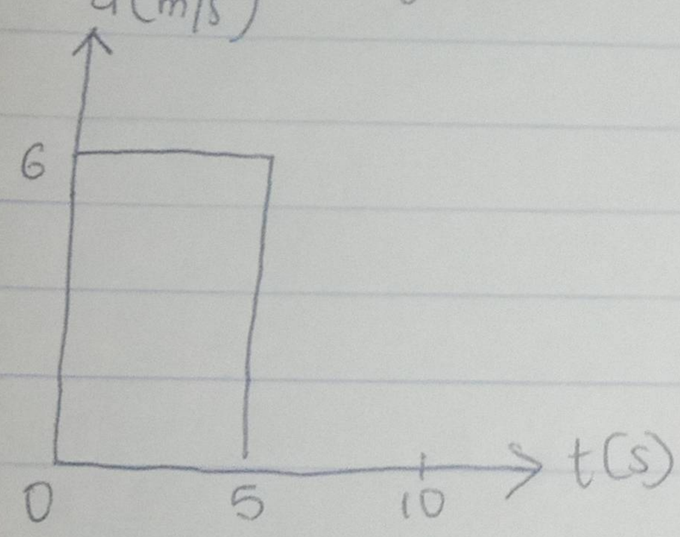
at $t = 5s$

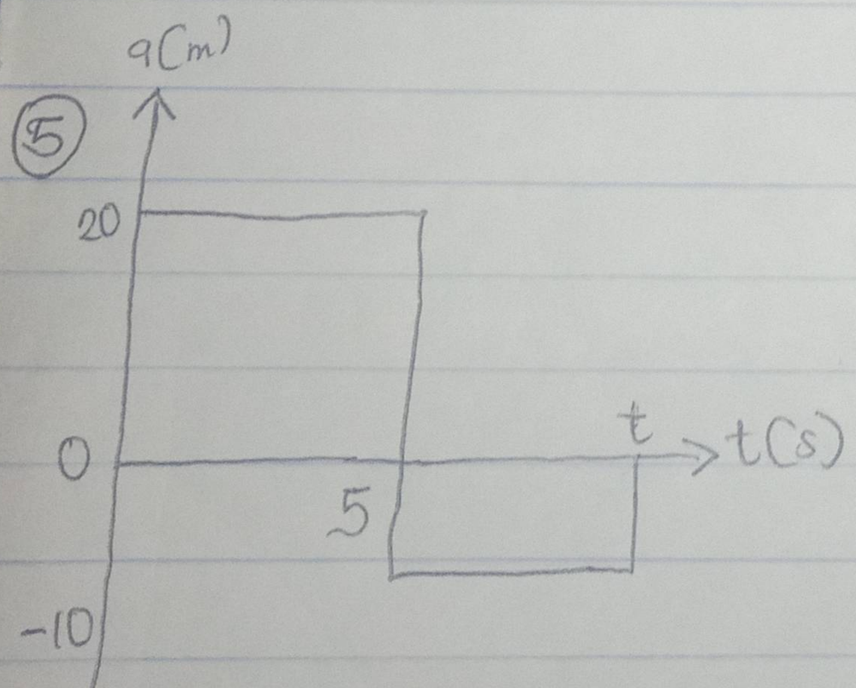
$a = 6m/s^2$

at $t = 10s$

$a = 0m/s$

a-t graph





(i) $V = \int a\,dt$

$V = \int 20\,dt$

$V = 20t$

at $t = 5s$

$V = 20 \times 5 = 100m/s$

$5s < t \leq t$

$\int_{100}^{V} dv = \int_{5}^{t'} -10\,dt$

$V - 100 = -10t\Big|_{5}^{t'}$

$V - 100 = -10t' + 10(5)$

$V - 100 = -10t' + 50$

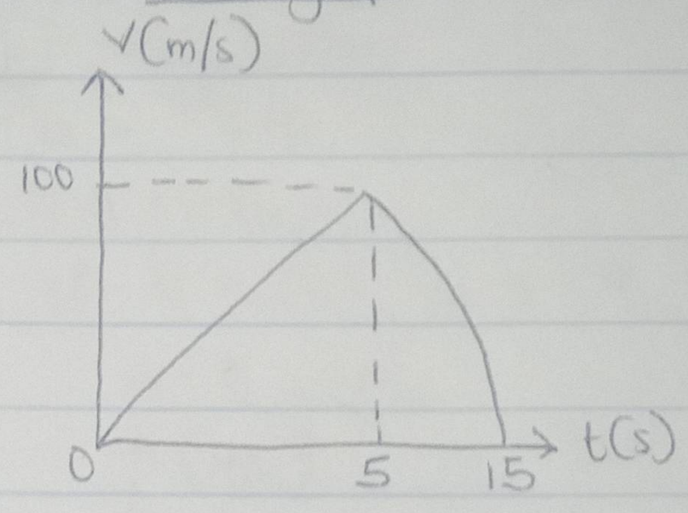
at $t', V = 0$

$0 - 100 = -10t + 50$

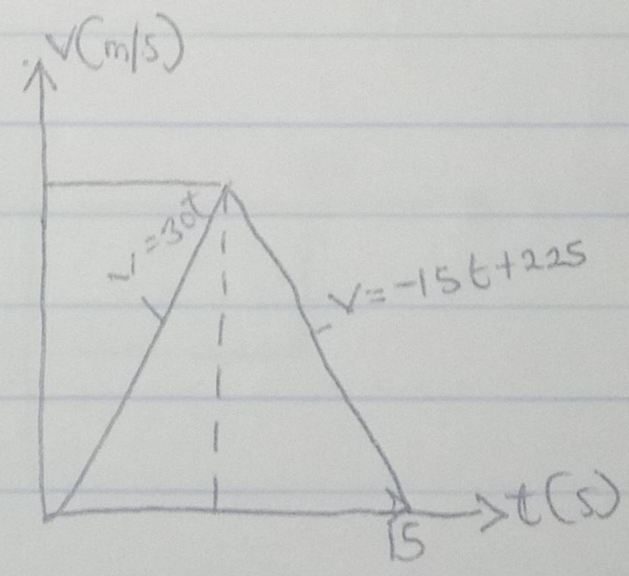
$10t' = 100$

$t' = 15s$

V-t graph



(6)



$0 \leq t \leq 5$

$V = 30t$

$\int_0^5 ds = \int_0^5 30t$

$s = 15t^2\Big|_0^5$

$S = 15(5)^2 - 15(0)^2$

$S = 15 \times 25$

$S = 375\,m$

$5s \leq t \leq 15s$

$V = -15t + 225$