Hearing PowerPoint Notes

The structures of the ear relate to their functions.

Like light, sound is a wave.
A wave is a _____________ that transfers energy from place to place. Your eyes can detect light waves. You cannot see sound waves with your eyes. Instead, you “see” them with your ears! Sound is a _____________. Sound waves are pressure waves with alternating high and low __________ regions. A sound wave is created when something vibrates—like a speaker playing music. If you touch the surface of the speaker, you can feel the vibrations that create a sound wave. Those vibrations transfer energy to the surrounding __________ _____________.

How a sound wave is created:
Air molecules are spread very far apart and are in constant, random _____________. When air molecules are pushed by the vibrations, it creates a layer of ____________ pressure. That layer pushes on the next layer, which pushes on the next layer, and so on. The result is a traveling vibration of pressure—a _____________ wave. The molecules in a sound wave are compressed in the _____________ that the wave travels. The frequency of a sound wave is the number of _____________ per second. Wave frequency is measured in _____________ (Hz). A wave with a frequency of 1 hertz vibrates at one _____________ per second.

Properties of Sound

Pitch
The pitch of a sound is how we _____________ and interpret its _____________. The range of frequencies humans can hear varies from about 20 hertz to 20,000 hertz. A low-frequency sound has a low _____________, like the rumble of a big truck or a bass guitar. A high-frequency sound has a high pitch, like the scream of a _____________ or siren.

Loudness
The loudness of a sound is measured in _____________ (dB). The decibel is unit used to express relative differences in the loudness of sounds. The decibel scale compares the _____________of sounds. Most sounds fall between _____________ and _____________ on the decibel scale.
Frequency

Why is it easy to recognize one person’s _____________ from another, even when people are saying the same word? The reason is that voices have different mixtures of _____________. A frequency spectrum is a graph showing the different frequencies present in a sound. _____________ is on the vertical axis and _____________ is on the horizontal axis.

**The human ear can be divided into sections:**
- The external ear,
- The middle ear, and
- The inner ear.

**The Outer Ear**
The outer ear helps collect sound _____________ and directs them into the middle ear. Some mammals can move their outer ears to detect the _____________ of sound. You must turn your _____________. The outer ear funnels sound waves into the ear or _____________ canal which leads to the middle ear.

**The Middle Ear**
The middle ear is an _____________ cavity that consists of the _____________ and three tiny, interconnected _____________: the maleus, incus, and stapes. The eardrum is a tightly stretched membrane that _____________ as the sound wave reaches it. The eardrum vibrates at the same _____________ of the sound wave. Being connected to the maleus, the movements of the eardrum set the maleus, incus, and stapes into _____________ at the same frequency of the sound wave.

**The Inner Ear**
The stapes is connected to the _____________ of the inner ear. The inner ear has two important functions: providing our sense of _____________ and our sense of _____________. The three semicircular canals near the cochlea are also filled with _____________. Fluid moving in each of the three canals tells the brain whether the body is moving left-right, up-down, or forward-backward. The _____________ is a tiny fluid-filled cavity in the inner ear that contains ______ cells that convert sound from vibrational energy into _____________ impulses. The stapes _____________ against the cochlea. _____________ in the spiral of the cochlea vibrates and creates waves that travel up the spiral. The spiral channel starts out large and gets narrower near the end. The nerves near the beginning respond to _____________-frequency sound. The nerves at the small end of the channel respond to _____________ frequency sound. Neurons in the cochlea convert the waves into nerve impulses and send them to an area of the _____________ that interprets sound.