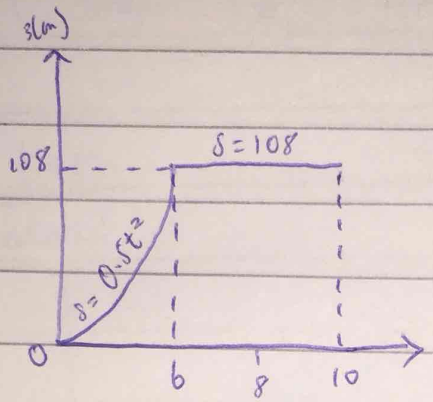
DAGOGO TAMUNOMIEBAKA STAMPSON
18/ENG05/013
MECHATRONICS ENGINEERING

1)



$v = ds/dt$

$v = 1.5t^2$

at $t = 6s$

$v = 1.5 \times 6^2$

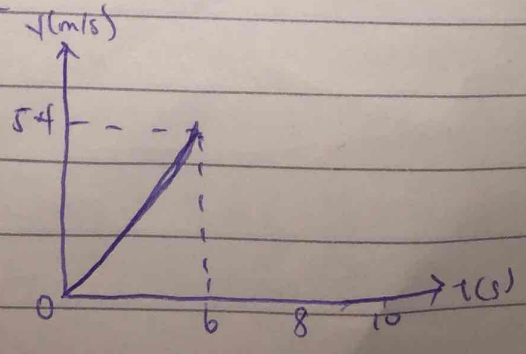
$= 1.5 \times 36$

$v = 54 m/s$

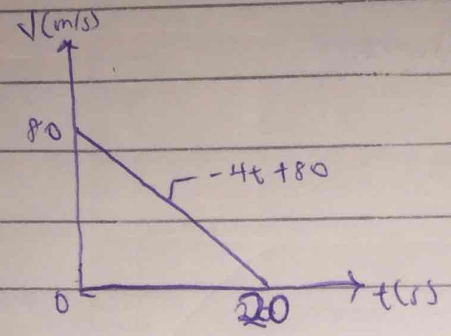
From $t = 6s - 10s$, $s = 108$

$\therefore v = 0$

v-t graph



2)



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

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

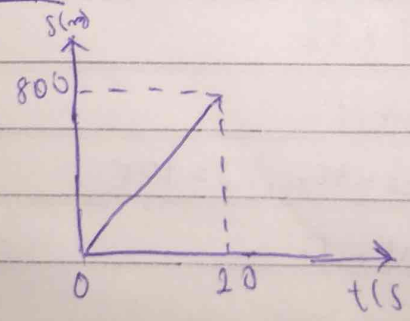
$s = -2t^2 + 80t$

at $t = 20s$

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

$s = 1600 - 800 = 800m$

s-t graph



ii) acc

a

a-

3)

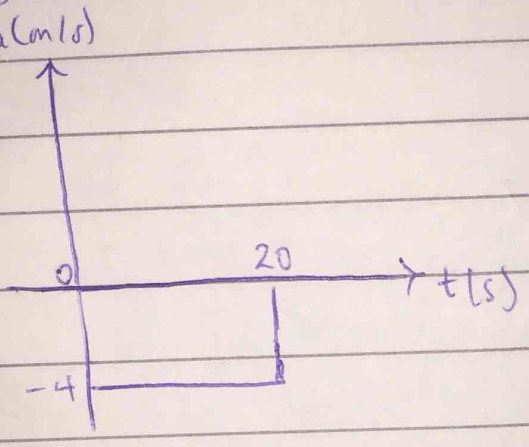
ii) acceleration

$a = dv/dt$

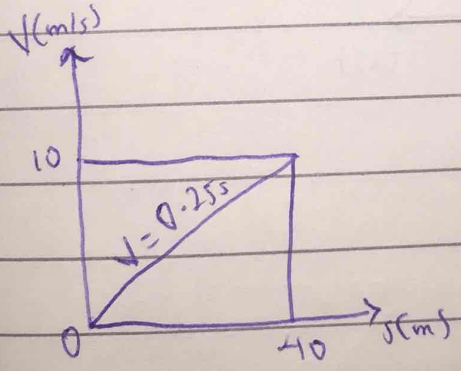
$\therefore a = -4 m/s^2$

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

a-t graph



3)



