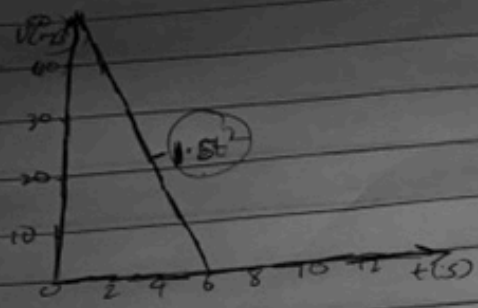


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 18/ENG06/040
 Mechanical Engineering
 Mechanics



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

$$v = 1.5t^2$$

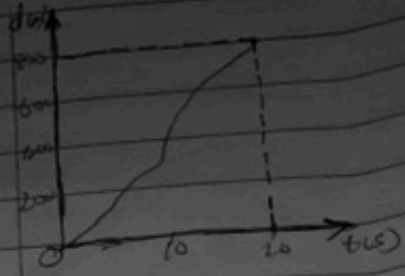
at $t = 6$ seconds

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

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

From $t = 6 \text{ s} - 10 \text{ s}$, $s = 100$

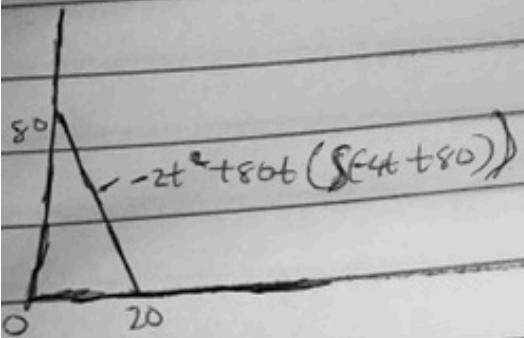
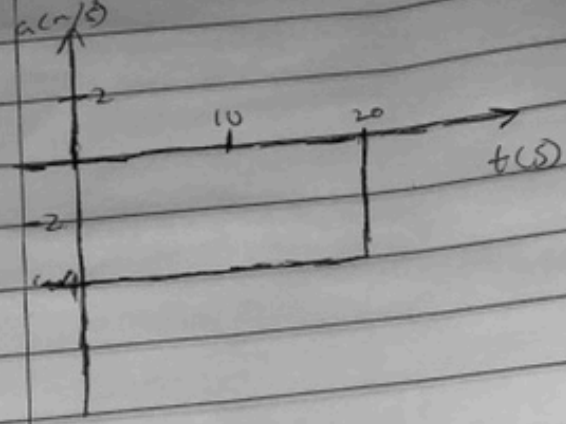
$$\therefore v = 0$$



