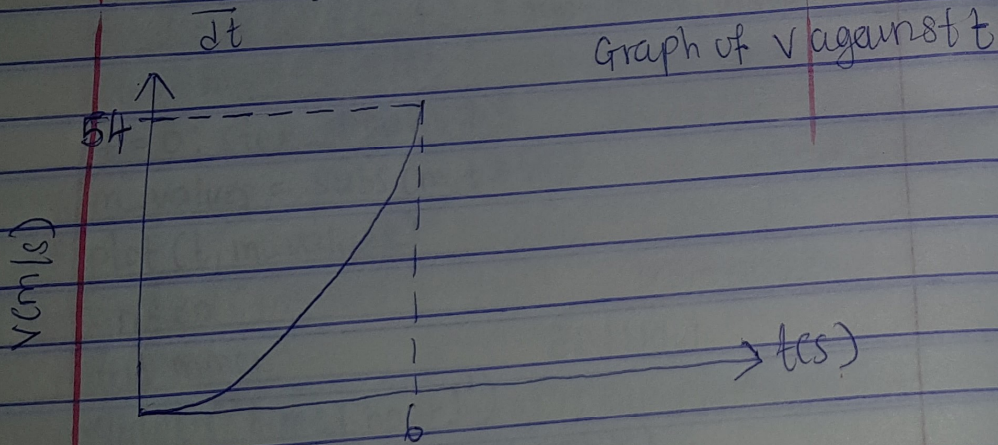


F12-9 Given that
 $s = 0.5t^3 \text{ m}$
 $v = \frac{ds}{dt}, v_1 = 1.5t^2$

at $t = 6$
 $v = 1.5(6)^2 = 54 \text{ m/s}$

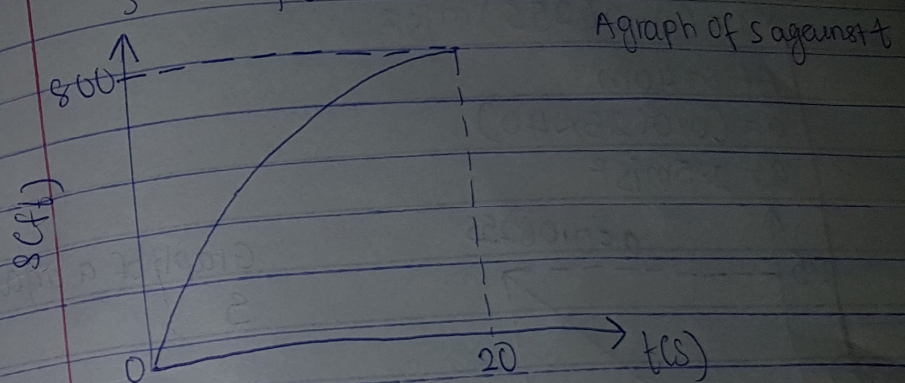
$s_2 = 108 \text{ m}$

$v = \frac{ds}{dt} = 0, v = 0 \text{ m/s}$



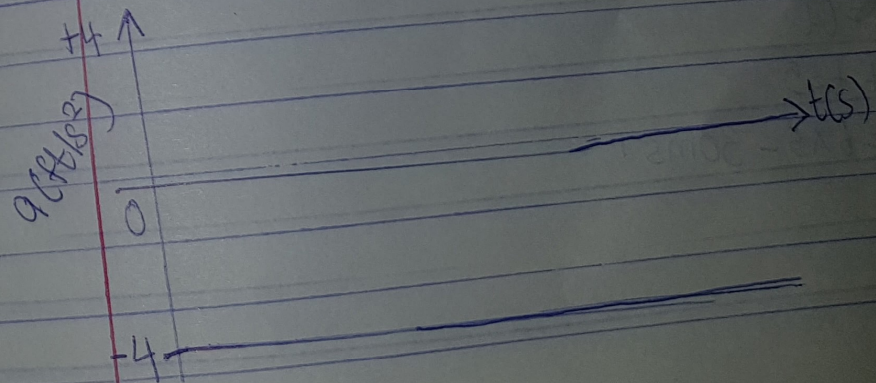
12-10 Given that
 $v = -4t + 80$
 $s = \int v dt$
 $s = \int_0^{20} -4t + 80 dt$
 $s = \left[-2t^2 + 80t \right]_0^{20}$

at $t = 20$
 $s = \left[-2(20)^2 + 80(20) \right]$
 $s = -800 + 1600$
 $s = 800 \text{ ft}$



