

## AUDIOLOGY LESSON - HAND OUT

Today, students will test their knowledge to help Dr. Camacho while she is performing tests on a patient to see if he has received middle ear damage. As you may remember from the video, sound is measured in units called decibels (dB), which work on a logarithmic scale. During tests, Dr. Camacho must gradually increase decibel levels in the patient's good ear, to see what the other ear is actually receiving. However, you could not simply turn the volume knob on the sound all the way up without serious risk of injuring the patient's good ear. We will need to see which loudness intensities can be used safely on a patient without damaging their ear drums.

A whisper is about 30 dB, normal conversation is about 60 dB, a motorcycle engine running is about 95 dB. Prolonged exposure to noises above 70 dB can start to damage hearing and loud noises above 120 dB can cause immediate ear damage.

The equation for sound intensity in decibels is  $L = 10 \log (i/m)$  where  $i$  is the intensity of the sound and  $m$  is the minimum intensity of sound detectible by the human ear. For our lesson we will set  $m = 1$ .

The lowest setting on the noise machine is 1dB. The highest setting is 120 dB. Dr. Camacho has given you 5 loudness intensity settings to program into the noise machine for the scale to be tested on the patient.

1. What are the decibel levels of the following intensities, and which of the below can be used with a normal hearing patient without doing damage to their ears?

- A)  $I = 1,000$
- B)  $I = 1,100,000$
- C)  $I = 398,107$
- D)  $I = 63,095,734$
- E)  $I = 39,810,717,055$

2. Dr. Camacho believes she has zeroed in on the patient's level of damage but, wishes to further test between 22 dB and 27 dB. What is the sound intensity difference between these two decibel levels?