

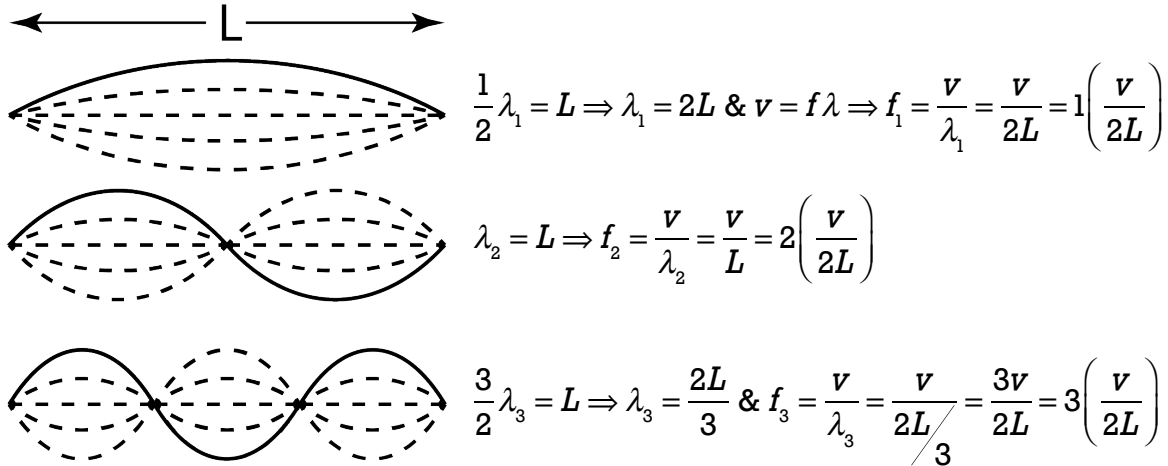


## Flipping Physics Lecture Notes:

### Stringed Instrument Frequencies

<https://www.flippingphysics.com/stringed-instrument.html>

Stringed instruments set up standing wave patterns on the strings to create frequencies or what we hear as pitch. These instruments have strings which are fixed in place on either end. This means the ends of the strings must be nodes.



$$f_n = n \left( \frac{v}{2L} \right)$$

The frequencies created by a stringed instrument:

- $v$  is the speed of the wave on the string.
- $L$  is the length of the string.
- $n$  is the *harmonic number*.
- $n = 1$  is the *first harmonic* and the *fundamental frequency*.
- $n = 2$  is the *second harmonic*.
- $n = 3$  is the *third harmonic* ... and so on.
- Each of the harmonics is an integer multiple of the fundamental frequency.

$$f_1 = 1 \left( \frac{v}{2L} \right) = \frac{v}{2L} \text{ \& } f_2 = 2 \left( \frac{v}{2L} \right) = 2f_1 \Rightarrow f_2 = 2f_1 \text{ \& } f_3 = 3f_1 \text{ \& etc.}$$