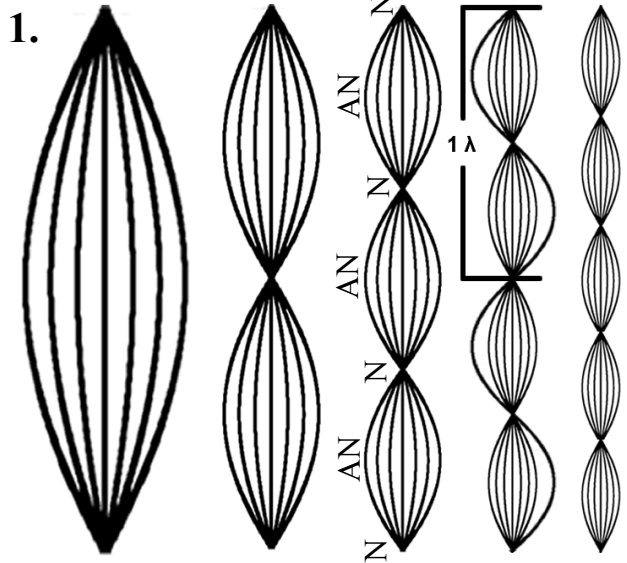


Harmonics Frequencies

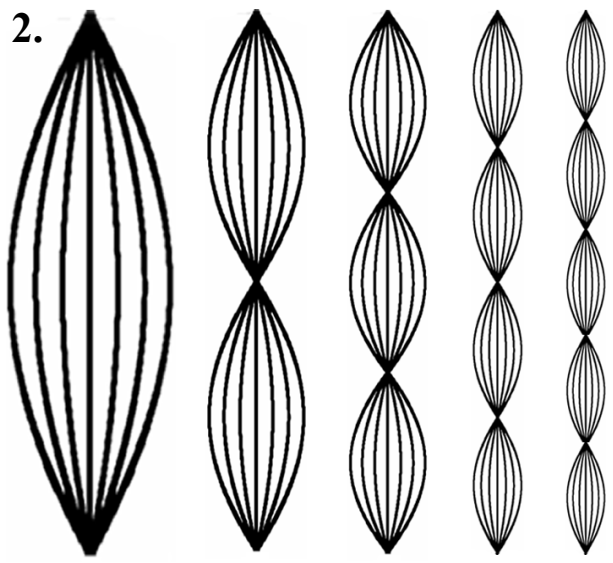
Each set shows the harmonics for a fixed string with a particular tension and length.

Example:



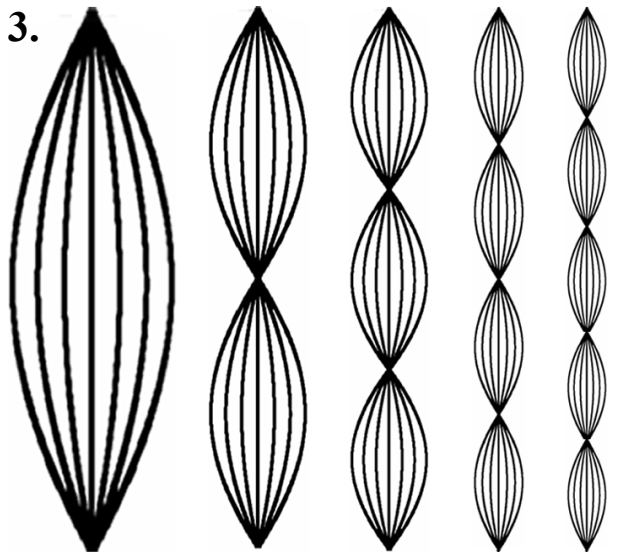
H# = H₁ H₂ H₃ H₄ H₅
 f = 6 Hz 12 Hz 18 Hz 24 Hz 30 Hz

1. Mark the nodes (N) and antinodes (AN) for harmonic 3.
2. Show the waveform of H₄ at one moment in time.
3. Mark one wavelength of H₄. (Notice that 2 AN = 1 λ)



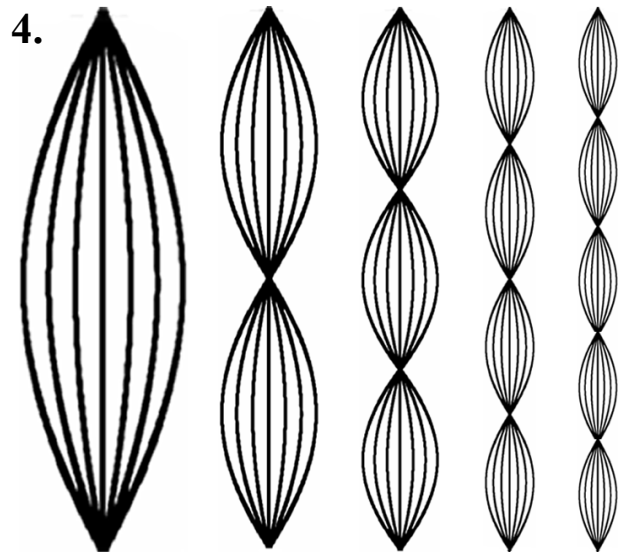
H# = _____ _____ H₃ _____ _____
 f = _____ 20 Hz _____ _____ _____

