Week 13a – Spoon Bell (VanCleave's #161)

Prep Notes	
Materials	Metal spoon (heavy works best) 30 inches of string
Teacher Background	Sound travels through a "medium" like air, water, or Earth: • air – most of what we hear • water – e.g., whale singing/communication, which can travel 100 miles in water! • Earth – e.g., putting your ear to the ground to hear the coming stampede. Sound cannot travel through a vacuum, like space, where there are no molecules to vibrate. In this project, we'll listen to sound that originates with a vibrating spoon and travels through a string. The vibrations in the spoon translate to vibrations along the molecules of the string, all the way to the finger and into the ear. One would also be able to hear the spoon as its sound traveled through the air, but this experiment isolates the spoons vibrations from the other sounds in the environment. The listener is "plugging his ears" to the world, and only hearing his own spoon's vibrations, through the string as the medium.
Opener Ideas	• What things make sounds? (Noisy babies, instruments, cars, bugs, etc.) • How can you describe sound? (High/low volume, High/low pitch, harmony/cacophony) • Where can sounds be heard? ("everywhere", even under water, but not in space!)
Grammar	• **Vibrate**: wiggle back and forth (demo: "twang" a ruler, as in VC experiment #163, or pluck a rubber band) **very** quickly • **Medium**: the "stuff" through which sound is traveling (air, water, string, etc.) • **Wave**: a model for showing and measuring the movement (propagation) of sound through a medium • **Amplitude**: the strength (loudness), measured as the "height" of the sound wave, usually measured in decibels (dB); sounds over 90-100dB are "very loud", and could damage ears *Optional / older:* • **Frequency**: the speed of the vibration, measured as the "width" of the wave humps, measured in vibrations per second (Hertz, or Hz)
Scientific Method	
Observations	...about sound, perhaps sounds in the room; consider keying off of "Opener Ideas", above.
Question	How will the sound of a softly-tapped spoon differ from that of a firmly-struck spoon?
Hypotheses	Ideas might include change in pitch, change in volume, no change at all
Experiment (Procedure)	Tie the middle of the string to the middle of the spoon Wrap each end of the string once around each of your index fingers Put your index fingers gently into your ears Lean forward to dangle the spoon, then swing it gently into a table or object Listen/observe Now lean forward and swing it vigorously into a table or object Listen/observe the difference
Results	The gently-tapped spoon vibration should be less intense (lower amplitude, lower volume) than the firmly-struck spoon.
Conclusions	The spoon itself will only vibrate at one frequency, when suspended from a string like this – to get a different pitch, you'd have to try a different spoon. Generally, a smaller spoon will ring "higher", and a larger spoon will ring "lower", but other factors could influence pitch, too