

### 4.6.3: Procedure

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1. Mount the microphone on the stand at a comfortable height. Connect it to the pre-amp (if available), and the pre-amp to channel one of the oscilloscope.
  2. Depress the oscilloscope's "Quick Menu" button and use the following settings: Input Coupling=AC, Input Impedance=1M, Bandwidth=20MHz.
  3. Adjust the oscilloscope time base (horizontal scale) to approximately 2 milliseconds per division and the amplitude (vertical scale) to 5 mV per division if no pre-amp, and 100 mV otherwise.
  4. Position yourself a few inches away from the microphone and speak in a normal voice while observing the oscilloscope display. Adjust the vertical sensitivity scale so that the waveform peaks do not go off-screen.
  5. Compare the oscilloscope displays using both faster and slower time base settings (100 microseconds per division and 20 milliseconds per division).
  6. Using the sample capture/freeze ability of the oscilloscope (the "single shot" button on the extreme right side), grab portions of speech and examine them. How do these waveforms compare to sine waves?
  7. Use the microphone and oscilloscope to determine the **lowest** pitch capable of being generated by the first member in the group. Do your best to hold a "long A" vowel sound for several seconds and capture the waveform using the single shot button. How does this waveform compare to a simple sine wave? Determine the fundamental frequency and record it in Table 1. Do likewise for the **highest** pitch attainable using a "long A" sound.
  8. Repeat Step 7 for a "long E" sound and for a "long O" sound for this group member. Pay particular attention to the change in wave shape between the vowel sounds as shown on the oscilloscope.
  9. Repeat Steps 7 and 8 for the remaining group members. Record the frequencies in Table 2 (replicate more tables if needed so that each member gets a turn).
  10. Repeat Steps 7 through 9 but whistle instead. Again, examine the wave shape and record the frequency in Table 3 (stretch the table if there are more than two members in the group).
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