

I highly recommend that you review the vocabulary terms, you look over the guided reading assignments for Ch. 26 & 27. Review your video logs and watch any sound and light videos you might not have watched yet.

Sound

1. What produces sound waves? What type of wave is a sound wave? **A sound wave is a longitudinal (AKA compression) wave. Sound waves are produced by a vibration. Sound waves require a medium to carry them.**
2. What happens when waves interfere? **Waves can constructively interfere to make a louder wave (Higher amplitude), or they can destructively interfere to cancel the wave (lower the amplitude).**
3. What is the speed of sound? Does sound travel the fastest in solids, liquids, or gases? What factors affect the speed of sound in materials? **The speed of sound is 330 m/s in 0 °C air. The speed of sound increases 0.6 m/s every 1°C the air warms. Sound is faster in liquids than in air, and is faster in solids than in liquids. The speed of sound waves in a material depends on the phase of matter of the material, the temperature of the material, and the elasticity of the particles that make up a material.**
4. Where can sound waves NOT travel at all? Or not be heard? **Sound waves cannot travel in a vacuum (AKA no air), they must have a medium to carry the energy. (Remember the buzzer under the bell jar.)**
5. What is resonance? When does resonance occur? **Resonance is a phenomenon that occurs when the frequency of a forced vibration on an object matches the object's natural frequency and a dramatic increase in amplitude occurs. Examples of resonance: The MythBusters video where they broke glass with sound, the Tacoma Narrows Bridge, and the street artist that was playing a song with crystal glasses.**
6. Using your voice to shatter a glass is an example of what? **Resonance.**
7. What causes beats? **Beats are caused by two frequencies that are close to each other sound at the same time and they constructively and destructively interfere making louder or canceling them out.**
8. What is constructive and destructive interference? **Constructive interference is when a crest and crest (or a compression and another compression) overlap and make a wave with larger amplitude (or louder), and destructive interference is when a crest and a trough (or a compression and a rarefaction) pass and slightly or completely cancel out (resulting in lower amplitude.)**
9. What factors affect the speed of a sound wave in a medium? **The speed of sound waves in a material depends on the phase of matter of the material, the temperature of the material, and the elasticity of the particles that make up a material.**
10. How do you determine the beat frequency? **You find the difference in the two individual frequencies. For example if a 256 Hz tuning fork and a 258 Hz tuning fork are struck, you will hear a beat frequency of 2 Hz, or two beats per second.**

Light

11. Does light behave like a wave or a particle? **Both. Light has a dual-nature and partially behaves like a wave, and partially behaves like a particle.**
12. What type of wave is an electromagnetic wave? Do EM waves need a medium? **Electromagnetic waves are transverse waves and do not need a medium to carry them. Many times, they can travel through a medium, but a medium is not required for the wave to travel.**
13. What is the speed of light? **Rounded to 3.0×10^8 m/s**
14. List the EM waves on order of increasing wavelength & frequencies. **Wavelength Shortest to longest: Gamma, X-Rays, UV light, Visible Light (VIBGYOR), Infrared, Microwaves, Radio waves. Frequency, lowest to highest: Radio waves, Microwaves, Infrared, Visible Light (ROYGBIV), UV Light, X-Rays, & Gamma Rays.**

15. What is the main difference between a radio wave and an infrared wave? **The main difference between any two types of EM waves is the frequency and wavelength (which are inverse). All electromagnetic waves travel at the same velocity, so the only difference between all the wave types is the frequency and wavelength.**
16. How does polarization work? **Polarization filters out all by 1 plane of light, if you have two polarizing filters, and you rotate them to a right angle, you can block almost all the light. Depending on the quality of the filters, only 0% to 40% of the light can come through both filters when they are at a right angle.**
17. What is refraction? What causes refraction? **Refraction is the bending of light as it changes medium. Light bends when it changes medium because it changes speed when it changes mediums.**
18. What determines the color we see? **The color we see is determined by the wavelength of wave that is reflected off an object. (Which is also related to the frequency). Objects that absorb RYGBIV will be orange, because if they don't absorb it they reflect the color and that is what color an object appears to you.**
19. State the law of reflection. **This law states that the angle of incidence of a light ray is equal to the angle of reflection of that light ray.**
20. What are the colors of the visible spectrum? **In the visible light spectrum, what causes different colors? ROYGBIV are the colors of the visible spectrum, and the different colors are caused by the different wavelength and frequencies of the light waves.**
21. What determines the color that something appears to be? **The color that something appears to be is the color that the object reflects. All other wavelengths are absorbed.**

Problems: Provided formula: $V = \lambda \cdot f$

22. Be able to calculate the velocity of a wave, the frequency of a wave, or the wavelength using: $V = \lambda \times f$
23. You hear a firecracker 500 m away. The speed of sound is 340 m/s. How long did it take the sound to reach you after the firecracker exploded? **$v = \frac{d}{t}$ so the time can be found: $t = \frac{d}{v} = \frac{500m}{340 m/s} = 1.47 \text{ seconds}$**
24. How much louder is a 40 dB sound over a 20 dB sound? **To go from 20 to 30 is a 10dB and to go from 30 to 40 is another 10 dB. So 10×10 is a 100 times increase in volume between 20 and 40 dB.**
25. What is the wavelength of a 256 Hz sound wave that travels 340 m/s? **if $v = f \cdot \lambda$ then $\lambda = \frac{v}{f} = \frac{340 m/s}{256 \text{ hz}} = 1.3 \text{ m}$**
26. What is the ocean depth if sonar is used and the signal take 11 seconds for a round trip and the speed of sound in saltwater is 1500 m/s? (Hint: remember this is a round trip so you have to take an extra step.)
**if it took 11 seconds for a round trip down and back up, then it only takes 5.5 seconds for a 1 way trip down:
if $s = \frac{d}{t}$ then the distance is $d = s \cdot t = 1500 \text{ m/s} \cdot 5.5 \text{ sec} = 8250 \text{ m}$**
27. A 200 Hz and a 203 Hz tuning fork are struck, what is the beat frequency. **The Beat frequency is the difference of the two frequencies. So, 3 Hertz is the beat frequency.**