

Name _____.

October 1, 2009.

The Nature of Sound (and Elephant Feet)

Part One:

a) Sound cannot travel through a _____, it requires a _____ to get from one place to another.

b) _____ is a wave which is created by vibrating objects and *propagated* through a medium from one location to another.

c) Sound is an example of a _____ wave, which means that the individual particles of the medium are moving in a direction parallel to the energy transport. Since a sound wave is a disturbance which is transported through a medium via _____ interaction, sound is also characterized as a _____ wave.

d) As I speak to you, vibrations of sound waves create compressions and rarefactions within the air. The compressions are areas of _____ pressure, and the rarefactions are areas of _____ pressure.

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Part Three: The Secret Sense of Elephants



.....If I were to ask you why elephants are extraordinarily good at listening, how would you answer? Wouldn't the first thing to come to mind be their incredibly large ears? Although it is true that an elephant can hear an awful lot by putting its ears out, the answer to my question is a bit more complicated. Elephants are ultimate sound-perceiving organisms largely due to the nature of their feet!

Elephants listen to airborne (acoustic) sounds by perking their ears and orienting toward the source of the sound. Recently scientists began noticing a very puzzling behavior: several elephants would freeze, simultaneously, often in mid-stride, and they would press their front feet into the ground. Sometimes they roll a foot forward so that their toenails touched the ground. At other times, they would lift one of their legs.

What is happening here?

Infrasound, or low-frequency, elephant vocalizations below the threshold of human hearing travel through the ground in the same waveform as they do in the air. This ground vocalization has the potential of traveling further than the airborne vocalization as there is no outer limit to how far sound can travel through the earth.

There are two ways elephants "hear" sound waves traveling through the ground:

- Elephants feel the sound wave through their feet and trunks using something called a **somatosensory pathway**. Their feet and trunks have a large number of specialized cells that can detect vibrations. These cells can help transmit these vibrations to the brain.

