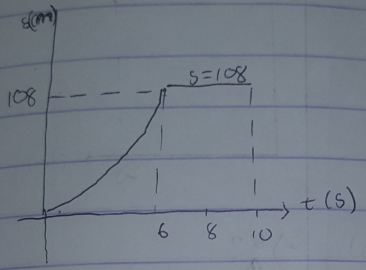
ISOLSAMIABI DATONYE
18/Eng06/029
Mechanical Engineering

1.



$V = \frac{ds}{dt}$

$V = 1.5t^2$

at $t = 6s$

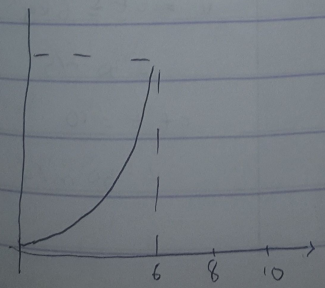
$V = 1.5 \times 6^2$

$V = 1.5 \times 36$

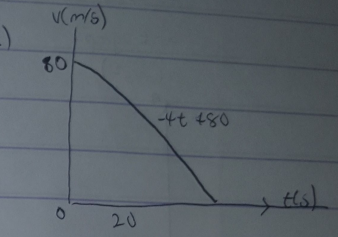
from $t = 6s - 10s$, $s = 108$

$\therefore V = 0$

V-t graph



2)



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

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

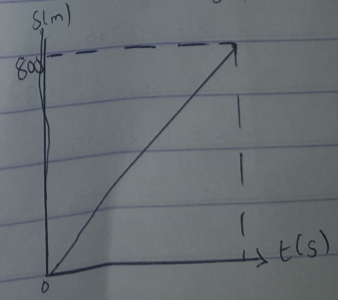
$s = -2t^2 + 80t$

at $t = 20s$

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

$s = 1600 - 800 = 800\,m$

s(m) s-t graph



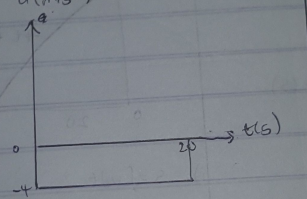
ii) acceleration

$a = \frac{dv}{dt}$

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

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

a-t graph



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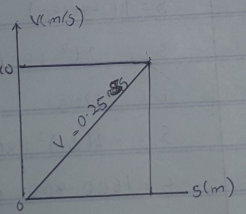


$a = \left(\frac{dv}{ds}\right) v$

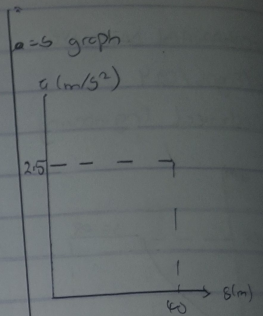
$v = 0.25s$

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

$a = 10 \times 0.25$

$a = 2.5 m/s^2$

a-s graph



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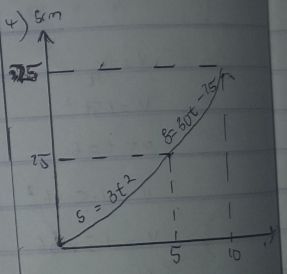


$v = ds/dt$

at $t = 5s$

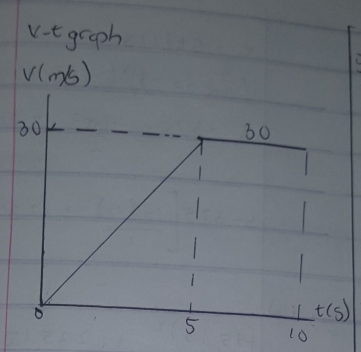
$v = 6t = 6 \times 5$

$= 30 m/s$

at $t = 10$

$v = 30 m/s$

v-t graph



ii) $a = dv/dt$

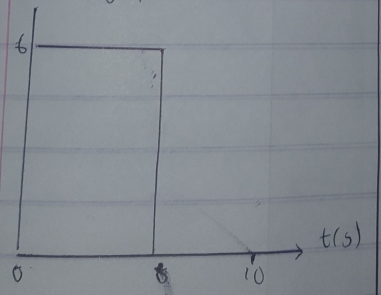
at $t = 5$

$a = 6 m/s^2$

at $t = 10s$

$a = 0 m/s^2$

a-t graph



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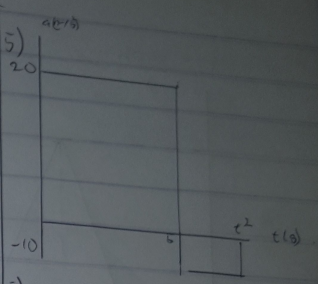


i) $v = \int a\,dt$

$v = \int 20\,dt$

$v = 20t$

at $t = 5s$

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

$5s < t \leq t$

$\int_v^v 100\,dv = \int_5^{t'} -10\,dt$

$v - 100_v = -10t|_5^{t'}$

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

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

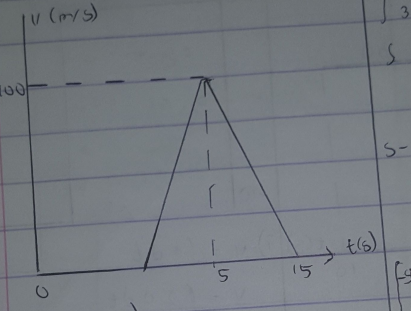
at t', $v = 0$

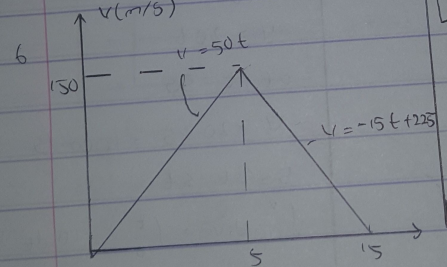
$0 - 100 = 10t + 50$

$10t' = 150$

$t' = 15_s$

v - t graph





$0 \le t \le 5$

$v = 30t$

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

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

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

$s = 15 \times 25$

$s = 375\,m$

$5 \le t \le 15$

$v = -15t + 225$

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

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

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

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

$s - 375 = +1687.5 - 937.5$

$s - 375 = 750$

$s = 1125\,m$