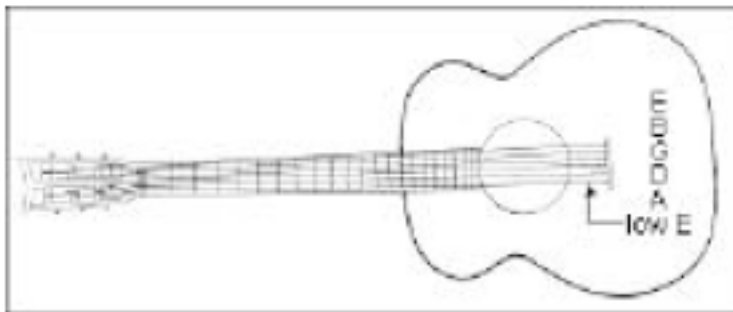


Activity Sheet: The Sounds of Music

1. Connect the graphing calculator, microphone, and data-collection device. Pluck the low E string (refer to the picture) of a guitar and collect data. (The microphone will measure the pressure of the sound wave, and the data-collection device will record the time and pressure, transmitting the data to the calculator.)



2. Examine the graph of the data. Is the graph periodic? If not, repeat the procedure.
3. Using the trace function of the calculator, determine the time for successive crests, and calculate the difference between those times to approximate the period of the graph.
4. Find the reciprocal of each difference to determine the frequencies. What is the average frequency?
5. To create other notes on the guitar, a musician can fret a string by holding the string down on one of the guitar frets. This is like shortening the string length. If you fret the guitar at the twelfth fret, the vibrating string will be half the length of the original E string. Using the procedure in Steps 1–4 above, calculate the average frequency of the wave created by the fretted string.
6. Based on your data, how do the frequencies appear to be related to the string length?
7. Predict the frequency of a string one-third the length of the original string. One-fourth the length.