

Answer on Question #64002 – Physics – Mechanics | Relativity

Question:

A siren emitting a note of frequency n is fitted on a police van, traveling towards a stationary listener. What is the velocity of the van, if the frequency of the note heard by the listener is double the original frequency?

- a) $V_s = V$
- b) $V_s = V/2$
- c) $V_s = 2V$
- d) $V_s = V/3$

Answer:

Here's an equation for Doppler Effect:

$$v = v_0 \frac{v + v_l}{v - v_s};$$

In this situation $v_l = 0$:

$$v = v_0 \frac{v}{v - v_s} \Rightarrow 2v_0 = v_0 \frac{v}{v - v_s} \Rightarrow 2 = \frac{v}{v - v_s} \Rightarrow 2v - 2v_s = v \Rightarrow v = 2v_s \Rightarrow v_s = \frac{v}{2}.$$

So, answer is b) $V_s = V/2$.

Answer provided by <https://www.AssignmentExpert.com>