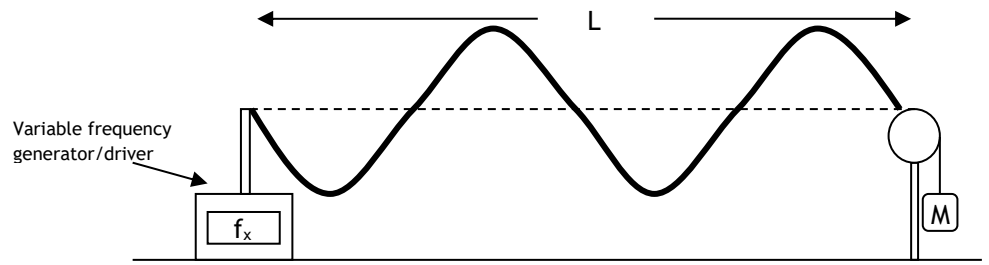


A string of length, L , is attached to a variable frequency generator/driver at one end and a hanging mass, M , on the other end. The string resonates at many different frequencies, but our experimenter stops to observe the following pattern when the generator is set at a frequency f_x . Find all values in terms of f_x and L .

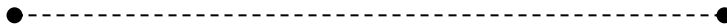


a) Determine the wavelength of sound.

b) Determine the speed of the wave.

c) i. Determine the next higher frequency which will produce a standing wave pattern.

ii. Draw the next higher wave pattern



d) What would to the number of antinodes if the mass M , were to be replaced by a mass of $4M$? Explain.
 More antinodes _____ Less Loops antinodes _____ Same antinodes _____

A 300 Hz buzzer is held outside a window, 20 m above the ground. The buzzer is released. Assume air resistance is negligible. Assume the speed of sound is 343 m/s.

a) How much time does it take the buzzer to hit the ground below?

b) What frequency is heard by the person who dropped the buzzer the moment before the buzzer hits the ground?

c) Describe what a stationary observer would hear, if the person was lying on the ground directly next to where the buzzer strikes.

If an identical 300 Hz buzzer is placed on the window sill, and the original buzzer is dropped again.

c) What is the maximum number of beats heard?