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Introduction to Music Technology

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Harmonic Series

When playing a note on an instrument, it will produce a sound that is made of waves of consistent frequency. It is because of the vibrating string of the instrument. The waves can be vibrating at different times on a string per second. The vibration can be happening on a whole string, half string or one third of a string. That means when one note is playing, there will be more different notes heard after this note is playing because different length of the string vibrating creates different notes. That's the meaning of the Harmonic series. Harmonic series is also called overtone series, is a sequence of harmonics, that its frequency is the integer multiple of a fundamental frequency.

For example, the note A has a frequency of 55 hertz, which means the note A creates 55 cycles of waves per second. This note A is considered the fundamental frequency. In order to get the rest of the harmonics, the fundamental frequency has to be added up together each time. In A major, the fundamental frequency or the first harmonic is 55 hertz. There are usually 16 harmonic or overtones for every fundamental note. The second will be an octave higher, which adds up another 55 hertz, and it will be 110 hertz, equal to A3 in the piano keyboard. The third harmonic is the fifth above the second note. The fourth

harmonic is the perfect 4th above the third note. The fifth harmonic is the major 3rd above the 4th note. The 6th harmonic is the minor third above the fifth note. The 7th harmonic is also the minor third above the 6th note. The 8th harmonic is a minor second of the 7th note. The 9th harmonic is the major second of the 8th note. So in A major, the harmonic tone created by A will be A1, A2, E3, A3, #C4, E4, G4, A4, B, #C5, #D5 and E5.