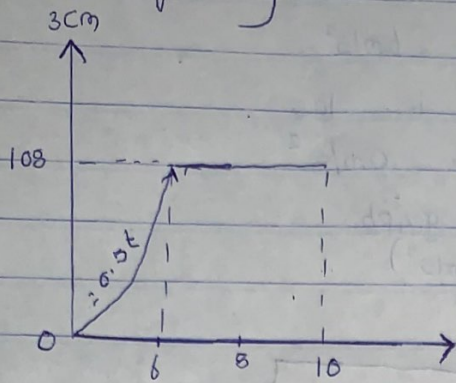


Isioma Onochie - Onyebeny Brian

18/ENG08/01b

Biomedical Engineering

1)



$$v = ds/dt$$

$$v = 1.5t^2$$

$$\text{at } t = 6s$$

$$v = 1.5 \times 6^2$$

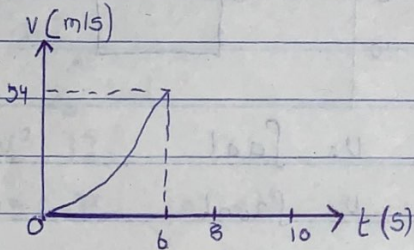
$$= 1.5 \times 36$$

$$v = 54 \text{ m/s}$$

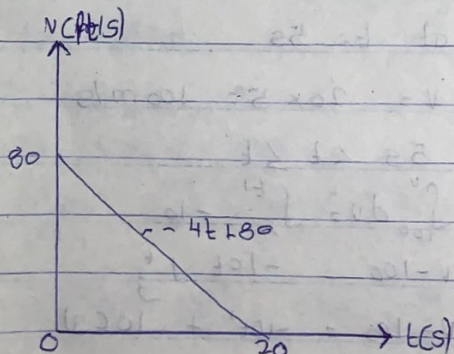
$$\text{From } t = 6s \text{ to } 10s, s = 108$$

$$\therefore v = 0$$

v-t graph



2)



$$s = \int v dt$$

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

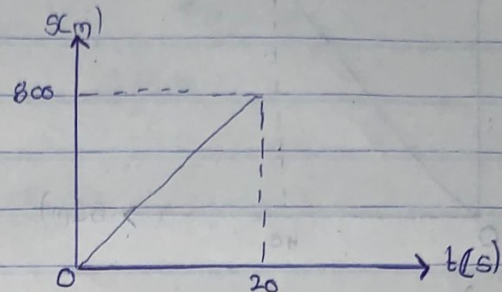
$$s = -2t^2 + 80t$$

$$\text{at } t = 20s$$

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

$$s = 1600 - 800 = 800 \text{ m}$$

s-t graph



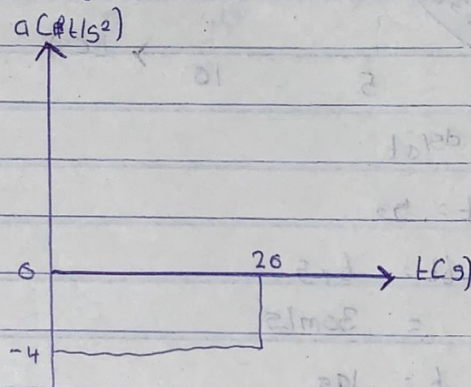
ii) acceleration

$$a = dv/dt$$

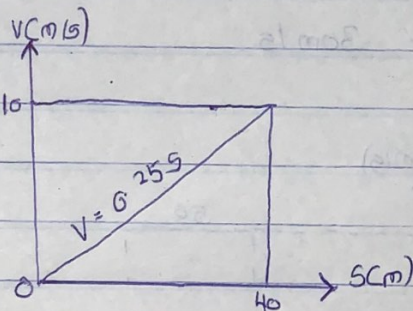
$$\therefore a = -4 \text{ m/s}^2 = -4 \text{ ft/s}^2$$

