

- i. Participants will inform the event supervisor which major scale they are playing, whether they are playing it ascending or descending and what note they will start on (e.g., F3 or F4 in playing an F major scale).
- ii. Participants will play one pitch at a time, holding it for a duration of 5 seconds as indicated by signals from the event supervisor. For devices with a quick decay time, multiple attacks on the pitch are allowed (for example, striking a bar multiple times with a mallet or plucking a string). The pitch measurement will be the best value during the 5 seconds. Participants will wait until the supervisor records the measured pitch frequency and indicates that they may proceed before playing the next note in the sequence.
- iii. If the device is so quiet that the equipment has trouble registering the pitch, the supervisor may move the microphone closer to the participants' setup for the Pitch Test only.
- iv. If the device is unable to play some of the required pitches, the participants must notify the supervisor before playing the first note which pitches in the sequence will be skipped. Otherwise it will be assumed that the participants are playing the next note in the scale sequence. Points will be awarded per note.
- g. Once the Pitch Score Test is completed the participants will conduct their Volume Score Test to determine the maximum volume of their device:
 - i. No alterations of the device are allowed between the pitch and volume tests. If the supervisor moved the test equipment closer for the pitch test, it must be moved back to its original location (1.0 m away).
 - ii. Participants will select a single note from the pitch test. Participants will play the pitch for 5 seconds; multiple attacks on the pitch are allowed. The event supervisor will score the loudest volume reached during the 5 seconds.
 - iii. If the volume exceeds 85 dB, the supervisor will stop the testing and a volume of 85 dB will be recorded.
- h. The event supervisor will review with the teams the Part II data recorded on their scoresheet.
5. **SCORING:**
 - a. High score wins. A complete scoring rubric is available on the Sounds of Music page on soinc.org
 - b. The Final Score = TS + LS + PS + VS;
 - i. Test Score (TS) = (Part I score / Highest Part I score for all teams) x 45 points
 - ii. Log Score (LS) = max of 10 points
 - iii. Pitch Score (PS) = (Sum of IPS for the Device / Highest IPS Sum for all teams) x 36 points
 IPS (Individual Pitch Score for each pitch) =
 - (1) C (cents) = abs |cents off the target frequency|.
 - (2) IPS for skipped pitches = 0
 - (3) If $C \leq 5$, $IPS = 4.5$; If $C > 5$, $IPS = 5 - 0.1 \times C$, with a minimum IPS score of 0
 - iv. Volume Score (VS) = (Device max dB / Highest dB over all teams) x 9 points
 - c. The log must track the iterations of calibrating one pitch on the device. The Log Score (LS) points will be assigned as follows:
 - i. 2 pts - For a list of materials used in the device
 - ii. 2 pts - For including data comparing pitch accuracy to an appropriate design element change (e.g., pitch vs length of tubing)
 - iii. 2 pts - For including at least 5 data points
 - iv. 2 pts - For proper labeling (e.g. title, team name, units)
 - v. 2 pts - For including a labeled picture showing how the device changes for the different pitches (ex. a fingering chart)
 - vi. LS = 0 if no device is brought to the event.
 - d. If a team violates any COMPETITION rules, their IPS and max dB values will be multiplied by 0.9 when calculating the scores.
 - e. If any CONSTRUCTION violation(s) are corrected during the Part II setup period, the IPS and max dB values will be multiplied by 0.7 when calculating the scores.
 - f. Teams that are disqualified for unsafe operation, do not bring a device, or whose device does not meet construction parameters at the end of their setup time receive zero points for their PS and VS scores. Teams will be allowed to compete in Part I.
 - g. Ties will be broken using the following categories in the listed order: 1) Best PS, 2) Best VS, 3) Best TS, and 4) Questions on the written test

Recommended Resources: The Science Olympiad Store (store.soinc.org) carries the Sounds of Music Video Download and Chem/Phy Science CD; other resources are on the event page at soinc.org.