$$a = \frac{dv}{dt} = -4$$

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

a-t graph



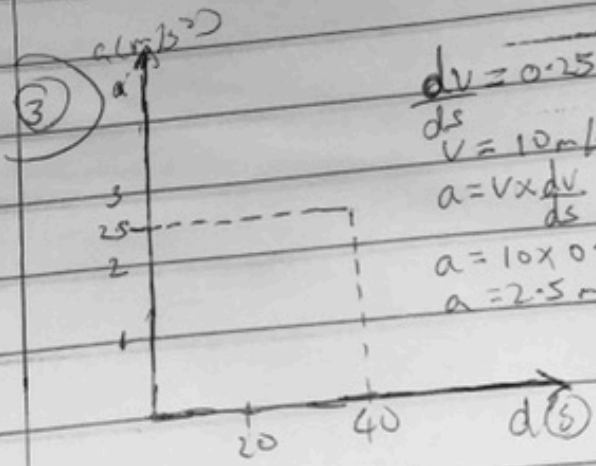
$$s = -2t^2 + 80t$$

at $t = 20 \text{ s}$

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

$$= s = +800 + 1600$$

$$= 2400 \text{ m}$$



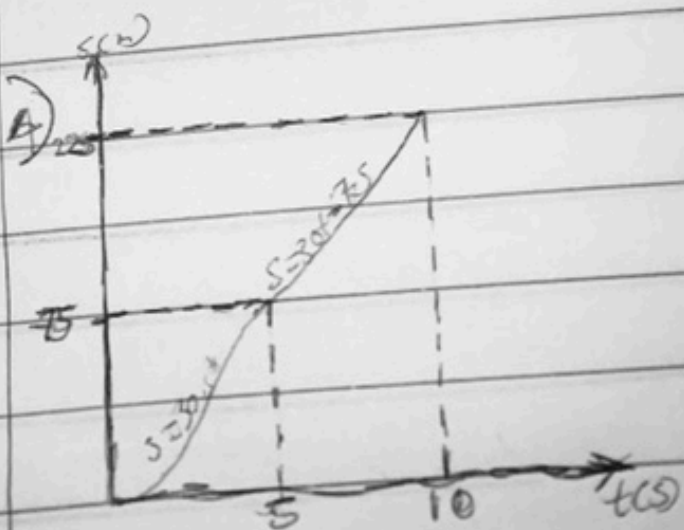
$$\frac{dv}{ds} = 0.25$$

$$v = 10 \text{ m/s}$$

$$a = v \times \frac{dv}{ds}$$

$$a = 10 \times 0.25$$

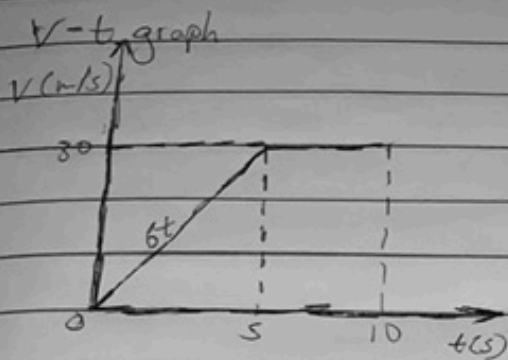
$$a = 2.5 \text{ m/s}^2$$



$$v = ds/dt$$

$$\text{at } t=5s, v=6t = 6 \times 5 = 30 \text{ m/s}$$

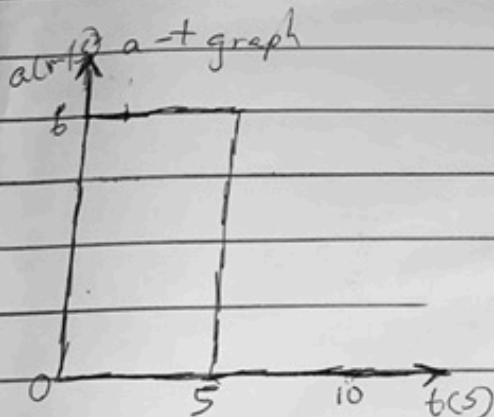
$$\text{at } t=10s, v=30 \text{ m/s}$$



$$a = dv/dt$$

$$\text{at } t=5s, a=6 \text{ m/s}^2$$

$$\text{at } t=10s, a=0 \text{ m/s}^2$$



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

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

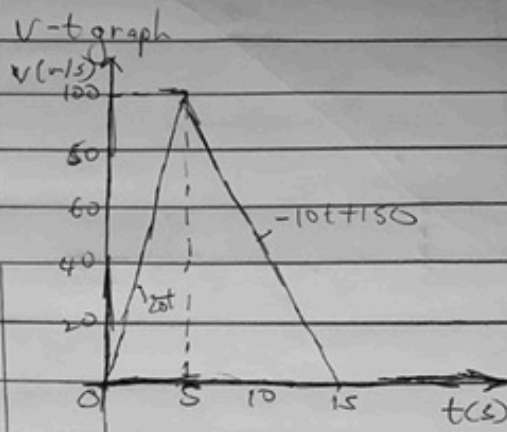
$$v-100 = -10t' + 50$$

$$\text{at } t', v=0$$

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

$$10t' = 150$$

$$t' = 15s$$



$$6 \int_0^5 s = \int_0^5 30t dt$$

$$s = 15t^2 \text{ m}$$

$$\text{when } t=5s$$

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

$$s = 375$$

With initial condition

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

$$\int_{375}^s s = \int_5^{t'} (-15t + 225) dt$$

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

$$s - 375 = -7.5t^2 + 225t + 187.5t$$

$$1125$$

$$s = -7.5t^2 + 225t + 1687.5$$

$$5 \quad v = \int a dt$$

$$v = \int 20 dt$$

$$v = 20t$$

$$\text{at } t=5s$$

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

$$5s \leq t \leq t'$$

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

when $t = 15s$

$$s = -7.5(15)^2 + 225(15) + 1687.5$$

$$s = -1687.5 + 1687.5 + 3375$$

$$\therefore s = 3375m$$

