

Two cars are running at a constant distance of 64 m ,car A is behind car B.if both cars accelerates at the same time ,car A is 11 m/s^2 and car B is 9 m/s^2 . When will car A overtake car B?

Solution

Constant distance between the cars is S , acceleration of the car A is $a_1 = 11 \text{ m/s}^2$, acceleration of the car B is $a_2 = 9 \text{ m/s}^2$.

When the car A overtakes the car B, car B will travel $L = a_2 \frac{t^2}{2}$, car A will travel $L + S = a_1 \frac{t^2}{2}$.

From hence

$$S = a_1 \frac{t^2}{2} - a_2 \frac{t^2}{2} \Rightarrow$$

$$S = t^2 \left(\frac{a_1}{2} - \frac{a_2}{2} \right) \Rightarrow$$

$$t = \sqrt{\frac{2S}{a_1 - a_2}} = 8s$$

Answer

$$t = \sqrt{\frac{2S}{a_1 - a_2}} = 8s$$