$$\text{at } t = 20s, a = -4 \text{ m/s}^2 = -4 \text{ ft/s}^2$$

a-t graph



3)



$$a = (dv/ds)v$$

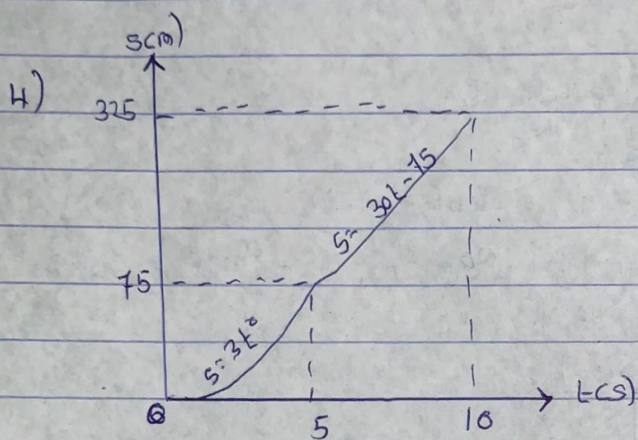
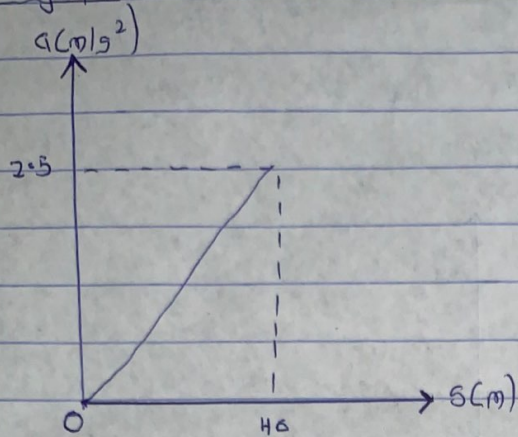
$$v = 0.25s$$

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

$$a = 10 \times 0.25$$

$$a = 2.5 \text{ m/s}^2$$

a-s graph



i) $v = ds/dt$

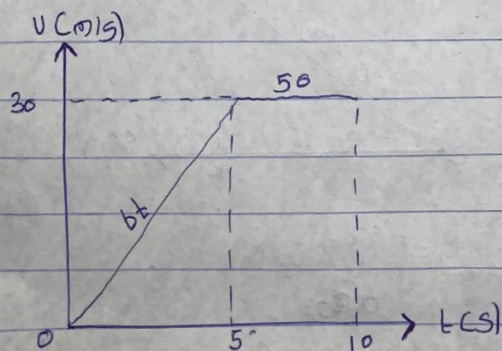
at $t = 5s$

$$v = bt = 6 \times 5 = 30 \text{ m/s}$$

at $t = 10s$

$$v = 30 \text{ m/s}$$

v-t graph



ii) $a = dv/dt$

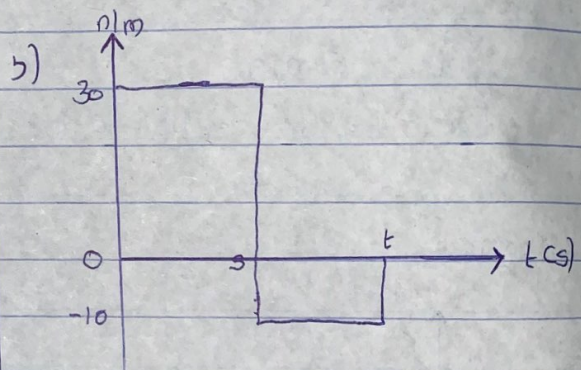
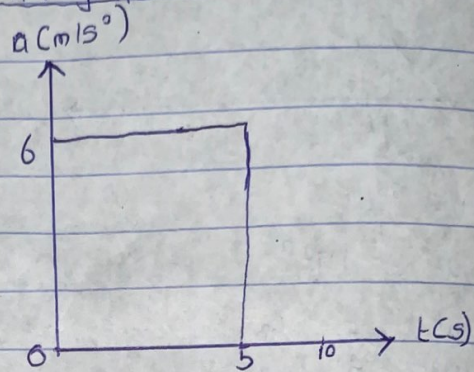
at $t = 5$

