10. The transverse flute is a hollow tube closed at one end and open at the other, but the placement of the mouthpiece makes it act as if it were open at both ends.

**Given:** The room temperature is 20°C. The lowest note that can be played on a flute is C, at 261.6 Hz, and the highest note is C three octaves higher, at 2093 Hz.

**Find:** (a) What is the wavelength of the lowest C that can be played on a flute?

(b) What is the wavelength of the highest C that can be played on the flute?

*(more on the next page)*
(c) Draw the first three harmonics for the flute.

(d) In terms of \( c \) (speed of the wave) and \( L \) (length of tube), give the wavelength and the frequencies of the first three harmonics (like I did in class).

(e) In terms of \( c \) (speed of the wave), \( L \) (length of tube), and the frequency of the first harmonic, determine a general formula for the frequency of the \( n \)th harmonic (like I did in class).

(f) What is the distance from a node to an antinode for the lowest C on this instrument?