

Instrument Project Grading (35 points total).

Create a Google slideshow addressing the 6 topics below. Feel free to insert extra slides as needed.

- Slide 1 (10 points): Instrument Photo.
 - Your photo must show that your instrument has a functional neck, body (resonator), bridge, nut, and tuners, plus at least four tuneable strings (for a passing score – 6/10 – you only need to have one tuneable string).
 - The above parts (except the strings) must be labeled with callouts.
- Slide 2 (5 points): Record a major scale (4 points for a major tetrachord – spacing W-W-H). Connect a microphone. If necessary, use the control panel to troubleshoot the microphone. In Audacity, under the *File* menu, **export** the sound file as a .wav file, and save it on your F:drive. Then upload the file to your Google drive and insert it into your slideshow. Other slide 2 requirements...
 - Correctly identify the tonic (first note) of the major scale.
 - For full points, the intonation must be *correct* (no further than half of a half-step from each intended note).
- Slide 3 (5 points): Harmonics. Record the lowest note in the scale, using Audacity. Create a graph showing the frequencies of the harmonics. To do this, open the *Analyze* tab and select *Plot Spectrum*. In the graph window, you may need to fuss with the size to get the most useful plot. Move your mouse over the peaks and read off the *peak* frequency (appears below graph) for each harmonic. Save a screen shot of the graph. Print it. On your printed graph, for each peak (harmonic) draw a miniature diagram of the standing wave pattern corresponding to that harmonic. Draw a line or arrow to connect each mini-diagram with its corresponding peak. Scan or photograph your annotated graph and insert it into your 3rd slide.
- Slide 4 (5 points): Record at least one complete verse of one song and insert it into your 4th slide. There is no requirement regarding difficulty, but more interesting songs will earn extra points. Note that you can record and overlay multiple tracks in Audacity. For the full 5 points, your song must be recognizable to a listener who is familiar with that song. You may compose your own song, but it needs to sound like a song (will depend on the subjective judgment of the grader). For songs with chords, full credit will be awarded if the chords noticeably compliment the melody. Options include:
 - Melody only. Entirely instrumental.
 - Chords accompanied by melody (humming, singing, whistling, instrumental accompaniment, etc.)
 - Other (as long as it proves that you can actually play a song on your instrument).
- Slide 5: (5 points) Tune your instrument. Then measure the fundamental frequency of each string and use the formula [provided here](#) to calculate the tension of each of your strings. You will need to measure the a sample string to get the mass/length ratio for each string. Show/explain your work. Calculate the total tension of all of your strings and compare that to the [suggested total tensions shown here](#), for your instrument's surface area.
- Slide 6: (5 points) Use the provided amplifier apparatus to create and photograph Chladni patterns on the back of your instrument. Using this [online tone generator](#), start at 100Hz and sweep the frequency upward until you reach the fundamental frequency of your instrument's back. Record the frequency and take a photo of the salt pattern. Then continue to the next two resonant frequencies. Photograph them and record their frequencies. Show all of the photos and corresponding frequencies on this slide. Also explain what the pictures represent. Explain what is happening at the areas that have salt and the areas that do not.
- Extra points may be awarded for exceptional quality.
- Prepare for the doppler challenge, which can earn you bonus points on the sound/waves test – details to come.
- Share your slideshow with jstapleton@ewsd.org (or make it public). Then submit your slideshow by pasting a link to your slideshow into a form that will be provided later.