Physics 102-Rec
Quiz#2-Sect.23
Chapter 17

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A pipe of length L closed at one end has a resonant frequency of 500 Hz. The next higher frequency is 580 Hz. What is the length L of the pipe. Take the speed of sound to be 340 m/s.

$$f_n = \frac{n v}{4L} \qquad n = 1, 3, 5, \ldots$$

$$f_{n+2} = (n+2)\frac{v}{4L}$$

$f_n = 500\,Hz$ and $f_{n+2} = 580\,Hz$

$$f_{n+2} - f_n = 80 = (n+2)\frac{v}{4L} - n\frac{v}{4L} = \frac{2v}{4L}$$

$$80 = \frac{340}{2L} \Rightarrow \boxed{L = 1.125\,m}$$