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18/ENG08/023
CIVIL ENGINEERING.

1 $S = 0.5t^3 m$

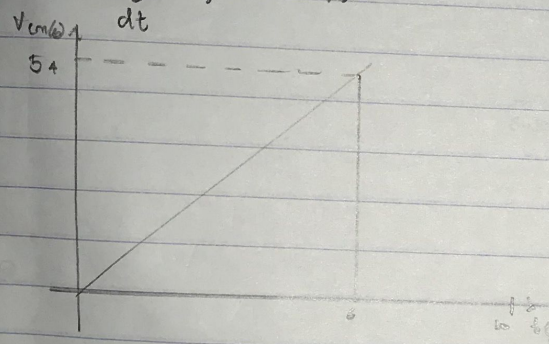
$V = \frac{ds}{dt} = 1.5t^2 m/s$

a $t = 6$

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

$\int_2 = 108$

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



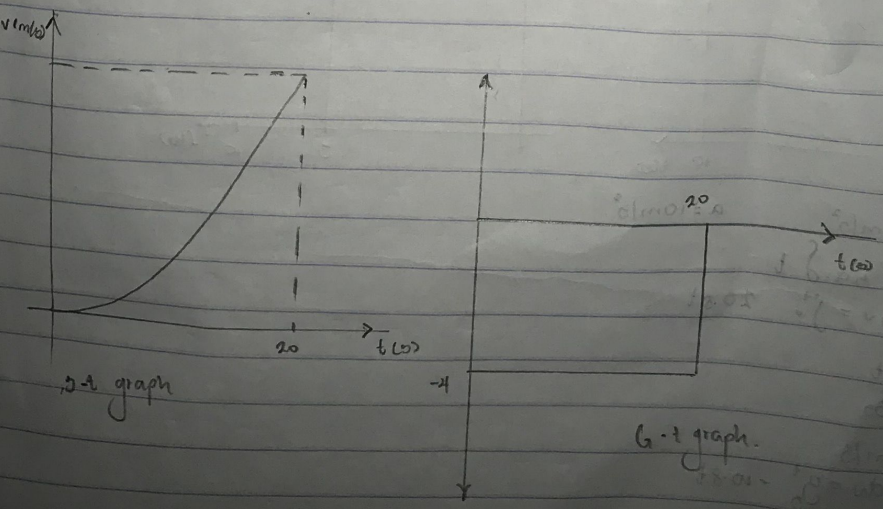
2. $V = -4t + 80$

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

$S = \int v dt$; $\int (-2t^2 + 80t)$

$\int = (-2(20)^2 + 80(20)) - (-2(0)^2 + 80(0))$

$\int = 800 m.$



3. $V = 0.25s$

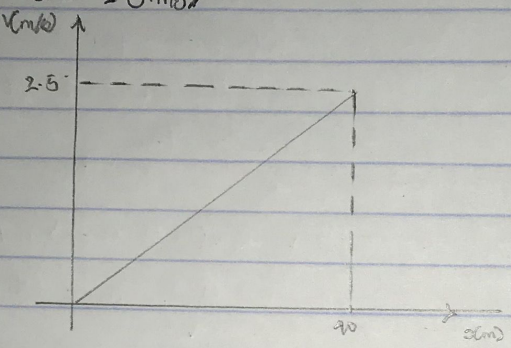
$a = v\left(\frac{dv}{ds}\right)$ ∫ $a = 0.250(0.25)$

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

@ $s = 40m$

$a = 0.0625(40)$

$a = 2.5 m/s^2$



4 $s = 3t^2$; $s = 30t - 7t$

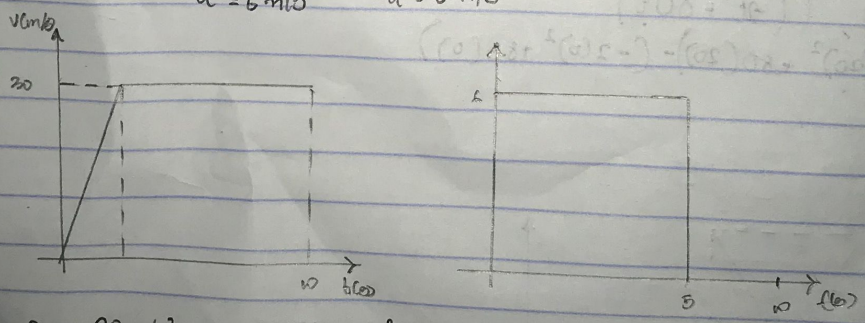
$v = \frac{ds}{dt}$; $6t$ $v = \frac{ds}{dt} = 30m/s$

∴ @ $t = 5$ $V_2 = 30m/s$

$V_1 = 6(5) = 30m/s$

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

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



5 $a = 20m/s^2$ $a = 10m/s^2$

$\int du = \int a \cdot \int t$

$\int_0^v dv = \int_0^t 20.8t$

$v = 20t$

@ $t = 5s$

$v = 100m/s$

$\int_{100}^{v} dv = \int_0^t -10.8t$

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

$v - 100 = -10t + 50$

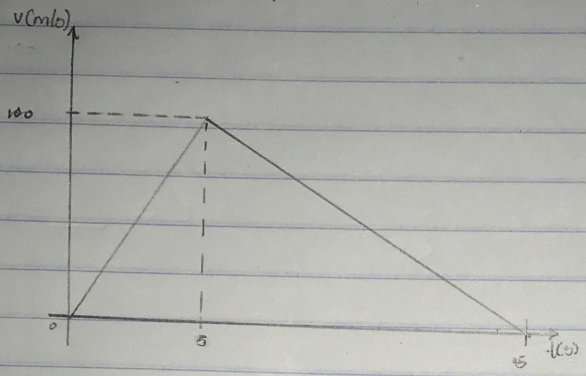
$v = (-10t + 150)$ m/s

@ $v = 0$

$0 = -10t + 150$

$-150 = -10t$

$t = 15$ s [~~for car 1~~ for car to come to rest]



6 $v = 30t$

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

@ $t = 5$

$= 15(5)^2$

$= 375$ m

$v = -15t + 225$

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

@ $t = t_2 - t_1 = 15 - 5 = 10$

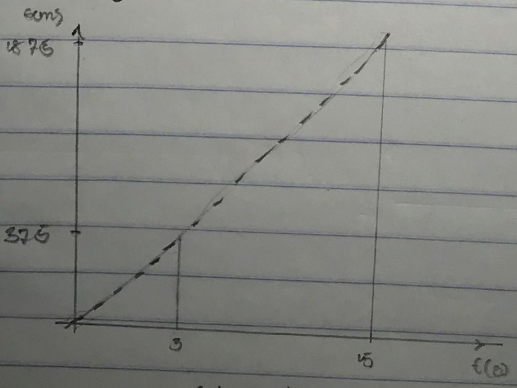
@ $t = 10$

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

$= 1500$ m

∴ total distance travelled

$= 375 + 1500 = 1875$ m



s-t graph.