

This instructional plan is especially suited to grades 3-6. For K-2, a simplified and slightly shorter version of the plan emphasizes the same glass music artistry, but more children's songs they are familiar with—and while still containing some of the science, less terminology, or *introduction* of some terminology, and the making of music from everyday things. For middle schoolers the plan expands to cover resonant frequencies, overtones, and a modern musical piece demonstrating overtones.

### Glass Harp Music/ Instructional Plan:

1. Artist introduces himself and instrument: 8 minutes

- a) Plays opening **musical selection**
- b) Description of instrument, origins of glassmaking, beginnings of glass music in 17<sup>th</sup> century Europe. (shortened for K-2)
- c) Artist's background
- d) **Participation** -- Invites audience member to play a glass, showing that anyone can make a glass sing with their finger, if they know how to go about it.
- e) **Musical selection**
- f) Overview – musical instruments can be found in lots of everyday things. If music can be thought of as a magical thing, it is fun to learn how the physics of music-making work, to enjoy its magic fully.
- g) **Discussion** -- Who has made an instrument at home? Using what materials?' (shortened for 4<sup>th</sup> grade and above)
- h) **Musical selection**

2. Sound Science: 12 minutes

- a) **Discussion** – What is vibration? What are sound waves? What does 'all sound comes from vibration' mean? How do materials vibrate? What is 'mass?' (K-2 simplified)
- b) Virtual 'zoom in' to see the changing shape of a soup bowl when struck – inference: vibrating material is flexible.
- c) **Discussion** – How is the mass of something related to its properties of vibration? What is pitch? What kind of a sound would one expect to hear from a large glass vs. a small one?  
(K-2 simplified)
- d) **Musical selection**
- e) Water tuning demonstration using soup bowls and 'Mary Had a little Lamb--' taking license with the laws of physics and sound. Explore how adding *water* increases mass, slows vibration, and lowers pitch, vs. adding cement/ sand/ chocolate pudding/ etc.
- f) Wind up: historical examples of water-tuned instruments. Jalatharangam music of India; Chinese, Japanese, and Middle Eastern equivalents.

3. **Musical break – two or three selections:** 8 minutes

## Glass Harp Music/ Instructional Plan continued:

### 4. Mechanics of Friction:

6 minutes

- a) **Discussion** – What is friction? Examples of friction in daily life, examples of musical instruments that use friction. (introduction of concept for K-2)
- b) **Participation** – a long string held taut between artist and an audience member is used to simulate a violin string being continually ‘caught and released,’ with the aid of a long piece of wood dragging against the string.
- c) Demonstration of Tibetan singing bowls and bird calls as friction instruments.
- d) Musical saw demonstration. The musical saw is shown to be another friction instrument, one where the vibrating area of the saw can be manipulated while playing to make the note go up or down. Audience request of one or two songs for the musical saw.

### 5. The Armonica:

6 minutes

- a) Overview of Ben Franklin’s talents as an inventor. How his inventions saved labor and were clever and efficient. The story of the glass armonica, from Ben’s enthusiasm at hearing musical glasses played in Europe to imagining and building the armonica.
- b) Assembly of demonstration armonica, showing Ben’s idea of mounting glasses sideways on a spindle.
- c) **Discussion** – How did this instrument work more efficiently? How do you play it? (quick explanation for K-2)
- d) **Participation** -- An audience member is invited to join the artist and play a chord on the rotating armonica.
- e) Musical selection: Mozart’s famous Adagio in C for Glasharmonica, or perhaps another historical piece of music written especially for this instrument. (Played on glass harp)

### 6. Audience question time and musical requests:

5 minutes

Total: 45 Minutes