OKORIE HANNA I.
CIVIL ENG.
181ENG03/046.
ENG. MECHANICS. (ENG. 234.)

1.) Given that:

$S = 0.5t^3$ m.

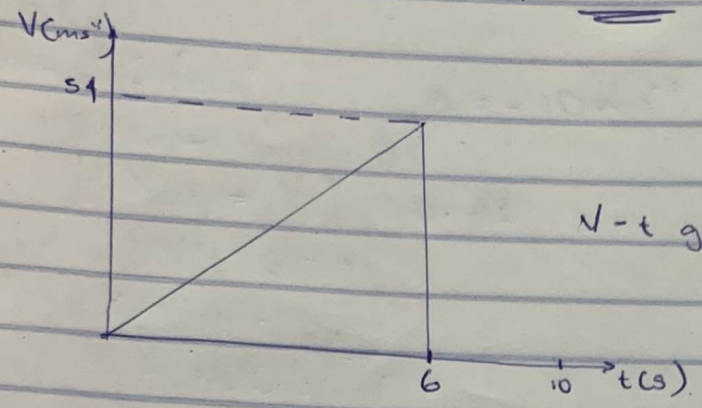
$V = ds/dt$, $V_1 = 1.5t^2$

S_0 at $t = 6$

$V = 1.5(6)^2 = 54\ ms^{-1}$

$S_2 = 108$m

$V = ds/dt = 0$, $V = 0\ ms^{-1}$



V-t graph.

2.) Given that.

$V = -4t + 80$

$S = \int V dt$

$S = \int_0^{20} -4t + 80\ dt$

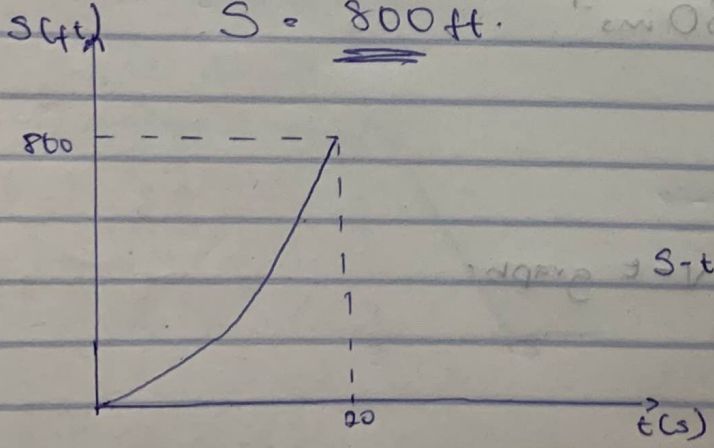
$S = [-2t^2 + 80t]_0^{20}$

$\therefore$ at $t = 20$

$S = [-2(20)^2 + 80(20)]$

$S = -800 + 1600$

$S = 800$ft.

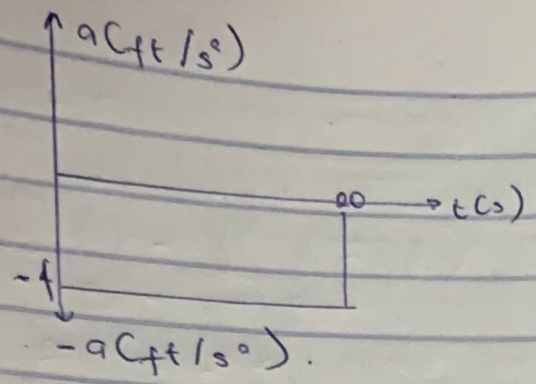


S-t graph

$V = (-4t + 80)$ ft/s

$a = dv/dt$

$a = -4$ ft/s²



a-t graph.

