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181 ENGO 3105

CIVIL ENGINEERING

1 Given that

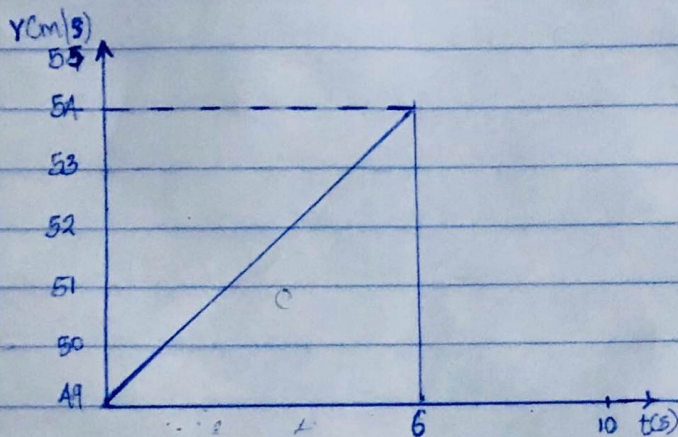
$$s = 0.5t^3 \text{ m}$$

$$v = \frac{ds}{dt}, v = 1.5t^2$$

$$\begin{aligned} \text{at } t=6, v &= 1.5(6)^2 \\ &= 54 \text{ m/s} \end{aligned}$$

$$s = 108 \text{ m}$$

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



V-t graph.

