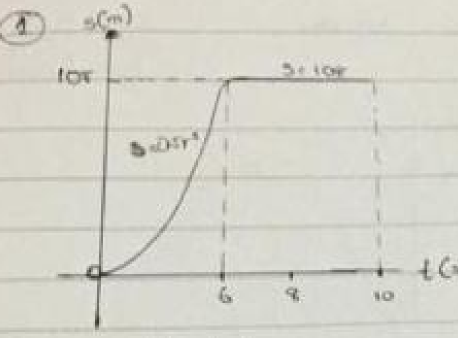
PRECIOUS [illegible]

18/ENG03/[illegible]

Civil Engineering

Mechanics Assignment

(1)



$v = ds/dt$

$v = 1.5t^2$

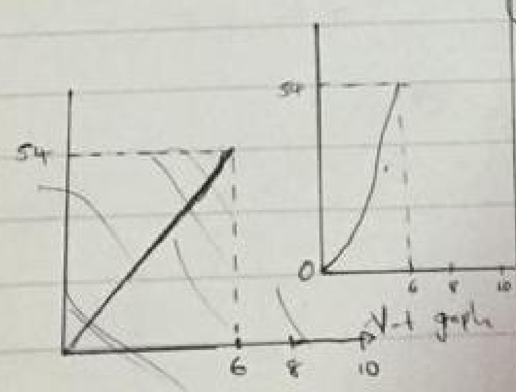
When $t = 6(s)$

$v = 1.5 \times 6^2$

$= 54 m/s$

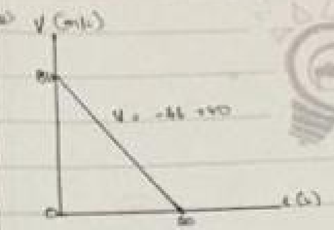
from $t = 6 - 10$; $s = 108$

$\therefore v = 0 m/s$



V-t graph

(2)



(i) $s = \int v dt$

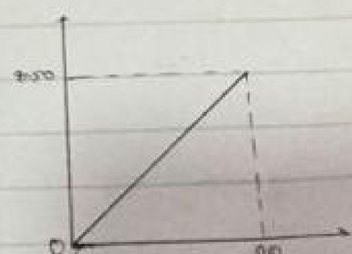
$s = \int (-4t + 80)$

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

When $t = 20s$

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

$s = 1600 - 800 = 800m$



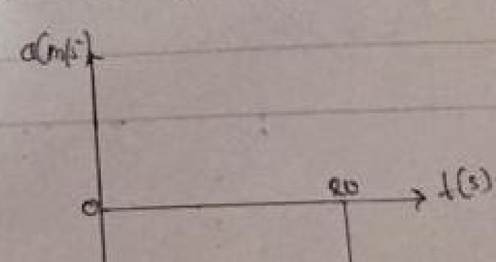
s-t graph

(ii) Acceleration

$a = dv/dt$

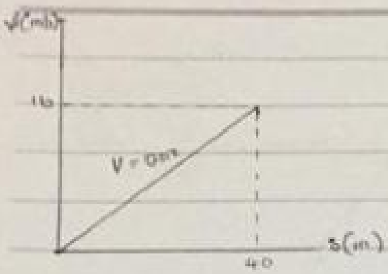
$\therefore a = -4 m/s^2$

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



a-t graph

3)



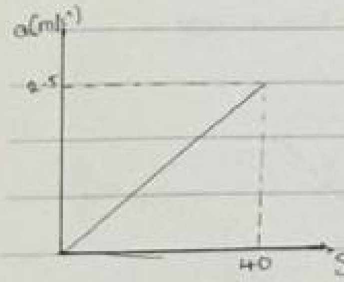
$a = \left(\frac{dv}{ds}\right)v$

$v = 0.25$

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

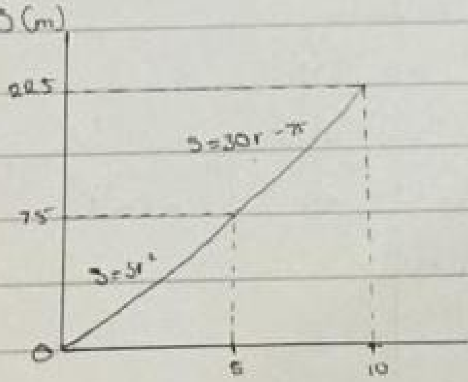
$a = 10 \times 0.25$

$a = 2.5 \, m/s^2$



a - s graph

4)



