Agammegwa Daniel
19/ENG05/067
Mechatronics

1 $s = 0.5t^3 m$

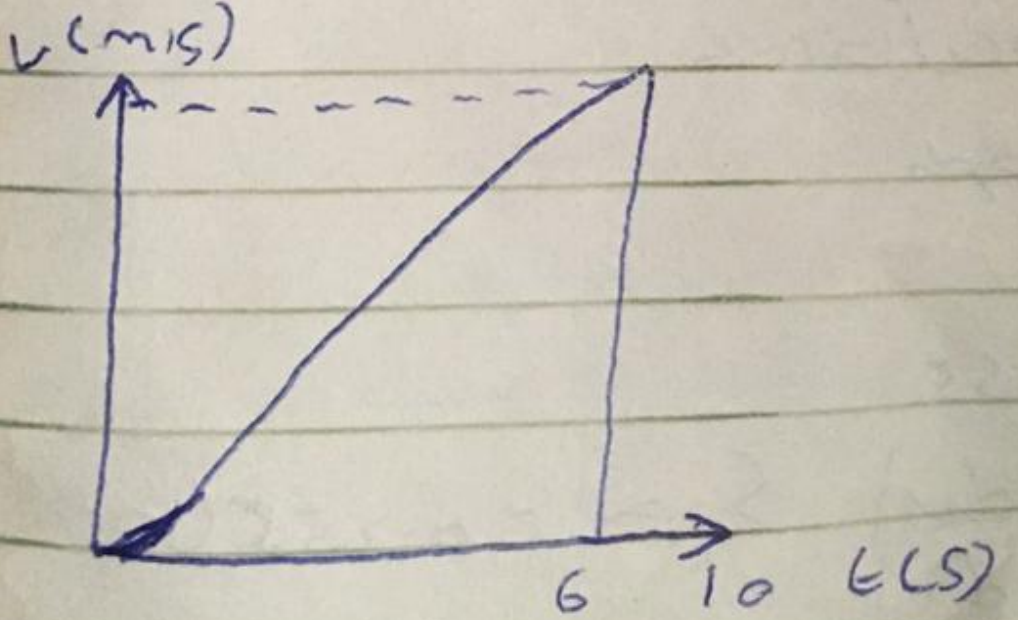
$v = \frac{ds}{dt} = 1.5t^2 m/s$

a) $t = 6$

velocity $= 1.5(6)^2 = 54 m/s$

$s_2 = 108$

$v = \frac{ds}{dt}$; $v = 0 m/s$



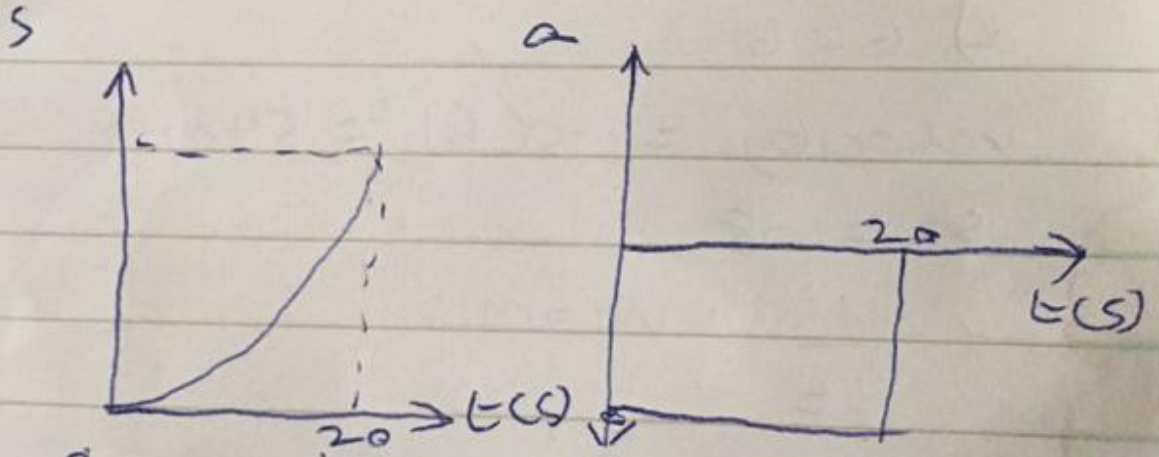
2 $v = -4t + 80$

$a = \frac{dv}{dt} = -4 m/s^2$; $t = 20$

$s = \int v\,dt \int_0^{20} (-2t^2 + 80t)$

$s = (-2(20)^2 + 80(20)) - (2(0)^2 + 80(0))$

$s = 800m$ or $0.8km$



Distance/time graph

3 $v = 0.25s$

$a = v\left(\frac{dv}{ds}\right)$ s $a = 0.25s(0.25)$

