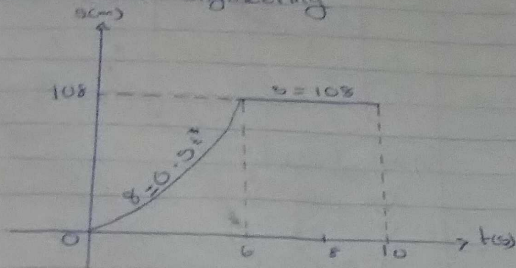


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DEPT = CIVIL Engineering

1.



$$V = \frac{ds}{dt}$$

$$V = 1.5t^2$$

$$at \cdot t = 60$$

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

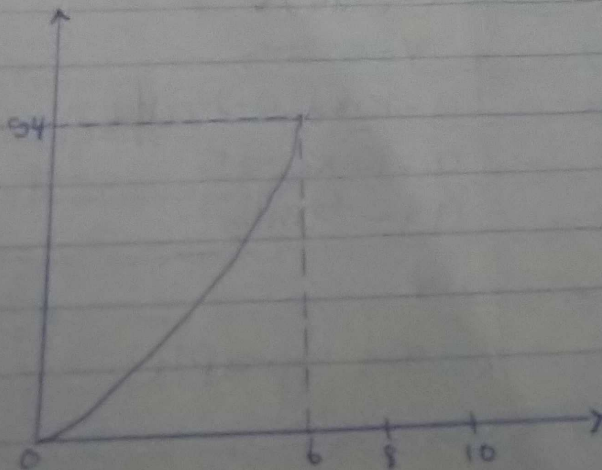
$$= 1.5 \times 36$$

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

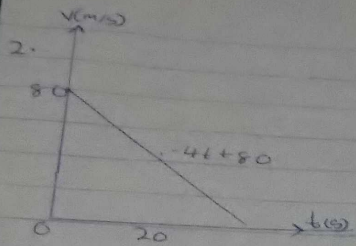
from  $t = 6 \text{ s} - 10 \text{ s}$ ,  $s = 108$

$$\therefore V = 0$$

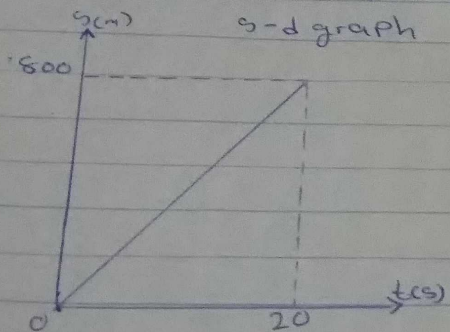
V-t graph







i)  $s = \int v dt$   
 $s = \int (-4t + 80) dt$   
 $s = -2t^2 + 80t$   
 at  $t = 20s$   
 $s = -2(20)^2 + 80(20)$   
 $s = 1600 - 800 = 800m$



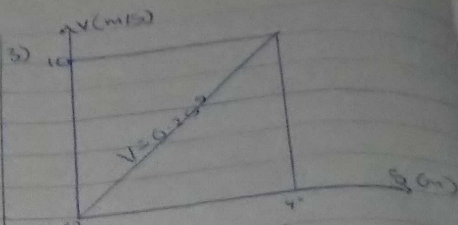
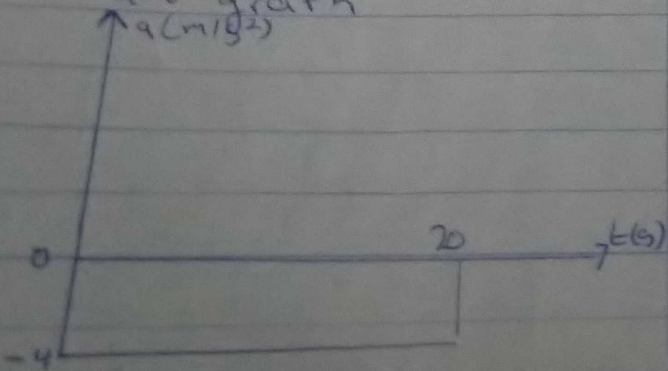
ii) acceleration

$$a = dv/dt$$

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

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

a-t graph



~~i)  $v = \int a ds$   
 $v = \int 2s ds$   
 $v = s^2$   
 at  $t = 20s$   
 $v = 20^2 = 400 m/s$   
 $s = t \leq t'$   
 $\int_{0}^{100} dx = \int_{0}^{t'} 2s ds$   
 $v = 100^2 = -10t' + 10(s)$   
 $v = 100 = -10t' + 10(s)$   
 at  $t', v = 0$   
 $0 - 100 = -10t' + 10(s)$   
 $10t' = 150$   
 $t' = 15s$~~