3) $V = (0.25s)\ ms^{-1}$

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

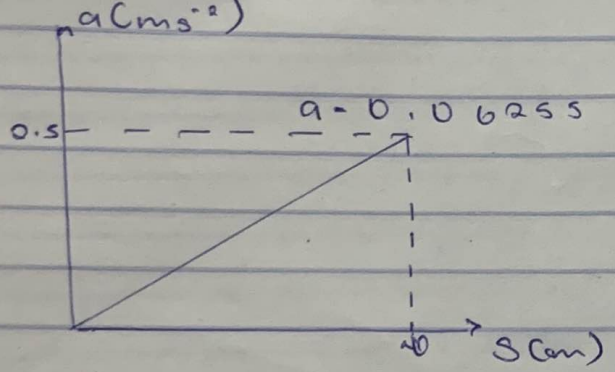
$a = 0.25s\ (0.25)$

$a = (0.0625s)\ ms^{-2}$

At $s = 40m$

$a = (0.0625 \times 40)$

$a = 0.5\ ms^{-2}$.



a-s graph.

4.) $s = 3t^2$

$v = 6t$

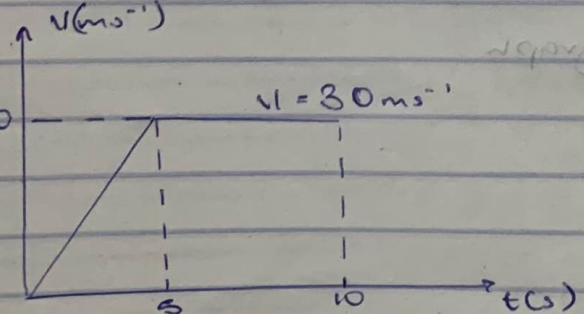
At $t = 5$

$v = 6 \times 5$

$v = 30\ ms^{-1}$

$s = 30t - 75$

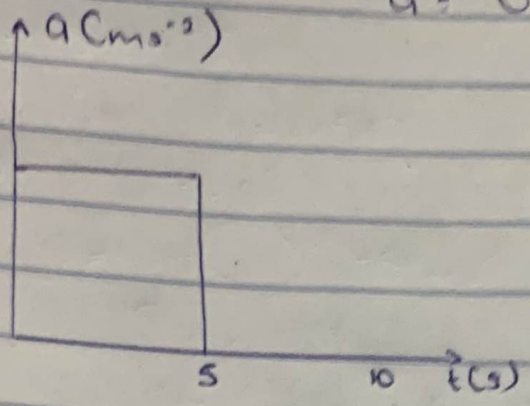
$v = 30\ ms^{-1}$



v-t graph.

$v = (6t)\ ms^{-1}$ $\quad v = 30\ ms^{-1}$

$a = 6\ ms^{-2}$ $\quad a = 0\ ms^{-2}$.



a-t graph.

5.) $a = 20\ ms^{-2}$ $\quad a = -10\ ms^{-2}$

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

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

$v = 20t$

At $t = 5$,

$v = 100\ ms^{-1}$

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

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

$v - 100 = -10t + 50$

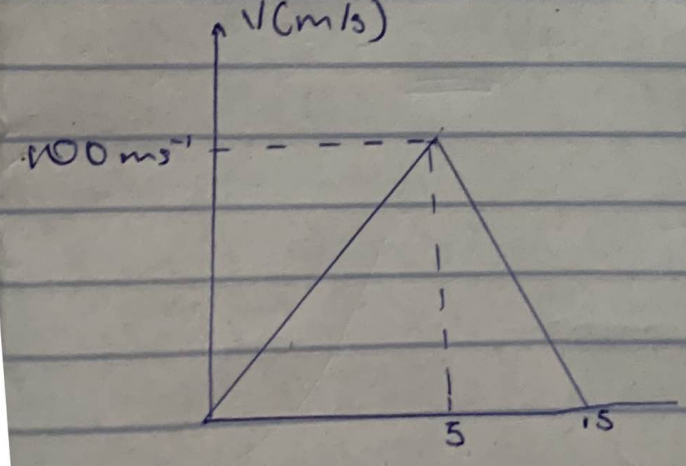
$v = (-10t + 150)\ ms^{-1}$

At $v = 0$

$0 = -10t + 150$

$-150 = -10t$

$t = 15$ sec. (time for the car to come rest).



v-t graph.

6.) $v = 30t$

$\int ds = \int v\,dt$

$\int_0^5 ds = \int_0^t (30t)\,dt$

$s = 15t^2$

At $t = 5_s$

$s = 15(5)^2$

$S = 375\ mm.$