## Answer on question \#65101, Physics / Other

Question The apparent frequency of a note when listener moves towards a stationary source with velocity $40 \mathrm{~m} / \mathrm{s}$ is 200 Hz . When he moves away from the same source with same speed the apparent frequency of note is 160 Hz .Calculate velocity of sound in air.

Solution When listener moves towards a stationary source frequency is changed from $\nu_{0}$ to

$$
\nu_{1}=\nu_{0} \frac{c}{c-v}=\nu_{0} \frac{c}{c-40}=200
$$

where $c$ is velocity of sound and $v$ is velocity of listener. When it is moving away then frequency changes to

$$
\nu_{2}=\nu_{0} \frac{c}{c+v}=\nu_{0} \frac{c}{c+40}=160
$$

From these two equation we can easily find that

$$
\begin{aligned}
& \frac{c+40}{c-40}=\frac{200}{160} \\
& c=360 \mathrm{~m} / \mathrm{s}
\end{aligned}
$$