2 Given that

$$v = -At + 80$$

$$s = \int v dt$$

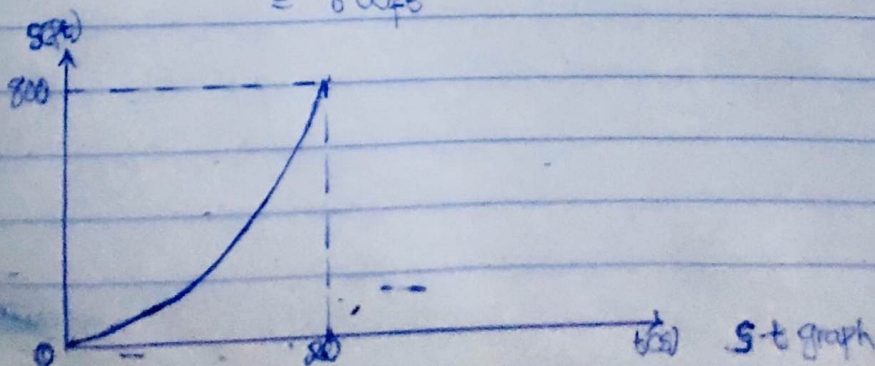
$$= \int_0^{20} -At + 80 dt$$

$$s = \left[-2t^2 + 80t \right]_0^{20}$$

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

$$= -800 + 1600$$

$$= 800 \text{ ft}$$

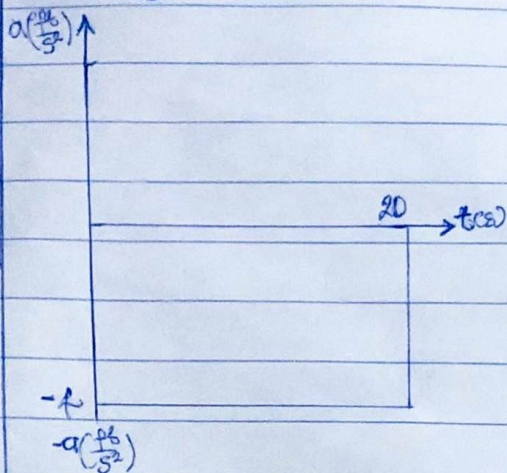


s-t graph

$$v = C - At + 80 \text{ ft/s}$$

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

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



a-t graph

3 Given that

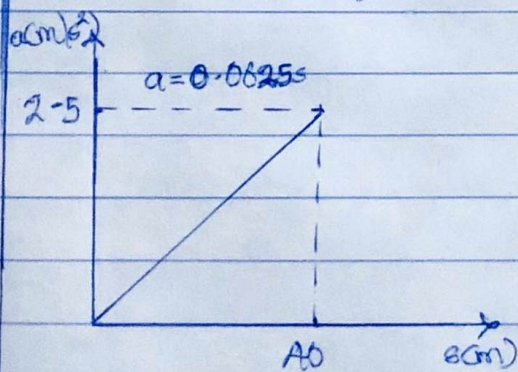
$$v = (0.25t^2) \text{ m/s}$$

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

$$= 0.25(0.25t^2)$$

$$= 0.0625t^2 \text{ m/s}^2$$

at $s = 100 \text{ m}$, $a = (0.0625 \times 100)$
 $= 2.5 \text{ m/s}^2$



a-s graph

4 Given that

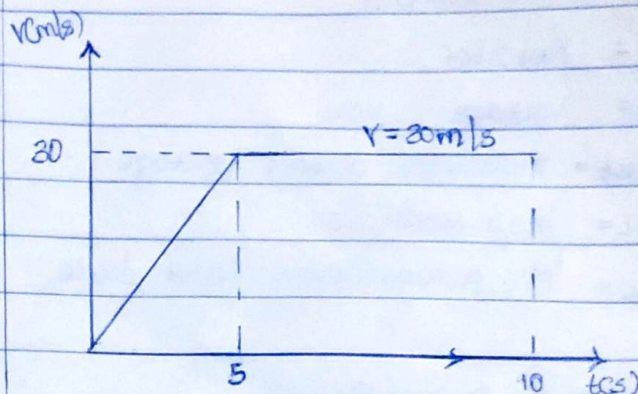
$$s = 3t^2$$

$$v = 6t$$

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

$$s = 80t - 75$$

$$v = 80 \text{ m/s}$$



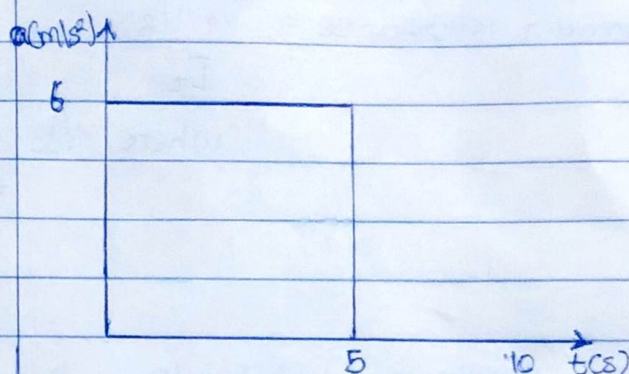
v-t graph

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

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

$$v = 20 \text{ m/s}$$

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



a-t graph

5 $a = 20 \text{ m/s}^2$

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

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

$$v = 20t$$

\therefore at $t = 5$, $v = 20(5) = 100 \text{ m/s}$

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

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

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

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

at $v = 0$,

$$-10t + 150 = 0$$

$$-10t = -150$$

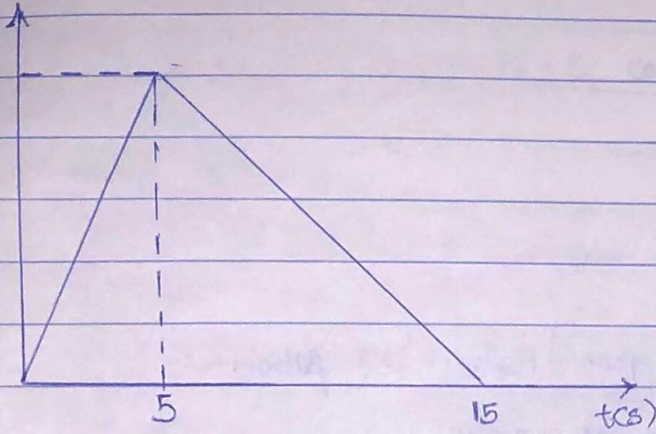
$$-10 \quad -10$$

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

Mark

$v(m/s)$

100



v-t graph

6 Given that

$$v = 20t$$

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

$$\int_0^5 ds = \int_0^5 (20t) dt$$

$$s = 10t^2$$

$$\text{at } t = 5, s = 10(5)^2 \\ = 250m$$