2020 NC Coaches Institute
Sounds of Music Handout

The big changes this year are that the volume requirement has been dropped and the required scale is now split across 2 octaves. There is a required song. There is a pitch bonus opportunity.

1) Each team will bring just 1 instrument. No electric, toy, or professional parts may be used, except strings. Rosin is allowed if needed. The instrument must fit in a 60.0cm x 60.0cm x 100cm box and must be moveable by only the participating students. Devices may become larger when set up.

2) One or both participants must be able to play an 8 note scale, but this year that scale must be only ascending. The first note must be between F2 and F3 inclusive, and then jump an octave on the 4th note. Please note that F3 is the highest legal first you can use to start your scale.

   For example: C3 D3 E3 F3 then jump to G4 A4 B4 C5

3) Students must be able to play the first 4 measures of a required song within 15 seconds. That song is: "Twinkle, twinkle, little star, how I wonder what you are."
   This requires 6 consecution notes in your scale, and means that you must build more than 8 notes this year. Based on the above scale example, you will also need G3 and A3.

4) You can also build an 11th note for 5 bonus points. This note must be an octave below your lowest note, or an octave above your highest note. Based on the above scale example, the bonus note must be C2 or C6. Accuracy matters and must be with 10 cents for Regionals, 7 cents for States, and 3 cents for Nationals.

5) Participants have 2 minutes to set up and tune the instrument, using their own tuner or cell phone app. No more adjustments are allowed after this 2 minute period.

6) Each note, including bonus note if there is one, will be tested for accurate tuning using the software program available at sonic.org. Students MUST know the octave number of the starting pitch in the chosen scale. If the instrument cannot play a full 8 note scale, participants must say which notes will be skipped in the sequence. Points are awarded per note. Pitch accuracy target is $\pm$ 10 cents for Regionals, $\pm$ 7 cents for States, and $\pm$ 3 cents for Nationals

7) Song score test will be conducted after the pitch testing. Judging covers rhythmic and pitch accuracy, and playing must be completed within 15 seconds.

8) A log describing the testing of one pitch must be submitted.
   - List of materials
   - Data comparing pitch accuracy to design (i.e. pitch vs. length of tube or string)
   - Must include at least 5 data points
   - Labeling - title, team name, units
   - Labeled picture showing how the device changes pitch (i.e. fingering chart)

9) Participants will be informed of their pitch and song results, and will sign to acknowledge this.

10) There will be a separate 20 minute written test on the Physics of Sound. The proposed NC Division C schedule states that the written test will be given at 12 noon. But the test may be given at different times depending on the region. Check with your director.
    - Before 1st period begins.
    - During the lunch break.
    - During the self-scheduled time that the students choose to compete.

11) Scoring is mathematically complicated. Scoresheet will be posted at the national website. A spreadsheet will be used to record all data, calculate pitch score, and rank teams.

    Total Score = Test Score + Log Score + Pitch Score + Song Score + Bonus

Test Score	45
Log Score	10
Pitch Score	36
Song Score	9
Bonus	5
Best Total	105

    You can see the scoresheets at this link. The newer 2020 versions were not there as of this writing at the end of September. Keep checking. The 2019 versions are fine for practice. Download and just enter zero for the volume score.
    https://www.soinc.org/scoresheets

12) Tips:
    - It is VERY important to understand the octave numbers of the notes. An instrument may be perfectly tuned, but if any note is outside of the allowed range, a zero score is given for that pitch.
    - Wind instruments may be hard to build accurately to get maximum points. These are hard to tune in lower registers, and F2 to F3 is low for a wind instrument. Try to make your starting note as close to F3 as you can. Make the bonus note on the high end.
    - Instruments based on rubber bands, and sometimes tone block instruments, are very hard to pick up with any kind of tuner. Multiple strikes are allowed, and we use multiple types of tuners for best chance.
    - Tuning software is being provided this year. You can use it standalone by downloading it to your own device. MUST use Chrome of Firefox. It will not work with IE.
      https://www.pascioly.org/sounds/
    - Review the Constructed device policy. Judges must be satisfied that the students did the work. Very professional looking devices will receive scrutiny. Document with pictures. https://www.sciencenc.com/about-us/policies/constructed-devices/

References Books

Musical Instrument Design by Bart Hopkins
The Physics of Music and Musical Instruments by David R. Lapp