Bounce Back

**Purpose**
To capture an echo.

**Materials**
- 2 empty paper towel tubes
- Watch that ticks
- Book
- Helper

**Procedure**
1. Lay the tubes on a table with their ends together and at about a 45° angle to each other.
2. Hold the watch in your hand at the end of one of the tubes and position one of your ears at the end of the other tube. Cover your other ear with your free hand. Make note of the loudness of the ticking of the watch.
3. Ask your helper to hold the book in front of the open ends of the tubes. Again make note of the loudness of the ticking of the watch.

**Results**
When you first listened through the tubes, you could not hear the ticking of the watch. However, with the book at the end of the tubes, you did hear the ticking of the watch.

**Why?**
Sound travels through air in waves. Sound from the watch travels through the tube. Without the book at the open end, the ticking sound exits the tube and spreads out in all directions. The loudness of sound depends on the energy of its waves the more the energy, the louder. The more the sound is scattered, the less energy it has, so the more difficult it is to hear. With the book, some of the sound waves spread in all directions but a great deal of them are reflected off the book and some enter the tube leading to your ear. This sound is less spread out and thus has more energy, so it is louder. An echo is a reflected sound wave. In other words, like the ticking sound, an echo bounces back off a surface.