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

$$v = 0.25s$$

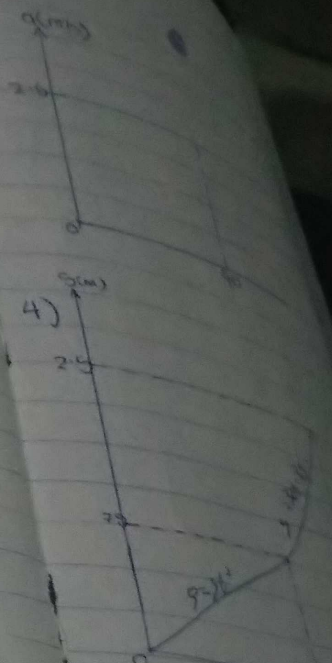
$$a = 10 \times d(0.25s) / ds$$

$$a = 10 \times 0.25$$

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

at

a-s graph



4)

i)  $v = ds/dt$

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

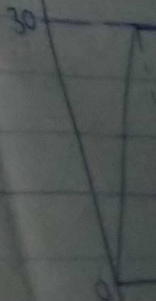
$$v = bt = 6 \times 20$$

$$= 30$$

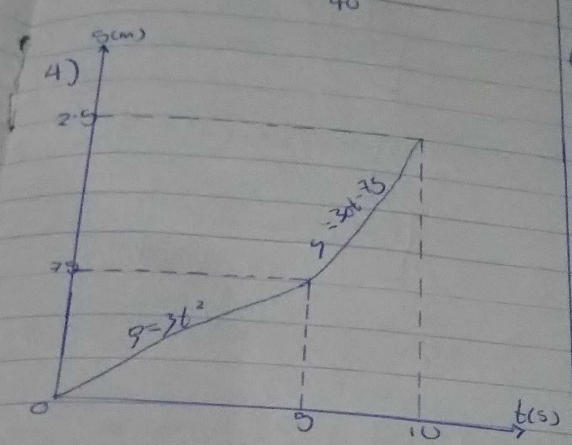
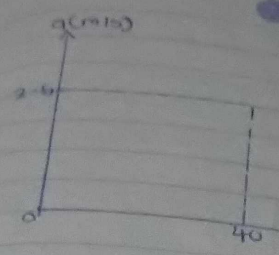
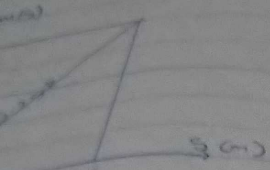
$$\text{at } t =$$

$$v = 30$$

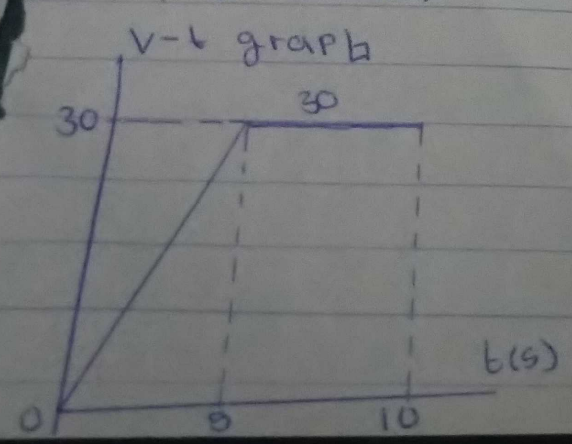
v-t graph



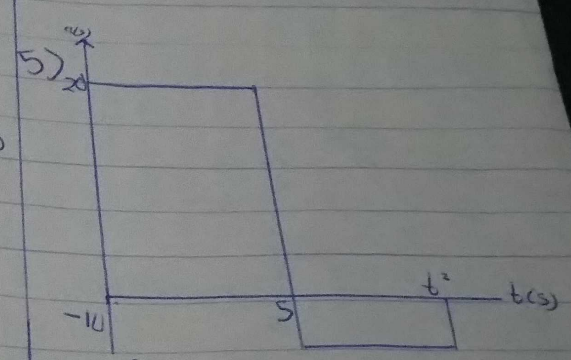
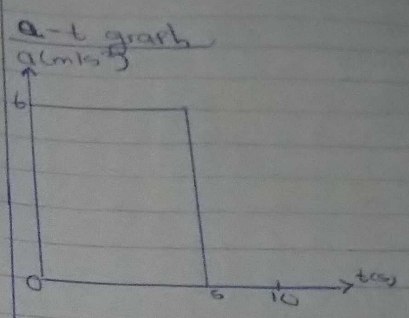