$a = (0.0625s)\ m/s$

$s = 40m$

$a = 0.0625(40) = 2.5 m/s^2$

3 $a = 20 m/s^2$ $a = -10 m/s^2$

$\int dv = \int a \cdot dt$

$\int_0^v dv = \int_0^t 20 \cdot dt$

$v = 20t$

$t = 5s$

$v = 100 m/s$

$\int_{100}^{v} dv = \int_5^t -10 \cdot dt$

$v - 100 = -10(t-5)$

$v - 100 = -10t + 50$

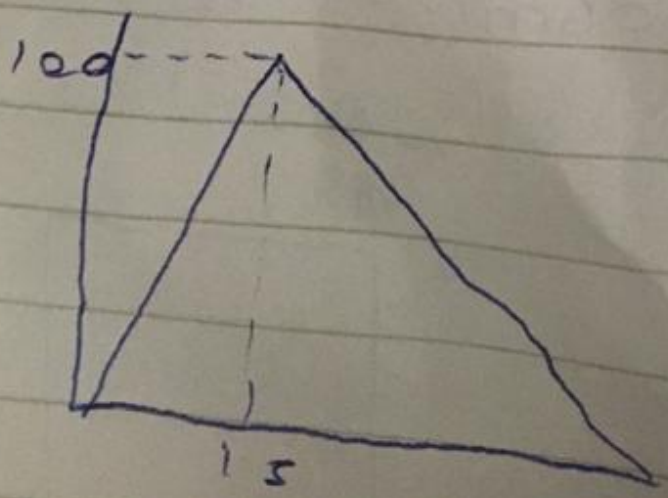
$v = (-10t + 150) m/s$

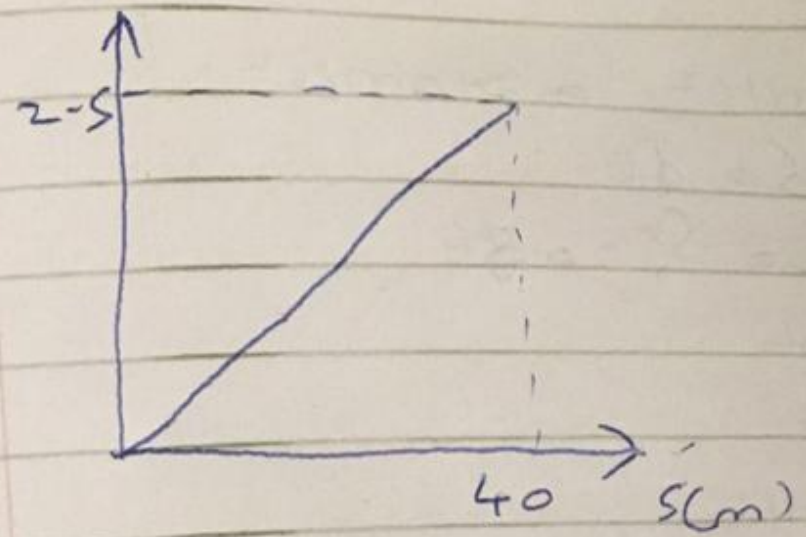
$v = 0$

$a = -10t + 150$

$-150 = -10t$

$t = 15 s$





4 $S = 3t^2$; $S = 30t - 75$

