A driver in a Car is traveling North at a velocity represented by the vertical vector. The driver hears the siren of an Ambulance traveling East with a velocity represented by the horizontal vector, as shown in the figure.

*Figure:* Drawn to scale.

At the exact positions and velocities shown in the figure, the siren frequency heard by the driver in the Car is

A) the same as if both the Car and Ambulance were at rest.

B) higher than if both the Car and Ambulance were at rest.

C) lower than if both the Car and Ambulance were at rest.

D) cannot be determined since the Doppler effect is only valid for co-linear speeds.
Let the velocity of the Car projected onto the Ambulance-Car direction be $v_{C\perp}$ and the velocity of the Ambulance projected onto the Ambulance-Car direction be $v_{A\perp}$.

By comparing the velocity projections on to a straight line between the Ambulance and Car, we have

\[\begin{align*}
v_{A\perp} & \quad \rightarrow \\
v_{C\perp} & \quad \rightarrow
\end{align*}\]

Answer B

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