

Answer on Question #38005, Physics, Acoustics

Question:

An organ pipe enclosed at one end has fundamental frequency of 1500 Hz. The maximum number of overtones generated by this pipe which a normal person can hear is : a) 6 b)11 c)9 d)13.

Answer:

A human ear usually hear sound in range from 20 Hz to 20 kHz. If an organ pipe has the fundamental frequency of $f_0 = 1500 \text{ Hz} = 1.5 \text{ kHz}$, overtones have frequencies $f_n = nf, n > 1$. Thus, the number of overtones which a normal person can hear can be estimated as

$$N = \left[\frac{20 \text{ kHz}}{1.5 \text{ kHz}} \right] = 13,$$

where $[x]$ means the integer part of x . So, the right answer is **d) 13**.