4/02/07@

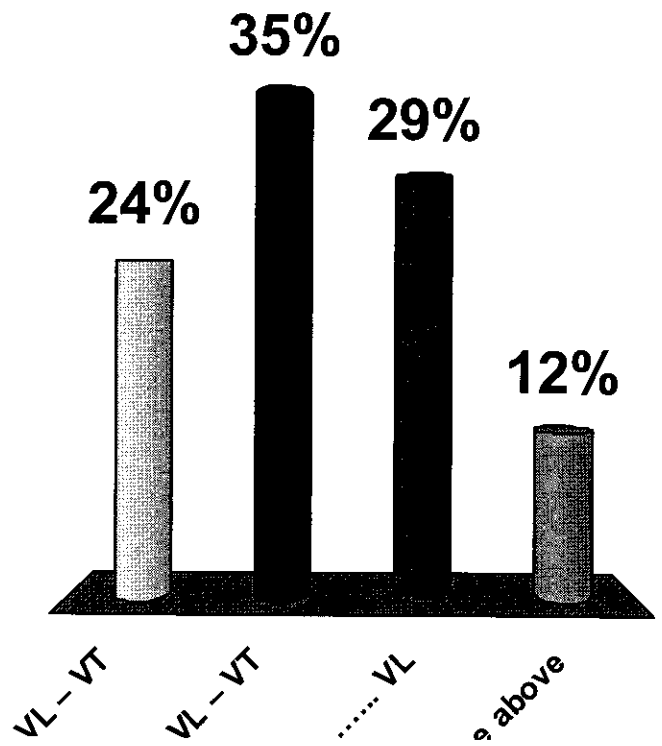
On a calm day an observer in a train station measures the speed of sound to be V_S = 343 m/s, and the speed of light to be V_L =3x10^8 m/s. An observer on a train moving with constant velocity, V_T, in the same direction as both waves measures these speeds to be _____ and _____, respectivley.

a) $V_S - V_T$ ..... $V_L - V_T$

b) V_S ..... $V_L - V_T$ ✔

c) $V_S - V_T$..... V_L

d) None of the above



4/02/07(b)

The correct answer is (c): the measured speeds are $V_S - V_T$ and V_L, respectively.

This is because sound travels in the atmospheric medium at a fixed speed with respect to the medium, and by Galilean

relativity, an observe moving in the direction of the wave with speed V_T measures the speed of the sound wave as $V'_S = V_S - V_T$.

But light is different from every other wave: it travels at the *same* speed in every inertial frame; therefore $V'_L = V_L$ is the same in the train's frame as in the station's/