

Q- The normal range of hearing is about 20 to 20000 Hz. Assume that your hearing range is 27 to 18500 Hz. (Use 340 m/s as the speed of sound.)

(a) What is the greatest length of an organ pipe that would have its fundamental note in your hearing range if it is closed at one end?

(b) What is the greatest length of an organ pipe that would have its fundamental note in your hearing range if it is open at both ends?

The fundamental frequency of the closed organ pipe is

$$n = \frac{c}{4L}$$

As the frequency is inversely proportional to the length the greatest length of the organ pipe is corresponding to the least frequency and thus for frequency of 27 Hz. Hence

$$L = \frac{c}{4n} = \frac{340}{4 \times 27} = 3.15m$$

(b) The fundamental frequency of the open organ pipe is

$$n = \frac{c}{2L}$$

Gives  $L = \frac{c}{n} = \frac{340}{2 \times 27} = 6.3m$