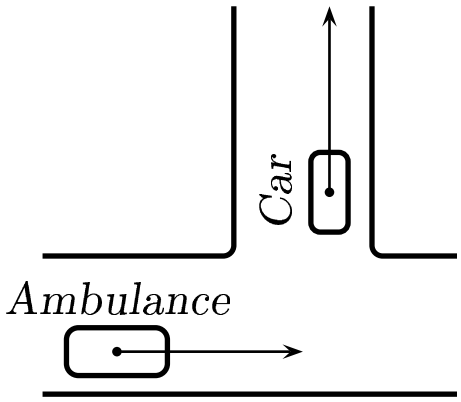


A driver in a *Car* is traveling North at a velocity represented by the vertical vector. The driver hears the siren of an *Ambulance* traveling East with a velocity represented by the horizontal vector, as shown in the figure.

Figure: Drawn to scale.

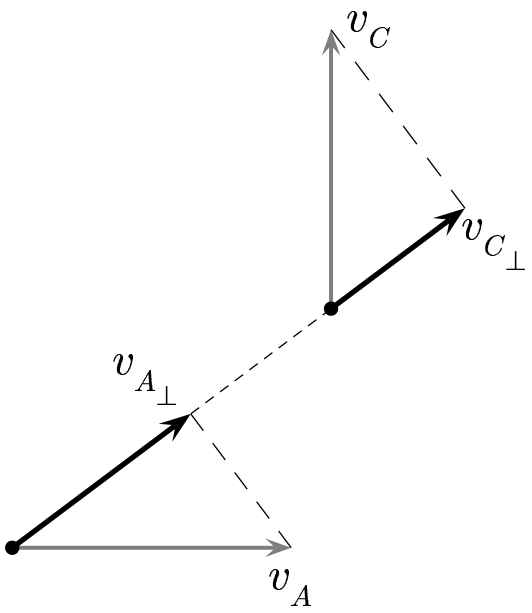
At the exact positions and velocities shown in the figure, the siren frequency heard by the driver in the *Car* is

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.

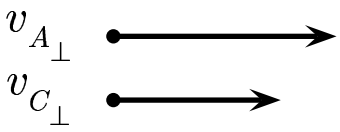
C) lower than if both the *Car* and *Ambulance* were at rest.

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



Answer **B**

17.05-06˙Car˙and˙Ambulance 2004-3-24