Answer on Question #38032, Physics, Other

Question:

A source and an observer move away from each other with a velocity of 10m/s with respect to ground.If the observer finds the frequency of sound coming from the source as 1950 Hz,then actual frequency of the source is (velocity of sound in airt =340m/s):

a)2486Hz

b)2132Hz

c)2068Hz

d)1950Hz.

Answer:

In classical physics the relationship between observed frequency f and emitted f_0 is given by:

$$f = f_0 \frac{c + v_r}{c + v_s}$$

where

c is the velocity of waves in the medium;

v_r is the velocity of the receiver relative to the medium; positive if the receiver is moving towards the source (and negative in the other direction);

v_s is the velocity of the source relative to the medium; positive if the source is moving away from the receiver (and negative in the other direction).

Therefore:

$$f_0 = f \frac{c + v_s}{c + v_r} = 1950 \frac{340 + 10}{340 - 10} = 2068 \, Hz$$

Answer: c)2068Hz