$s = 5t^2$

(i) $v = ds/dt$

when t = 5,

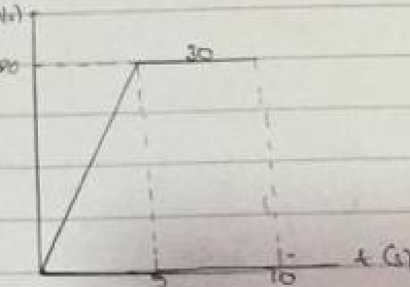
$v = 6t$

$= 6 \times 5 = 30 \, m/s$

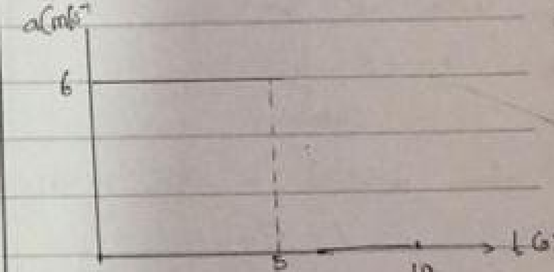
when

$s = 30t - 75$

$v = \frac{ds}{dt} = 30 \, m/s$

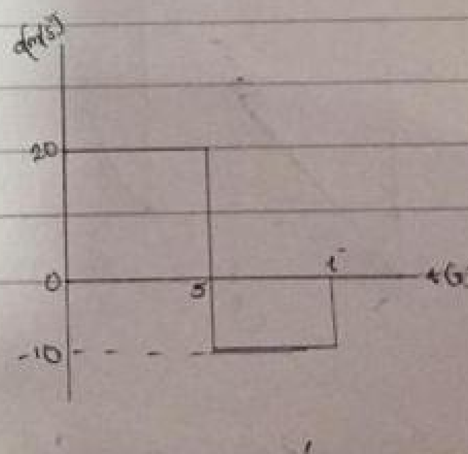


v - t graph



a-t graph

5)



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

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

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

$v = 20t$

at $t = 5s$

$v = 100 m/s$

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

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

$v - 100 = -10t + 50$

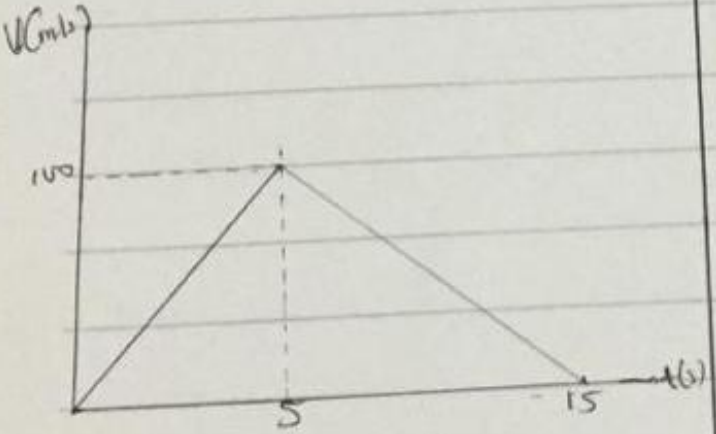
$v = (-10t + 150) m/s$

at $v = 0$

$0 = -10t + 150$

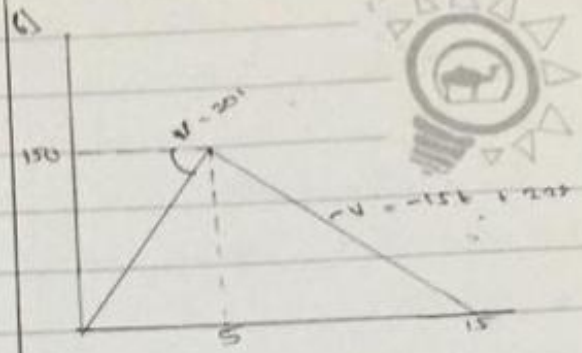
$-150 = 10t$

$t = 15s$



v-t graph

(i)



$v = 30t$

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

at $t = 5$

$= 15(5)^2 = 375 m$

$v = -15t + 225$

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

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

at $t = 10$:

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

$= 1500 m$

∴ total distance travelled

$= 375 + 1500$

$= 1875 m$