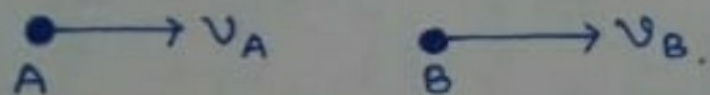


Different cases of relative motion

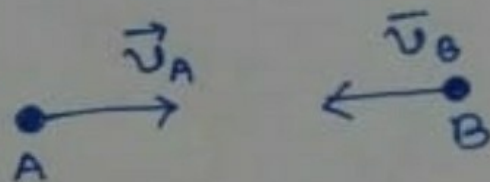
(i) Relative motion of cars

Case-1



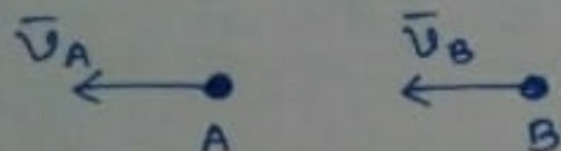
$$\vec{v}_{AB} = \vec{v}_A - \vec{v}_B = (v_A - v_B)\hat{i}$$

Case-3



$$\begin{aligned}\vec{v}_{AB} &= \vec{v}_A - \vec{v}_B \\ &= v_A\hat{i} - (-v_B\hat{i}) \\ &= (v_A + v_B)\hat{i}\end{aligned}$$

Case-2



$$\begin{aligned}\vec{v}_{AB} &= \vec{v}_A - \vec{v}_B = -v_A\hat{i} - (-v_B\hat{i}) \\ &= (v_B - v_A)\hat{i}\end{aligned}$$

Case-4



$$\begin{aligned}\vec{v}_{AB} &= \vec{v}_A - \vec{v}_B \\ &= -v_A\hat{i} - v_B\hat{i} \\ &= -(v_A + v_B)\hat{i}\end{aligned}$$