1. Mark the nodes (N) and antinodes (AN) for harmonic 2.
2. Show the waveform of H₃ at one moment in time.
3. Mark one wavelength of H₃.



H# = f_{fundamental} _____ _____ _____ _____
 f = _____ _____ _____ 80 Hz _____

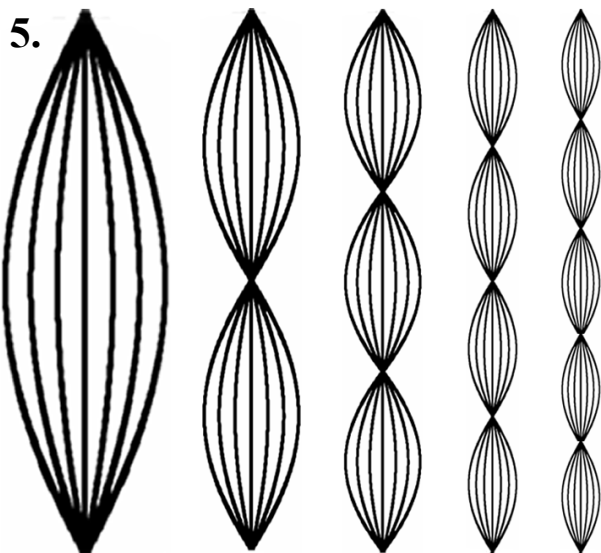
1. Mark the nodes (N) and antinodes (AN) for harmonic 4.
2. Which harmonic is one wavelength long? _____
3. Which harmonic is also called the fundamental? _____



H# = f_f _____ _____ _____ _____
 f = _____ _____ 33 Hz _____ _____

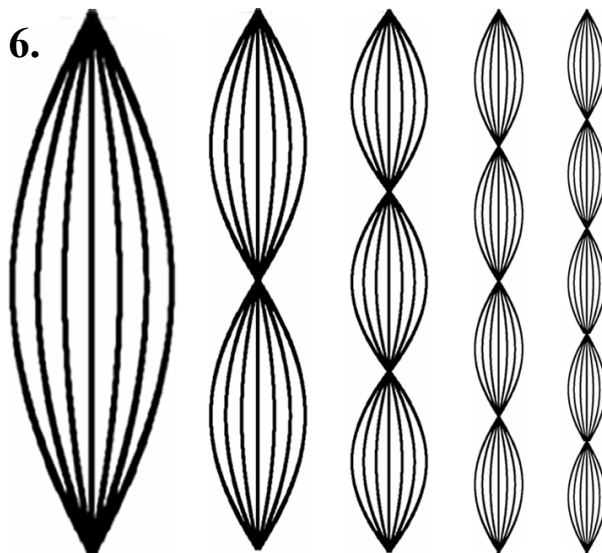
1. Mark the nodes (N) and antinodes (AN) for harmonic 5.
2. Show the waveform on H₅.
3. Mark one wavelength of H₅.

Note: the fundamental frequency is also known as the natural frequency.



H# = _____
 f = _____ 100 Hz

1. Mark the nodes (N) and antinodes (AN) for harmonic 5.
2. Which one is the natural frequency? _____ (see top)
3. Which harmonic is 2 wavelengths long? _____



H# = _____
 f = _____ 48 Hz

1. Mark one wavelength on harmonic 2.
2. Mark one wavelength on harmonic 4.
3. The wavelength of H₂ is *double* or *half* that of H₄?

The first harmonic has _____ antinodes.

The third harmonic has _____ antinodes.

The eighth harmonic has _____ antinodes.

The first harmonic has two other names:

If the fundamental frequency is 20 Hz, find H₃.

If the natural frequency is 8 Hz, find H₅.

If the 4th harmonic is 48 Hz, find the fundamental.

If the 3rd harmonic is 12 Hz, find the fundamental.

If the 4th harmonic is 20 Hz,
 A) find the fundamental frequency:

B) find the frequency of the 5th harmonic:

If the 3rd harmonic is 21 Hz, find harmonic 4.

What harmonic is this? _____

40 Hz

Mark the nodes and anti-nodes.

Mark one wavelength on the wave.

Find its natural frequency:

Find the frequency of H₄.