$v = \frac{dS}{dt}$; $6t$ $v = \frac{dS}{dt} = 30 m/s$

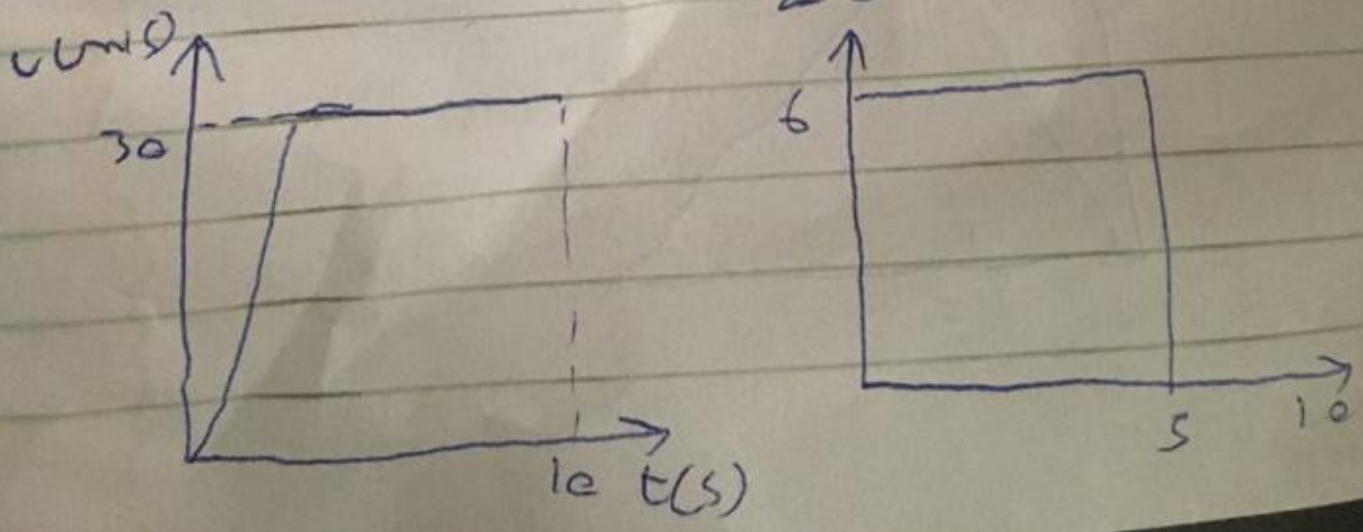
$v = 30 m/s$

~~$a = t$~~ $t = 5$

$v = 6(5) = 30 m/s$

$a = \frac{dv}{dt}$ $v = 6t$ $v = 30 m/s^2$

$a = 6 m/s^2$ $a = 0 m/s^2$



5 $v = 30t$

$s = \int v\,dt = (15t^2)$

$t = 5$

$= 15(5)^2$

$= 375m$

$v = -15t + 225$

$s = \int v\,dt = -7.5t^2 + 225t + A$

$t = t_2 - t_1 = 15 - 5$

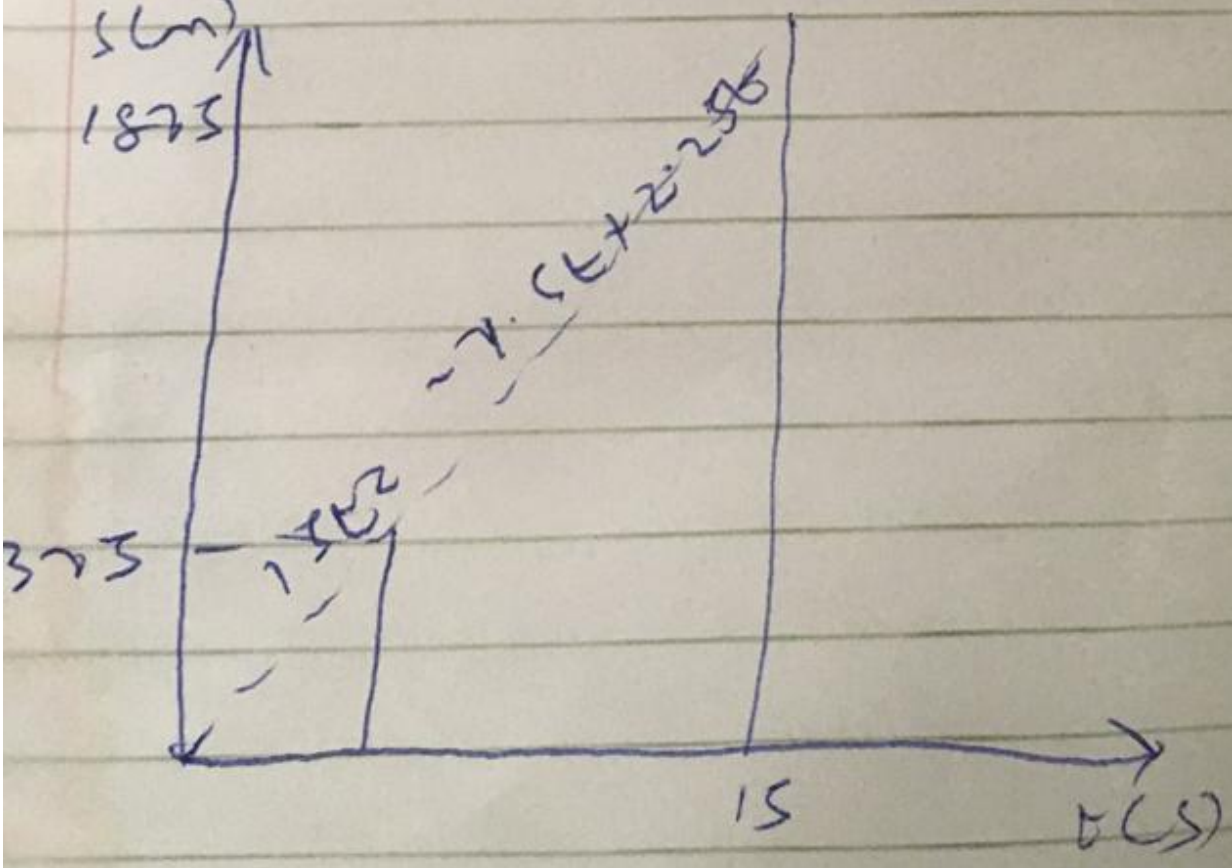
$t = 10$

$-7.5(10)^2 + (225)40)$

$= 1500m$

total distance

$= 375 + 1500 = 1875m$



s - t graph