

## ***Program Information***

### **PERFORMANCE**

Learn all about ***Musical Glasses***, or the ***Glass Harp***- a musical instrument that is a collection of drinking glasses, each chosen for their pitch or musical note. Glasses can also be ***tuned*** using water to obtain certain pitches. Glasses can be played by wetting ones fingers and carefully rubbing the rims of the glasses, using ***friction*** to make music. During the program Brien performs music of different styles and periods. The program explores musical instruments made from everyday materials, the history of glass and water-tuned music, and related concepts of physics and sound. Questions and song requests are welcome toward the end of the assembly.

### **GOALS AND OBJECTIVES**

To learn about the glass harp.

To understand related concepts of physics and sound.

To learn the history of water-tuned and glass music.

To be inspired to experiment with different ways of making music.

### **GRADE LEVEL K-12**

### **CURRICULUM CORRELATION**

#### ***SCIENCE***

The program explores the science of sound and elementary physics related to sound and musical instruments. Students are exposed to demonstration of how sound is generated, what 'waves' of sound are, what 'frequency' of sound waves means, the relationship between vibration and sound, and various ways sound frequency can be manipulated, especially in the example of water-tunes instruments. The concept of friction is explored to demonstrate how water glasses can be played.

#### ***HISTORY AND CULTURAL STUDIES***

Students are exposed to facts and examples of ancient Asian water-tuned instruments; how they were developed in the respective cultures from where they came, what materials were used to create them, and in what context they were played. Students are also acquainted with a rudimentary history of early water *glass* instruments played in Europe, again involving facts of the culture and social world surrounding the instruments, materials, different methods of playing them, practitioners, etc. A third historical/cultural segment woven into the program involves specifically Dr. Benjamin Franklin's invention of the Armonica, an advanced glass instrument that achieved great notoriety in the late 1700's.

#### ***MUSIC***

In exploring the various ways a musical instrument can be assembled, students are exposed to the musical science of intervals and harmony. Selections specific to the Baroque era of classical music are played in the assembly, as well as pieces composed for the glass armonica by W. A. Mozart and Carl Leopold Rollig. In order to demonstrate the melodic value of the glass harp, other selections are included in performance- drawing from Jazz, movie themes, Appalachian folk music, Celtic music, and popular songs.

## GETTING READY FOR THE PERFORMANCE

### A FEW WEEKS PRIOR TO THE PERFORMANCE:

Have two students pull on either end of a jump-rope or bungee cord until it is taut enough to give a sound when plucked. By varying the tautness, high and low sounds are created and the rope behaves differently.

Locate China, India, Japan, and Egypt on a map. Discuss the culture of these countries around the time of early water-tuned music. Discuss the ritual and story-telling meaning of music in those countries, more than a thousand years ago.

Locate Germany on a map. Discuss the culture of Germany in the early to mid 18<sup>th</sup> century—especially how the rise of a particular industry (glass making) created material for a new form of music making. Discuss the world of Baroque and classical music, and how many important composers were born in Germany.

Discuss the life and times of Dr. Benjamin Franklin. Statesman, Inventor, Writer, *and* musician! Dr. Franklin's philosophy was to 'work smart.' How, in inventing the armonica, did he make an instrument that was more accessible to the public? **NOTE: Benjamin Franklin's armonica took musical glasses a step further: He had glasses custom-built for him in exact pitches and sizes, with no stems (so they ended up resembling a progression of smaller and smaller bowls), and a hole in the center bottoms for a spindle to go through. Mounted sideways on the spindle and stacked together without quite touching, the rims were each less than an inch apart. As the spindle turned, all the glasses rotated. The musicians wet their hands and pressed their fingers against the turning bowls and voila! There was music.**

### ON THE DAY OF PERFORMANCE:

Have students think about what they have learned. What other things would they like to know about glass music, music of other cultures, the armonica, etc., that they can ask the performer? What musical requests would they like to make? What non-musical things are they inspired to learn more about through watching the performance?

### AFTER THE PERFORMANCE:

Ask what other little known musical instruments would students enjoy researching? Did the performance inspire a desire to build something? What further questions exist in their minds about sound and physics, now they have seen the performance?

Have students bring in different size glasses and (with close supervision) build a classroom glass harp. Place glasses in a sequence according to pitch.

Create a reproduction of an early water-tuned instrument, like the Jalatharan, played in India in 700. A collection of ceramic bowls can be tuned with water and struck with spoons or sticks. Metal cookware can also be tuned with water and be a percussion instrument.

## VOCABULARY

**Vibration-** Back-and-forth motion of matter. All musical instruments vibrate in some way- sending out very small changes in air pressure (sound waves) that we hear. To see vibration, strike a tuning fork and dip the prongs into a glass of water. The water splatters because of the vibration of the prongs.

**Pitch-** Lowness or highness of a sound, determined by how often sound waves are generated. A higher frequency of waves causes a "higher" sound. A rubber band can be stretched and plucked. The tighter the band is stretched, the faster it vibrates, the more frequent are the sound waves, and the higher the pitch. When the band is loosened, it vibrates at a lower *frequency*.

**Friction-** The rubbing of one surface against another. Crickets rub their legs against their bodies creating sound waves. Violins and glasses are friction instruments.

**Harmony-** The combination of musical tones or notes into chords and progressions of chords.

**Armonica-** Benjamin Franklin's musical invention; a variation on the glass harp.

**Spindle-** A shaft or rod which turns. Ben Franklin's armonica used glass cups that fitted around a metal spindle. When the spindle turned, so did all the cups.

## REFERENCES

### Books:

*Ben and Me*, written and illustrated by Robert Lawson

*How To Play Nearly Everything*, by Dallas Cline

*The Oxford Companion to Music*

*The Oxford Companion to Musical Instruments*

### On the Web:

<http://www.glassharp.org>

Brien Engel's glass harp site

<http://www.geocities.com/Vienna/7597/indexgb.htm>

Clemens Hoffinger's extensive site about glass music

<http://www.mindspring.com/~glassmusicintl/>

Glass music International

<http://www.physics.uoguelph.ca/summer/scor/articles/scor231.htm>

The Science Corner

<http://finkenbeiner.bcn.net/index.html>

Gerhard Finkenbeiner, builder of glass armonicas