QUES 01:-

A driver in a car, approaching a vertical wall notices that the frequency of his car horn, has changed from 440 Hz to 480 Hz, when it gets reflected from the wall. If the speed of sound in air is 345 m/s, then the speed of the car is :

(a) Let f_1 be the frequency heard by wall, $f_1 = \left(\dfrac{v}{v - v_c} \right) f_0$

Here, v = Velocity of sound,

v_c = Velocity of Car,

f_0 = actual frequency of car horn

Let f_2 be the frequency heard by driver after reflection from wall.

$$f_2 = \left(\dfrac{v + v_c}{v} \right) f_1 = \left(\dfrac{v + v_c}{v - v_c} \right) f_0$$

$$\Rightarrow 480 = \left[\dfrac{345 + v_c}{345 - v_c} \right] 440 \Rightarrow \dfrac{12}{11} = \dfrac{345 + v_c}{345 - v_c}$$

$$\Rightarrow v_c = 54 \text{ km/hr}$$