$a = (dv/ds)v$

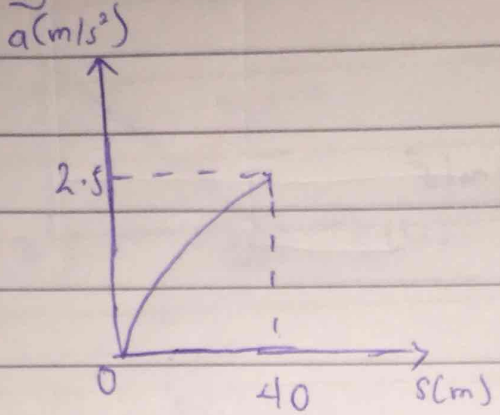
$v = 0.25s$

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

$a = 10 \times 0.25$

$a = 2.5 m/s^2$

a-s graph



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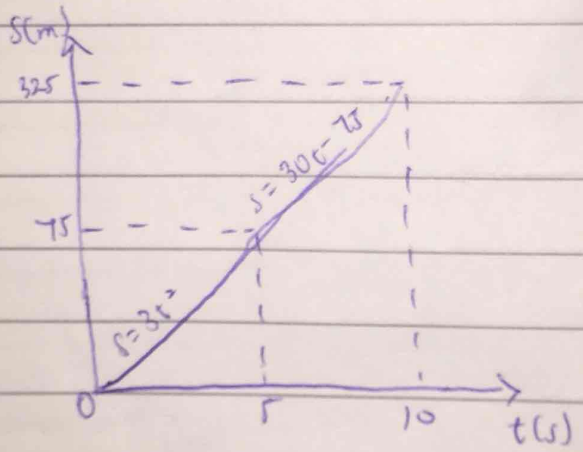


