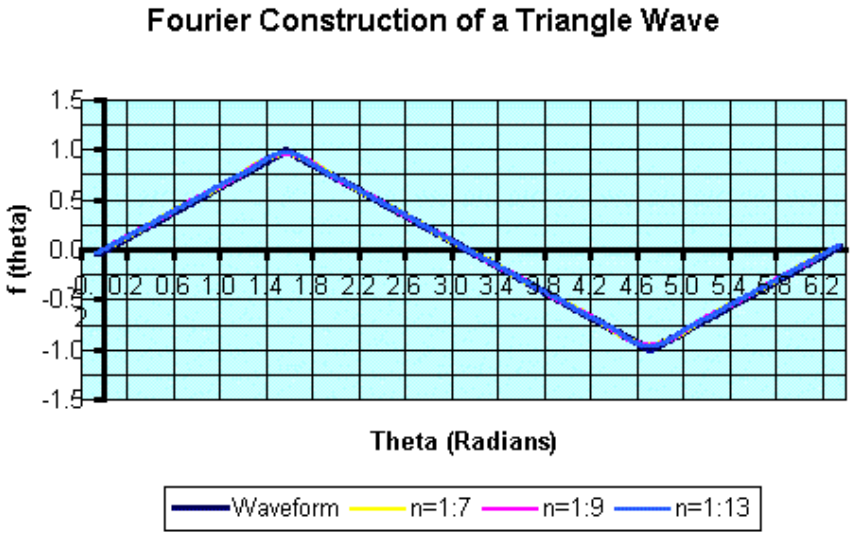
Note that the fundamental, a *sine* wave, is already a quite good approximation to the triangle wave (visually-speaking, but not auditorially so!). Just adding the first two harmonics to the fundamental brings this waveform into quite good visual agreement with the triangle wave, except at the sharp peak(s) of the triangle wave.

The second figure shows the bipolar triangle wave (labelled as "Waveform") overlaid with three other waveforms: that associated with the fundamental through the 7^{th} harmonic ("n = 1:7"), then the waveform associated with fundamental through the 9^{th} harmonic ("n = 1:9"), then the waveform associated with fundamental through the 13^{th} harmonic ("n = 1:13").



Thus, adding on higher harmonics to the lower-order harmonics associated with the triangle wave makes for only small visual changes in the overall waveform - primarily, just the peak(s) sharpen as the higher harmonics are added.

The bipolar triangle wave has physical relevance in stringed instruments, such as the guitar or violin, when the strings are ***plucked*** at the ***mid-point*** of the string, along its length, e.g. using one's fingernail, or a guitar pick (aka *plectrum*).

The ***scale length***, L_{scale} of a guitar is the *physical* length of the string(s) from the *bridge* to the *nut* at the headstock on the neck of the guitar. When one of the open (i.e. unfretted) strings vibrates, the fundamental mode of vibration of frequency, f with a *wavelength*, λ equal to ***twice*** the scale length of the guitar, i.e. $\lambda = 2L_{scale}$. In other words, the scale length of a guitar is ***half*** the wavelength of the fundamental, i.e. $L_{scale} = \lambda/2$. In our discussion of Fourier analysis, the wavelength, λ of the fundamental is *equal* to the space-domain length parameter, L, i.e. $\lambda = L$. Thus, the scale length, $L_{scale} = \lambda/2 = L/2$.

As shown in the figure below, the fundamental has a *node* (i.e. points of zero transverse displacement) at both ends of its wavelength, *and* at its midpoint. All harmonic waves on a guitar *must* have nodes at the bridge and nut, since these do not