i)  $v = ds/dt$   
 at  $t = 5s$   
 $v = 6t = 6 \times 5$   
 $= 30 \text{ m/s}$   
 at  $t = 10s$   
 $v = 30 \text{ m/s}$



ii)  $a = dv/dt$   
 at  $t = 5s$ ,  $a = 6 \text{ m/s}^2$   
 at  $t = 10s$   
 $a = 0 \text{ m/s}^2$



i)  $v = \int a dt$   
 $v = \int 20 dt$   
 $v = 20t$   
 at  $t = 5s$   
 $v = 20 \times 5 = 100 \text{ m/s}$   
 $5s < t < 10s$   
 $\int_{100}^v dv = \int_5^{t'} -10 dt$   
 $v - 100 = -10t \Big|_5^{t'}$   
 $v = 100 = -10t' + 10(5)$

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

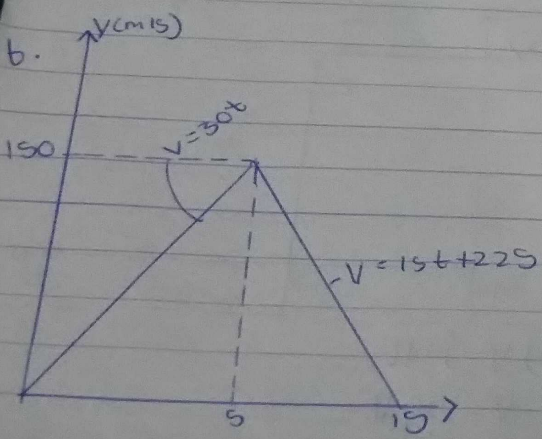
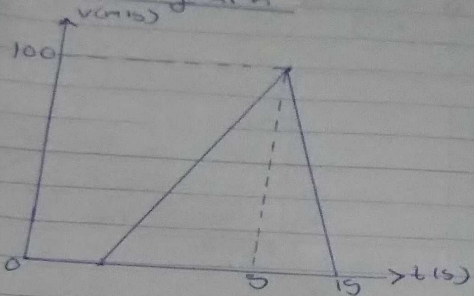
at  $t', v = 0$

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

$$10t' = 150$$

$$t' = 15s$$

V-t graph



$$0 \leq t \leq 5$$

$$v = 30t$$

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

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

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

$$s = 15 \times 25$$

$$s = 375m$$

$$5 \leq t \leq 15$$

$$v = -10t + 225$$

$$\int_5^{15} ds = \int_5^{15} (-10t + 225) dt$$

$$s - 375 = -\frac{10t^2}{2} + 225t \Big|_5^{15}$$

$$s - 375 = \left[ \frac{-10(15)^2}{2} + 225(15) \right] - \left[ \frac{-10(5)^2}{2} + 225(5) \right]$$

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

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

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

$$s - 375 = 750$$

$$s = 1125m$$



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

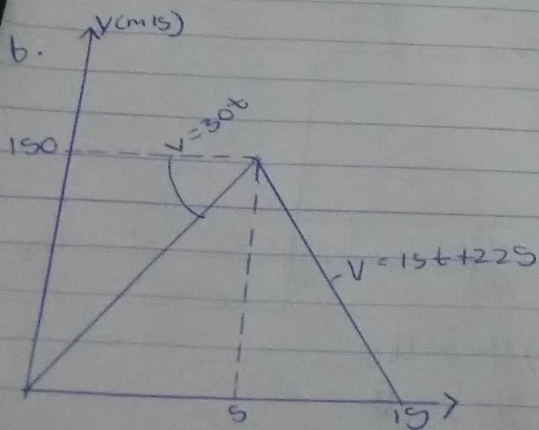
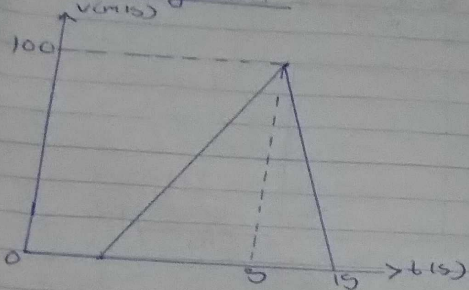
at  $t', v = 0$

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

$$10t' = 150$$

$$t' = 15s$$

V-t graph



$$0 \leq t \leq 5$$

$$v = 30t$$

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

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

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

$$s = 15 \times 25$$

$$s = 375m$$

$$5 \leq t \leq 15$$

$$v = -15t + 225$$

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

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

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

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

$$\left[ \frac{15 \times 25}{2} + 1125 \right]$$

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

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

$$s - 375 = 750$$

$$s = 1125m$$