

Name \_\_\_\_\_

## Sound Waves vs. Light Waves: A Journey into the World of Waves

### Open-Ended Response Answer Key

1. One practical application of sound waves is in the field of ultrasound for medical imaging, where high-frequency sound waves are used to create images of the inside of the human body. An application of light waves is in optical fiber communication, where light signals are transmitted through thin glass fibers to carry data over long distances. The properties of sound waves, such as their ability to travel through solids, make them useful for medical imaging. Light waves' ability to travel in a straight line and reflect off surfaces is essential for optical communication.
2. On a planet with no atmosphere like outer space, sound waves would not be able to travel since there is no medium for them to propagate through. However, you would still be able to see objects using light, as light waves can travel through a vacuum and reach your eyes.
3. The speed of sound in water is significantly faster than in air, at approximately 1,480 meters per second (about 3,315 miles per hour). This difference in speed is crucial for marine biology research, as it allows scientists to use underwater sonar to study underwater environments and locate marine life. Underwater communication systems also rely on the speed of sound in water to transmit messages over long distances.
4. Our ability to see objects depends on how they interact with light waves. When light hits an object, it can be reflected (bounced off the object's surface), refracted (bent as it passes through the object), or absorbed (converted into heat energy). The interaction of light with objects determines what we perceive as color, texture, and brightness. For example, when white light hits a red apple, the apple absorbs all colors except red, which is reflected back to our eyes, making the apple appear red.

