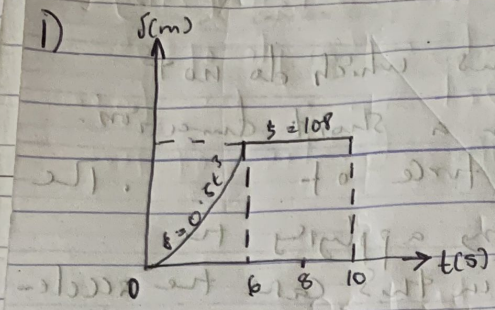
DLAMINKA BABATUNDE
18/ENG03/047
CIVIL ENGINEERING

1)




$v = ds/dt$

$v = 1.5t^2$

at $t = 6s$

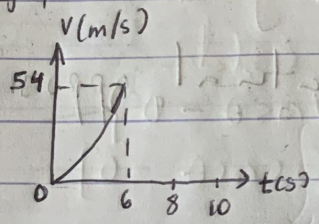
$v = 1.5 \times 6^2$

$= 54 m/s$

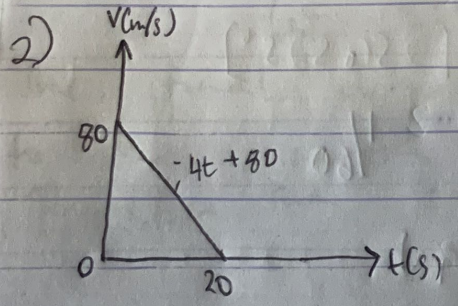
from $t = 6s - 10s$, $s = 108$

$\therefore v = 0$

V-t graph




2)




(i) $s = \int v\,dt$

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

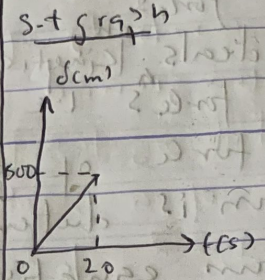
$= -2t^2 + 80t$

at $t = 20s$

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

$s = 1600 - 800 = 800 m$

s-t graph



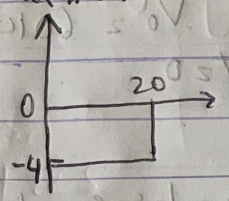

(ii) acceleration

$a = dv/dt$

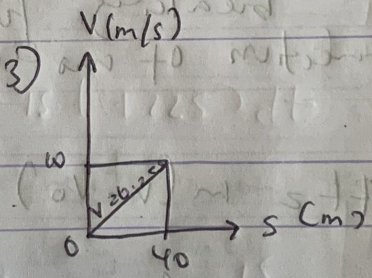
$\therefore a = -4 m/s^2$

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

a-t graph




3)




$a = (dv/ds)_v$

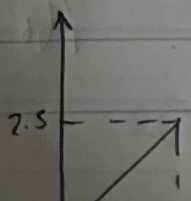
$v = 0.25s$

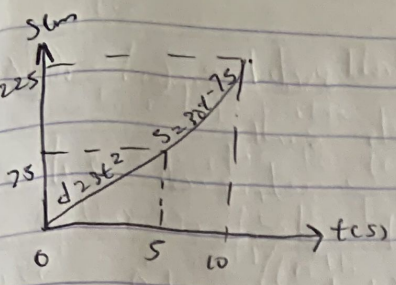
$a = 10 \times d(0.25s)/ds$

$a = 10 \times 0.25$

$a = 2.5 m/s^2$

a-s graph



4) 