i) $v = ds/dt$

at $t = 5s$

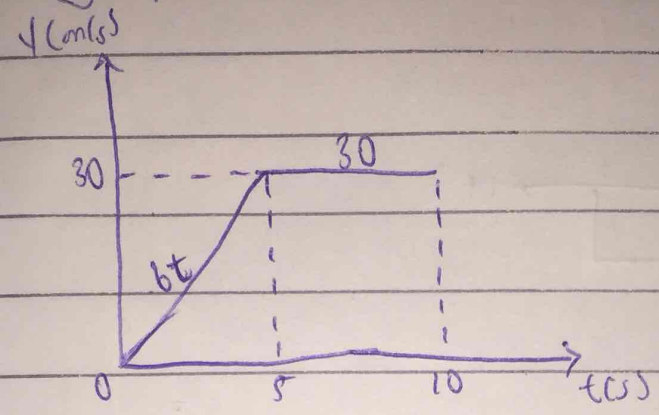
$v = 6t = 6 \times 5$

$= 30 m/s$

at $t = 10s$

$v = 30 m/s$

v-t graph



(a) $a = dv/dt$

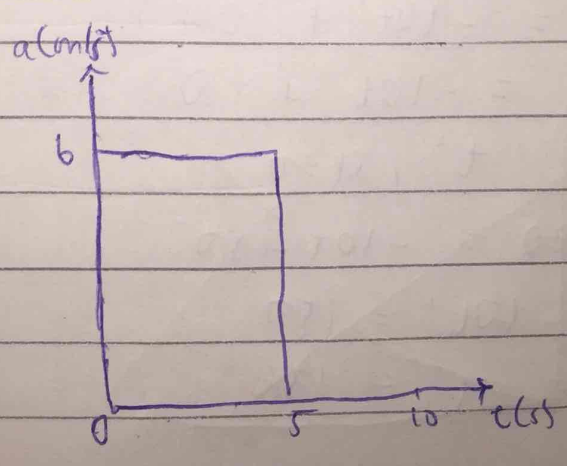
at $t = 5s$

$a = 6 m/s^2$

at $t = 10s$

$a = 0 m/s$

a-t graph



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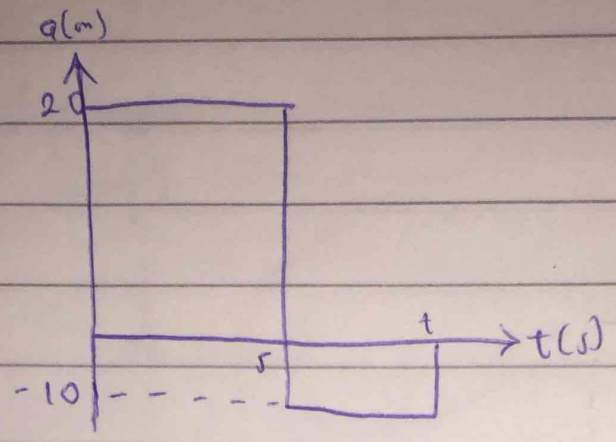


i) $V = \int a\,dt$

$V = \int 20\,dt$

$V = 20t$

at $t = 5s$

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

$5s < t \leq t'$

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

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

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

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

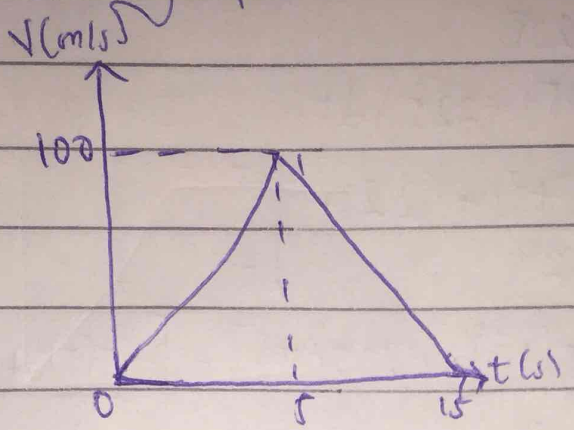
at t', $V = 0$

$0 - 100 = -10t + 50$

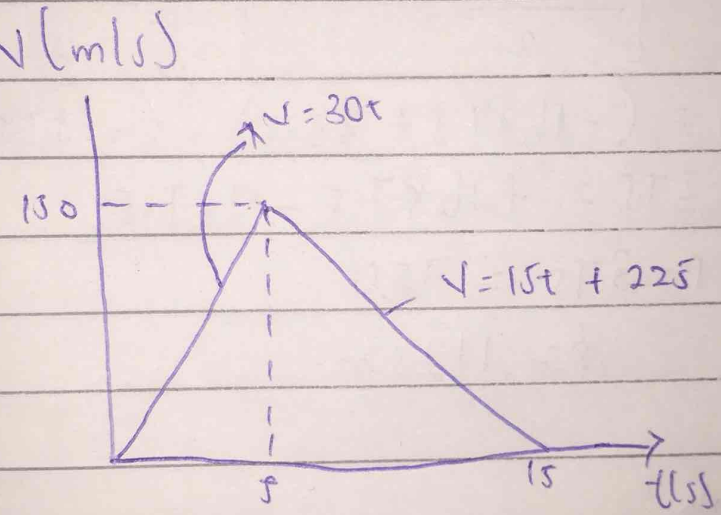
$-10t' = 150$

$t' = 15s$

V - t graph



6)



$0 \leq t \leq 5_s$

$v = 30t$

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

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

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

$s = 375 - 0$

$s = 375\ m$

$5s \leq t \leq 15s$

$v = -15t + 225$

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

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

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

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

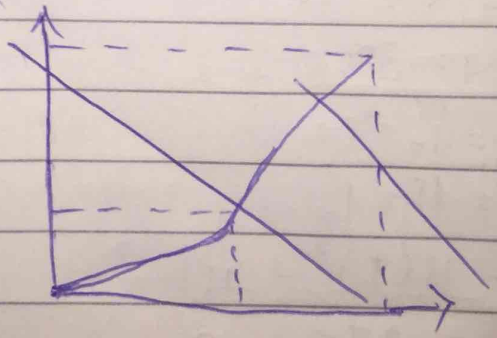
$s - 375 = (-1687.5 + 3375) - (-187.5 + 1125)$

$s - 375 = +1687.5 - 937.5$

$s - 375 = 750$

$s = 1125\,m$

s-t graph



s-t graph