This lesson will go over how to perform pure tone audiometric air conduction (AC) testing. The purpose of this hearing test is to see how sound travels through the outer, middle and inner ear respectively and measure on an audiometric chart how the cochlea is responding at multiple frequencies. It is important to conduct an otoscopic examination before doing any test, to ensure the canal and eardum looks healthy and free of wax compaction. If any FDA concerns are present, the patient should be referred before testing is conducted.

If referral is not necessary, proceed with the test by asking the patient which ear appears to hear better. Always start with the better ear, if they seem about the same to the patient start with the right ear for all tests. If using headphones, place the red phone over right ear and the blue over the left. If using inserts, place a new clean insert tip on both sides, and insert red into right ear and blue into left.

Once inserts or headphones are in place, using your microphone, explain to the patient, "Please listen for the beeping sounds and press the response button (if no response button is available have them raise their hand) each time you think you hear a tone, even if the sound is slight please respond. Do you understand"? If they have questions, make sure to answer and that they are comfortable before beginning the test. Lastly, have them either face away from you or simply close their eyes.

The frequencies we will be testing range from 250-8000 HZ. Begin testing at the most reliable frequency which is 1000 HZ. Introduce a 40 dB signal (30 or 50 are also acceptable starting stimulus) on the audiometer and see if they respond. If a response is given that they heard the signal, decrease the level presented by ten dB and present the signal. Lower by ten dB until no response is given. Once no response is given, increase the signal presented by 5 dB until the patient responds again. This is called the ascending/descending method. We are trying to find the patient's threshold for each frequency, which is the level they hear the signal at least 50 percent of them time. Refer to the example below for a patients right ear at 1000 Hz:

40 dB **Patient responds (descend)**

30 dB **Patient responds (descend 10)**

20 dB **Patient responds (Descend 10)**

10 dB **Patient doesn't respond (Ascend 5)**

15 dB **Patient doesn’t responds (Ascend 5)**

20 dB **Patient responds (Descend 10)**

10 dB **Patient doesn't respond (Ascend 5)**

15 dB **Patient doesn’t responds (Ascend 5)**

20 dB **Patient responds**

This confirms the patient responded at least half the time at 1000 Hz at 20 dB. We have confirmed this by getting a response three times at 20 dB. Now that a threshold has been found for 1000 Hz in the right ear, move forward and test in this order for each ear.

1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, 6000 Hz, 8000 Hz, reverify 1000 Hz, 500 Hz, 250 Hz

A secondary order of introducing signals is called the Carhart method and is as follows:

1000 HZ, 500 Hz, 250 Hz, reverify 1000 Hz, 2000 Hz, 3000 Hz, 4000 Hz, 6000 Hz, 8000 Hz

If there is a greater than 15 dB difference between 1000-2000 Hz it would be best to also test 1500 Hz, likewise if there is a 15 dB difference between 250 and 500Hz, 750 Hz should be tested. A general rule of thumb is if the patient responds to signal, drop down 10 dB and if they don’t respond increase by 5 dB. While introducing signals it is also required to stagger input rhythm and timing of signal. For instance, don’t fall into a set pattern of introducing stimulus because the patient may begin to anticipate for tone and give incorrect responses.

On the right ear we mark the audiogram with a **red O** and for the **left a blue x** at the patient's thresholds. These are universal symbols that are used for audiometry around the world.

Common audiogram symbols

	Red, **RIGHT**	Blue, **LEFT**
Air Conduction	O	X
Bone Conduction	<	>