(i) $v = ds/dt$

at $t = 5s$

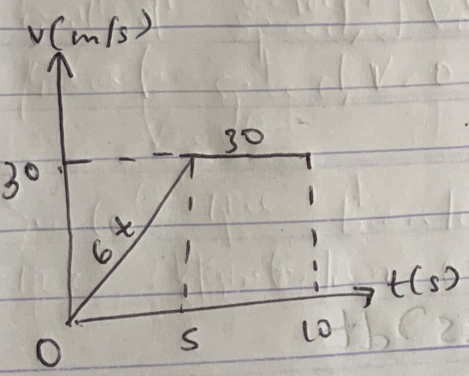
$v = 6t = 6 \times 5$

$= 30 m/s$

at $t = 10s$

$v = 30 m/s$

v-t graph



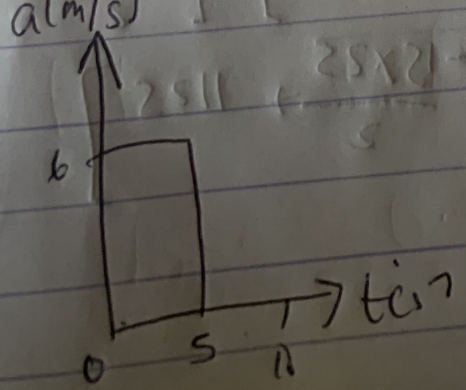

(ii) $a = dv/dt$

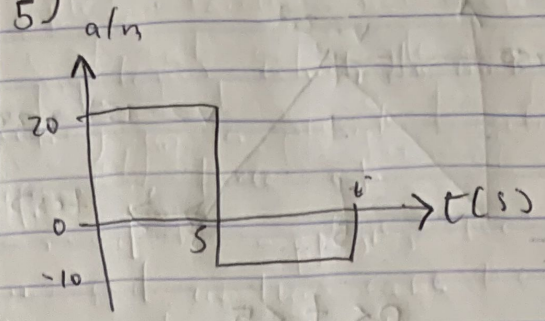
at $t = 5s$

$a = 6 m/s^2$

at $t = 10s$

$a = 0 m/s^2$




5) 


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

$v = \int 20\,dt$

$v = 20t$

at $t = 5s$

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

$5s < t \leq t$

$$\int_{100}^{v} dv = \int_{5}^{t} -10\,dt$$

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

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

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

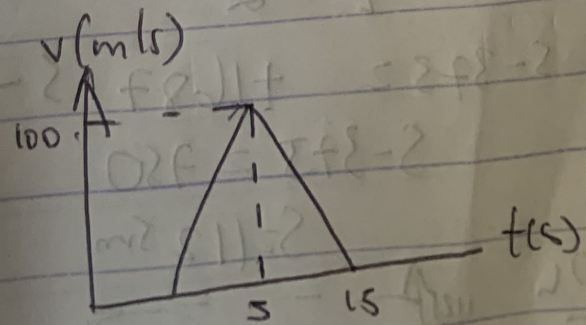
at $t'$, $v = 0$

$$0 - 100 = -10t + 50$$

$$10t' = 150$$

$$t' = 15s$$

v-t graph



D1

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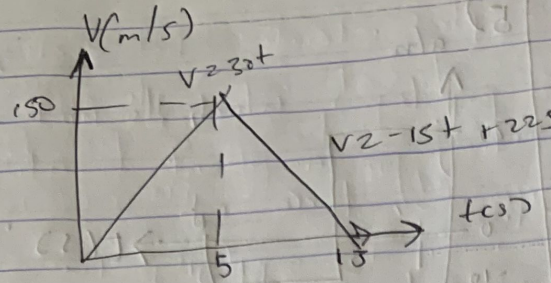
(6)




1)

$0 \leq t \leq 5s$

$V = 30t$

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

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

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

$s = 15 \times 25$

$s = 375m$

$5 \leq t \leq 15s$

$V = -15t + 225$

$\int_{375}^{s} ds = \int_5^{15} (-15t + 225)\,dt$

$s - 375 = \frac{-15t^2}{2} + 225t \Big|_5^{15}$

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

$s - 375 = \left[\frac{-15 \times 225}{2} + 3375\right] - \left[\frac{-15 \times 25}{2} + 1125\right]$

$s - 375 = +1687.5 - 937.5$

$s - 375 = 750$

$s = 1125m$

S-t graph