Saka-Shonayon Olanrewaju | Computer Engineering
18/ENG02/086

1.)

$v = ds/dt$

$v = 1.5t^2$

at $t = 6s$

$v = 1.5 \times 6^2$

$= 1.5 \times 36$

$v = 54 m/s$

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

$\therefore v = 0$

V-t graph

2.)

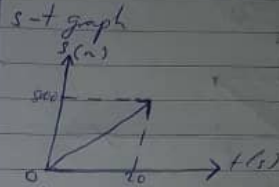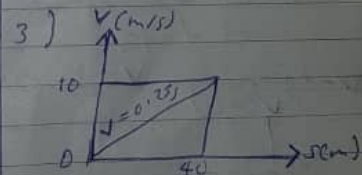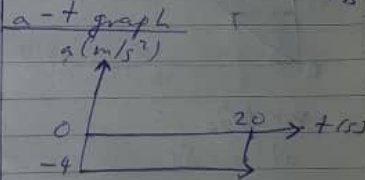
(i) $s = \int v \, dt$

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

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

at $t = 20s$

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

$s = 1600 - 800$

$\quad = 800m$

s-t graph

ii.) acceleration $a = dv/dt$

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

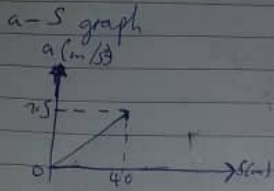at $t = 20s, \quad a = \frac{-4}{m/s}$

a-t graph

3)

$a = \left(dv/ds\right)v$

$v = 0.25s$

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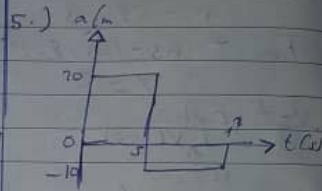
$a = 10 \times 0.25$

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

a—S graph

ii) $a = dv/dt$

at $t = 5s$

$a = 6 \, m/s^2$ ↑

at $t = 10s$

$a = 0 \, m/s^2$

a—t graph

4) S(m)
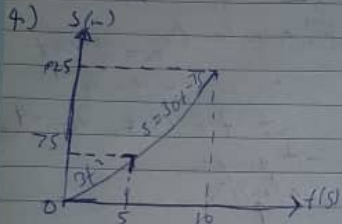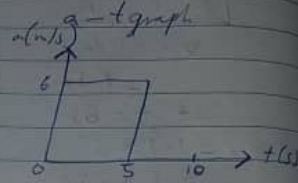
i) $v = ds/dt$

at $t = 5s$

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

at $t = 10s$

$v = 30 \, m/s$

v—t graph

5) a(m
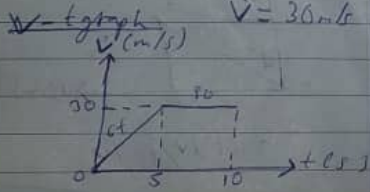
i) $v = \int a \, dt$

$v = \int 20 \, dt$

$v = 20t$

at $t = 5s$

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

$5s < t \le t'$

$\int_{100}^{v} dv = \int_{5}^{t'} -10 \, dt$
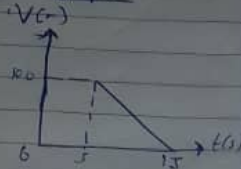
$v - 100 = -[10t]_{5}^{t'}$

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

at t', $v = 0$

$0 - 100 = -10t + 50$

$10t = 150$

$t' = 15s$

<u>V - t graph</u>

$V(m)$

$S - 375 = \left[-\dfrac{15(15^2)}{2} + 225(15) \right] - \left[\dfrac{-15(5)^2}{2} + 225(5) \right]$
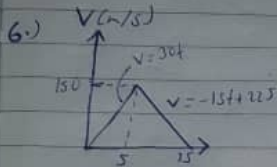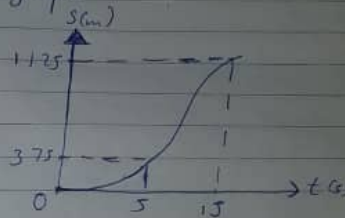
$S - 375 = (-1687.5 + 3375) - (-187.5 + 1125)$

$S - 375 = +1687.5 - 937.5$

$S - 375 = 750$

$S = 1125m$

<u>S-t graph</u>

$S(m)$

6.) $V(m/s)$

$v = 30t$

$v = -15t + 225$

$0 \leq t \leq 5s$

$v = 30t$

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

$S = 15t^2 \big|_0^5$

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

$S = 15 \times 25$

$S = 375m$

$5s \leq t \leq 15s$

$v = -15t + 225$

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

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