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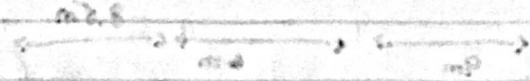
Speed = 21 m/s

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2) \leftarrow 25m \rightarrow 25m \rightarrow final position

Car A

Car B



① Time for Car A to accelerate at 30 m/s

$$T = \frac{V - U}{a} \quad \begin{array}{l} V = 30 \text{ m/s} \\ U = 21 \text{ m/s} \\ a = 2 \end{array} \Rightarrow \frac{30 - 21}{2} = 11/2 \Rightarrow 4.5 \text{ sec}$$

now at the same time Car B is still moving so,

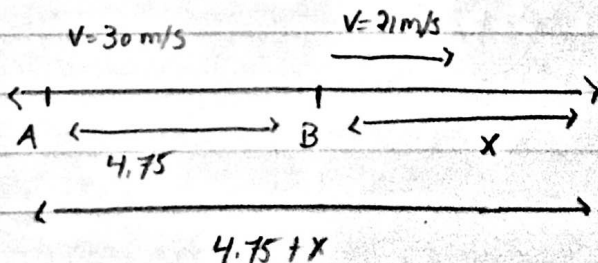
$$x_f = x_i + v_i t + \frac{1}{2} a t^2 \Rightarrow ut + \frac{1}{2} a t^2 = 21 \times 4.5 + \frac{1}{2} (2) (4.5)^2 = 114.75 \text{ m}$$

Car A distance since the start is

$$V_f = \text{start point} = V_i \times \text{Time} + 25 \text{ m after Car B} \Rightarrow 21 \times 4.5 + 25 = 119.5 \text{ m}$$

So Car A is still 4.75 m behind Car B

$$119.5 - 114.75 = 4.75 \text{ m so ...}$$



so for Car A to Overtake Car B it can be represented as $t = \frac{4.75 + x}{30}$

for Car B to Cover distance $\Rightarrow t = \frac{x}{21}$

Both of their times can be equal so

$$\frac{4.75 + x}{30} = \frac{x}{21}$$

$$\Rightarrow 30x = 4.75 \times 21 + 21x$$

$$\Rightarrow \frac{90x}{90} = \frac{99.75}{90} \Rightarrow x = 11.08 \text{ m}$$

Now that the car wants to be 25m ahead we have

$$\text{time for car B to travel distance} \Rightarrow t = \frac{x}{21}$$

$$\text{time for car A to travel 25m more} \Rightarrow t = \frac{x + 25}{30}$$

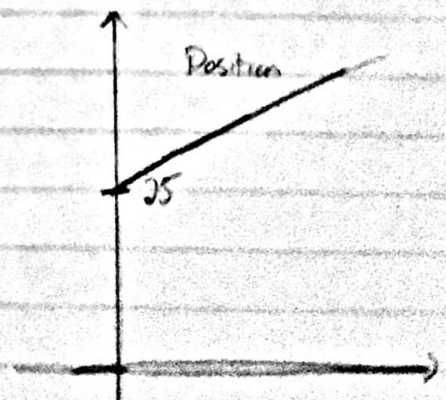
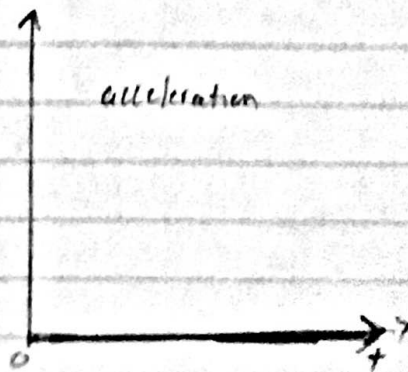
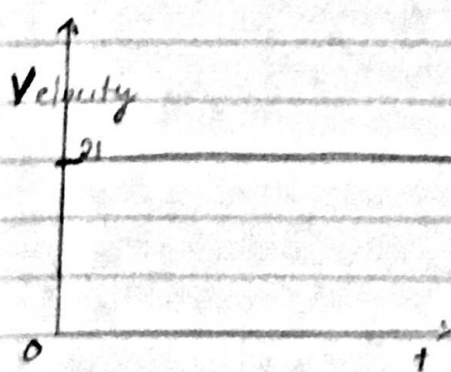
$$\Rightarrow \frac{x}{21} = \frac{x + 25}{30} \Rightarrow 30x = 21(x + 25) \Rightarrow 30x = 21x + 525 \Rightarrow \frac{9x}{9} = \frac{525}{9} \\ x = 58.33 \text{ m}$$

Final step: Sum all distances

$$114.75 \text{ m} + 4.75 \text{ m} + 11.08 \text{ m} + 58.33 \text{ m} + 25 \text{ m} \\ \Rightarrow 213.91 \text{ m}$$

Graphs:

Car B:



Car A:

