

# Lesson 1 - Q & A

## Introduction Sound and Hearing

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STUDIO NAME: House  
NAME OF MENTOR(S): Take

1. List the career opportunities in this field: (Page 19-23)

- a. The Artist
- b. Studio Musicians & Arrangers
- c. The Producer
- d. The Engineer
- e. The Assistant Engineer
- f. The Maintenance Engineer
- g. The Mastering Engineer
- h. The DJ
- i. The VJ
- j. The Songwriter

2. The distance a sound, as seen on a computer display, varies from the "centerline" is called it's amplitude. (page 43)

3. When we look at an audio sound bite in a digital audio workstation, the horizontal left-to-right image is called it's wavelength. (page 46)

4. The speed at which a wave travels through a medium is called it's velocity. (page 46)

5. The basic three wave forms used to create synthesizer sounds are named Square, triangle, sawtooth. (page 54)

6. To create a sound from scratch, four parameters are needed to construct a new sound. A Musical Waveform Envelope is made up of four parts (Page 57)

- a. Attack
- b. Decay
- c. Sustain
- d. Release

7. The scale for measuring the volume of a sound is called the decibel. (page 57-61)

8. The volume of a whisper is approximately 35 dB. The volume of an airplane taking off is approximately 125 dB. (page 60).

9. A popular graph for measuring our ear's sensitivity to loudness is known as the The Fletcher-Munson equal loudness contour curves. (page 64)

10. The recommended volume for mixing is 85-95 dB (page 65)

11. Why is it so important not to mix too loudly or too softly? infrasonic and ultrasonic  
also hearing loss (page 57-64).  
Inaccurate mixing

barely noticeable

## MANDATORY SUPPLEMENTAL READING

### Lesson 1 - Safety in Hearing.

Use the internet to find examples of the following level of sound pressure. Find common examples of the following levels of "noise" in our daily lives. For example, 150 db equals a gun shot, a jet engine at take off, etc.

#### 200 Decibels - Immediate Danger to Hearing

Saturn Rocket Firing

#### 125 Decibels - Pain Threshold

Pneumatic Riveter at 4'

#### 120 Decibels - Risk of hearing damage in 75 minutes.

Diesel Engine, Ball Mill

#### 115 Decibels - Risk of hearing damage in 15 min.

Sand Blasting, Loud Rock Concert

#### 110 Decibels - Risk of hearing damage in 30 min.

Power Saw at 3'

#### 105 Decibels - Risk of hearing damage in 1 hr.

Sporting Event, Table Saw

#### 100 Decibels - Risk of hearing damage in 2 hrs.

Lawn Mower, Factory

#### 95 Decibels - Risk of hearing damage in 4 hrs.

Jackhammer at 50'

#### 90 Decibels - Risk of hearing damage in 8 hrs.

Band, Symphony

# NOTES:

- All sounds are created by causing a medium to vibrate
- As sound travels it loses energy
- Sounds that vibrate many times per second are called "high frequency" sounds and those which vibrate less frequently are known as "low frequency" sounds
- Wavelengths from sound may range from one inch to forty (40) feet depending on the frequency
- Sound waves are periodic or cyclical
- Depending on the density of the medium, sound travels through some mediums faster than others
- Sound travels about 4 times faster in water than it does in air (mainly due to the molecular structure); it travels about 10 times slower in rubber
- The speed of sound is influenced by humidity; humid air absorbs more high frequencies than low frequencies
- Pitch is determined by a sound's frequency - the lower the frequency the lower the pitch
- High frequencies have shorter wavelengths than low frequencies
- The fundamental is the lowest pitch of sound
- The fundamental frequency is the strongest pitch we hear
- Even numbered harmonics make sounds "soft" and "warm," while odd numbered harmonics make sounds "bright" or "metallic"
- Lower order harmonics control the basic timbre of the sound and higher order harmonics control the harshness of the sound
- 2 notes separated by an octave are said to be "in tune"
- The intensity of a wave depends on the amplitude of the wave
- The human ear can detect sounds with an intensity as low as  $10^{-12} \text{ W/m}^2$  and as high as  $1 \text{ W/m}^2$
- The decibel is used to express power but doesn't measure power
- A sound that is 6 dB higher in level is perceived to be about twice as loud
- 2 researchers in the 1930s (Fletcher and Munson) were the 1st to measure and publish a set of curves showing the ears' sensitivity to loudness versus frequency
- The average optimum listening level is 85 dB SPL
- Beats are the result of the ears' inability to separate closely pitched tones