$$a = 6 \text{ m/s}^2$$

at $t = 10s$

$$a = 0 \text{ m/s}^2$$

at a-t graph



i) $v = \int a dt$

$$v = \int 20a dt$$

$$v = 20t$$

at $t = 5s$

$$v = 20 \times 5 = 100 \text{ m/s}$$

$$5s < t < t'$$

$$\int_{100}^v dv = \int_5^{t'} -10 dt$$

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

$$v - 100 = -10t' + 10(5)$$

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

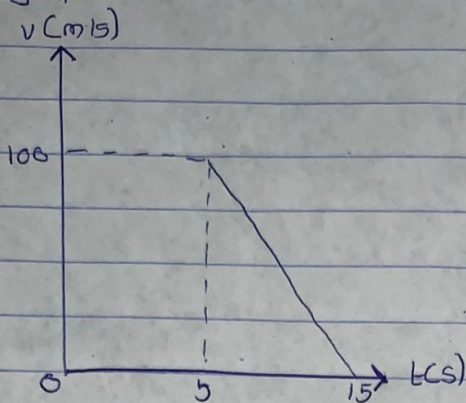
at $t', v = 0$

$$0 - 100 = -10t' + 50$$

$$10t' = 150$$

$$t = 15s$$

v-t graph



$$s = 375 = \left[\frac{-15 \times 225}{2} + 3375 \right] - \left[\frac{15 \times 25}{2} + 1125 \right]$$

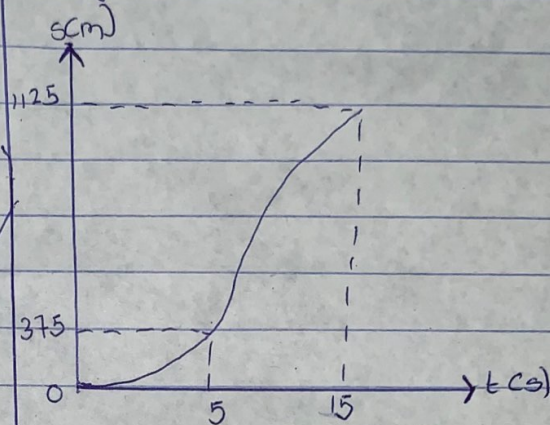
$$s = 375 = (-1687.5 + 3375) - (-187.5 + 1125)$$

$$\Rightarrow s = 375 = +1687.5 - 937.5$$

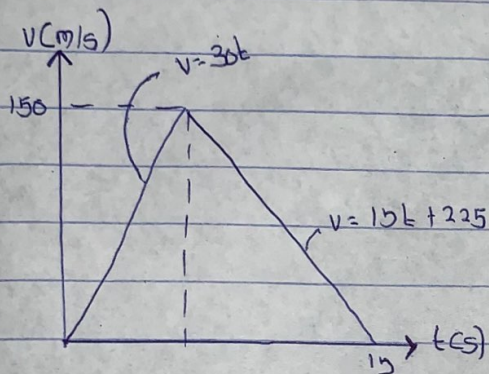
$$s = 375 = 750$$

$$s = 1125m$$

s-t graph



b)



$$0 \leq t \leq 5,$$

$$v = 30t$$

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

$$s = 15t^2 \Big|_0^5$$

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

$$s = 15 \times 25$$

$$s = 375m$$

$$5 \leq t \leq 15s$$

$$v = -15t + 225$$

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

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

$$s - 375 = \left[\frac{-15(15^2)}{2} + 225(15) \right] - \left[\frac{-15(5)^2}{2} + 225(5) \right]$$