$v = (-4t + 80) \text{ ft/s}$
 $a = \frac{dv}{dt}$

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



F12-11 $v = (0.255) \text{ m/s}$

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

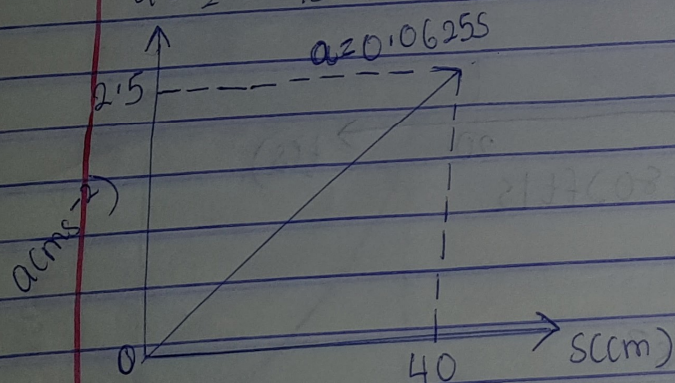
$$a = 0.255(0.25)$$

$$a = (0.06255) \text{ m/s}^2$$

At $s = 40 \text{ m}$

$$a = (0.0625 \times 40)$$

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



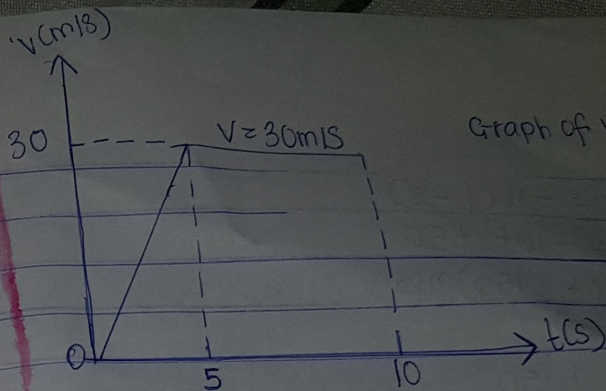
Graph of a against s

F12-12 $s = 3t^2$

$$v = 6t$$

At $t = 5$

$$v = 6 \times 5 = 30 \text{ m/s}^{-1}$$



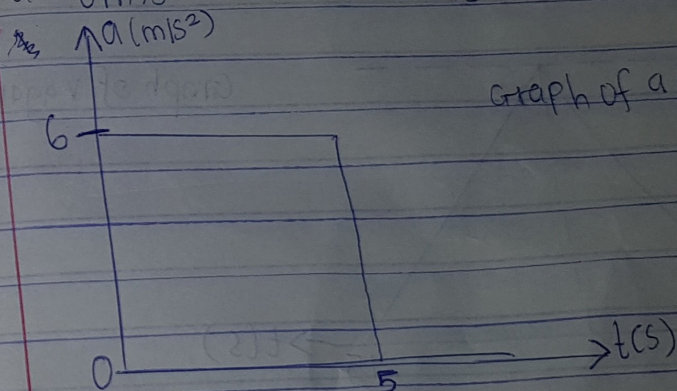
Graph of v against t

$$v = (6t) \text{ m/s}$$

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

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

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



Graph of a against t

F12-13 $a = 20 \text{ m/s}^2$ $a = -10 \text{ m/s}^2$

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

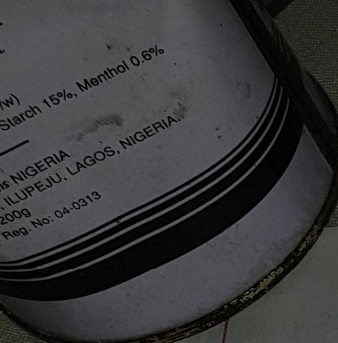
$$\int_0^v dv = \int_0^t 20 \cdot dt$$

$$v = 20t$$

At $t = 5 \text{ s}$

$$v = 100 \text{ m/s}$$

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



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

$$v - 100 = -10t + 50$$

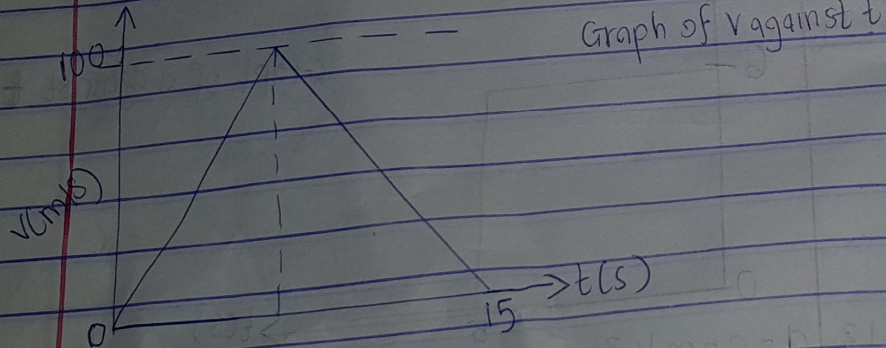
$$v = (-10t + 150) \text{ m/s}$$

At $v = 0$

$$0 = -10t + 150$$

$$-150 = -10t$$

$$t = 15 \text{ Secs}$$



F12-14

$$v = 30t$$

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

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

$$s = 15t^2$$

At $t = 5$

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

$$s = 375 \text{ m}$$

$$v = -15t + 225$$

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

$$s - 375 = \left[\frac{-15t^2}{2} + 225t \right]_5^t$$

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

$$s - 375 = \left[\frac{-15t^2}{2} + 225t \right] - 937.5$$

$$s = \frac{-15t^2}{2} + 225t - 937.5 + 375$$

$$s = \frac{-15t^2}{2} + 225t - 562.5$$

At $t = 15$

$$s = \frac{-15(15)^2}{2} + 225(15) - 562.5$$

$$s = 1125 \text{ m}$$

