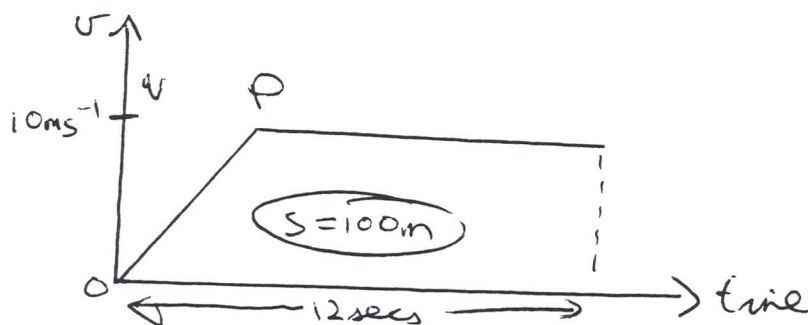


Q.1 Honours 1979 (Kinematics)

① Area under curve on a velocity time graph is the distance travelled in the time t .

Ans: Let :



Find Acceleration:

$$\text{Area } \Delta OPQ = 120 - 100 \text{ m} = 20 \text{ sq. units}$$

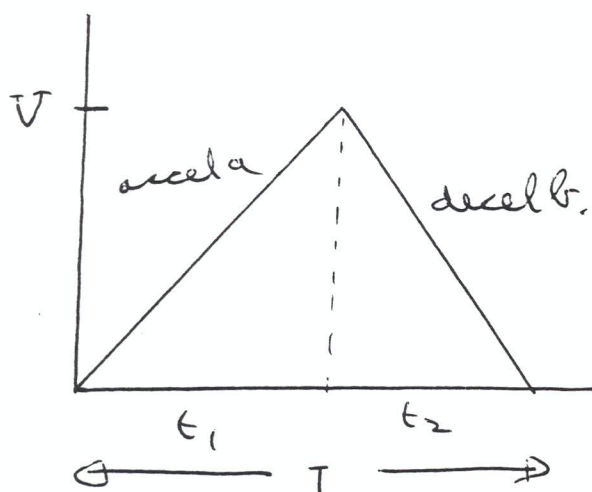
$$|OQ| = 10 \Rightarrow \frac{1}{2} (v_1 + v_2) \cdot |QP| = 20$$

$$\Rightarrow \frac{1}{2} \cdot 10 \cdot |QP| = 20 \Rightarrow |QP| = 4$$

\therefore time spent accelerating = 4 secs

$$\therefore v = u + at \Rightarrow 10 = 0 + a \cdot 4 \Rightarrow \underline{\underline{a = 2.5 \text{ ms}^{-2}}}$$

Speed time graph, $T^2 = 2l \left(\frac{1}{a} + \frac{1}{b} \right)$ to be shown. T is total time.



Area under curve = $2l$

Let t_1 be time accel

Let t_2 be time decel:

$$t_1 : t_2 = b : a$$

$$\Rightarrow \underline{\underline{t_1 = \frac{b}{b+a} T \text{ and } t_2 = \frac{a}{b+a} T}}$$

Now dist = area under curve

$$\Rightarrow \underline{\underline{2l = \frac{1}{2} T (V)}}$$

But $v = u + at \Rightarrow$

$$V = 0 + a t_1$$

$$= 0 + a \left(\frac{b}{b+a} \right) T$$

$$\therefore 2l = \frac{1}{2} \frac{ab}{a+b} T \cdot T$$

$$\Rightarrow 2l \left(\frac{a+b}{ab} \right) = T^2 \Rightarrow \underline{\underline{T^2 = 2l \left(\frac{1}{b} + \frac{1}{a} \right)}}$$

qed