

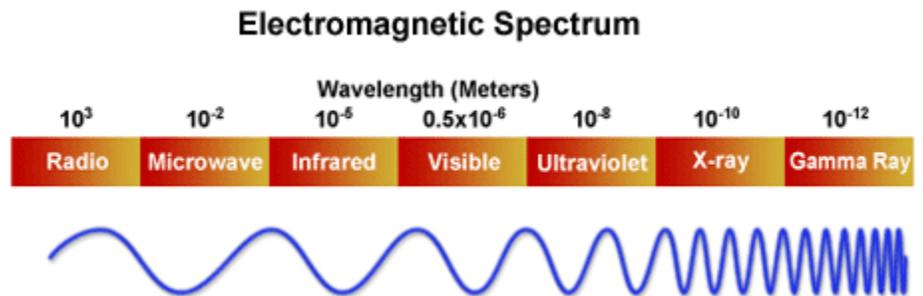
Waves Unit Study Guide KEY

1. Describe the differences between mechanical waves and electromagnetic waves? (S8P4a)

2. What feature best distinguishes one form of electromagnetic energy from another? (S8P4a)

Wavelength

3. Using the Electromagnetic Spectrum diagram to the right, which electromagnetic wave transfers the most energy? (S8P4a) **Gamma rays**



4. Define the following:

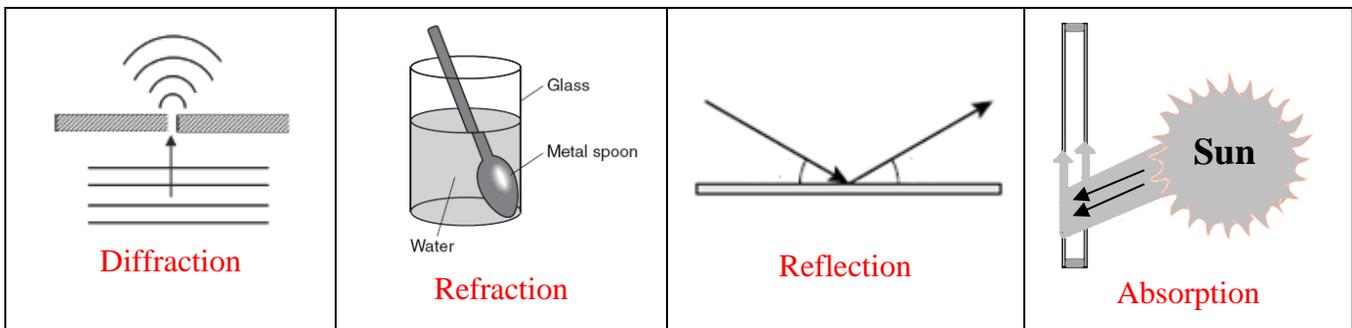
Reflection: **when a wave strikes an object or surface and bounces off**

Refraction: **the bending of a wave as it moves from one medium into another**

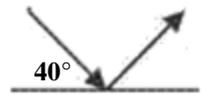
Diffraction: **the bending of waves around a barrier**

Absorption: **the transfer of light energy to matter**

5. Identify the following images as Reflection, Refraction, Diffraction, or Absorption.



6. If the light ray hits a mirror at a 40° angle, what angle will the ray of light be reflected? Why? (S8P4b) **40° because the angle with which the ray of light hits the surface is the same with which the ray of light is reflected**

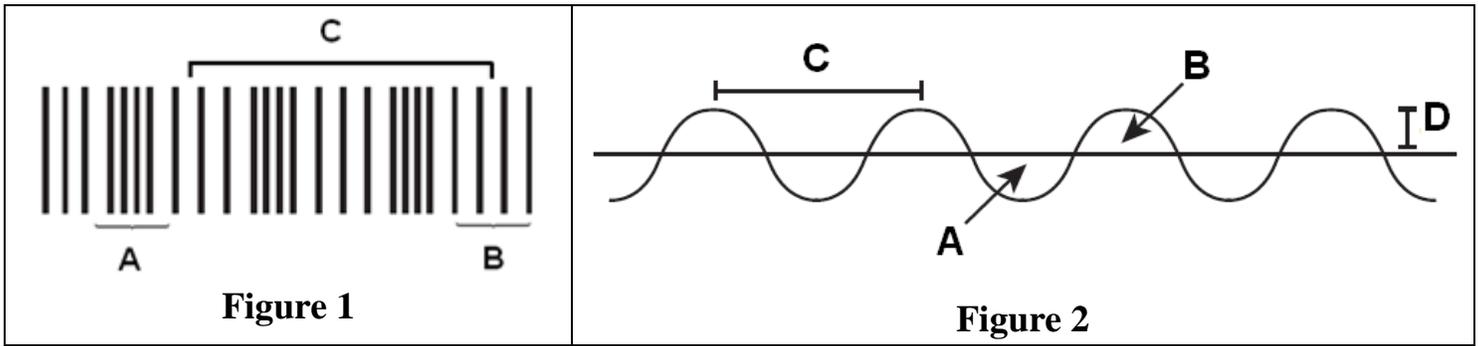


7. Sound waves cannot carry energy through _____. **A vacuum**

8. Vibrating matter is likely to create _____. **Sound**

9. How do dark colored objects compare to light colored objects? **Dark colored objects absorb more light waves than light colored objects. Therefore, dark colored objects feel warmer than light colored objects. They have absorbed more wavelengths.**

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Use Figure 1 and Figure 2 above to answer questions

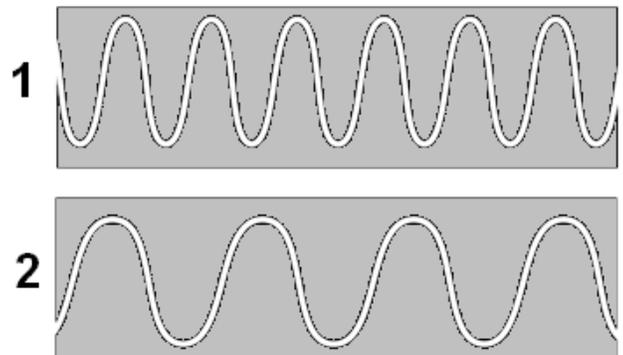
10. Which wave(s) is a transverse wave? **Figure 2**
11. Which wave(s) is a compressional wave? **Figure 1**
12. Which wave(s) is an electromagnetic wave? **Figure 2**
13. Which wave(s) could use a medium to transfer energy? **Figure 1 and Figure 2**
14. Which letter in Figure 1 and Figure 2 identifies the wavelength of a wave? **Letter C**
15. In Figure 2, what do letters A and B measure? **A is the amplitude of the trough and B is the amplitude of the crest**
16. If Figure 1 is a sound wave, which letter will change when the pitch of the sound changes? **Letter C**
17. Which property of a wave is related to the loudness of a sound? **Amplitude**
18. High Energy = _____ (low, **high**) Amplitude
19. High Energy = _____ (low, **high**) Frequency
20. High Energy = _____ (**short**, long) wavelength

21. Which wave to the right has the highest pitch?

Wave 1

22. Which wave to the right has the highest frequency?

Wave 1



23. Explain how objects appear to have color. **We see color based on the wavelength of visible light waves. Different wavelengths appear as different colors. An object can absorb or reflect wavelengths. The color or wavelength that is reflected is the color of the object that we see. All other wavelengths were absorbed by the object. Example: if you see a blue object, it means the color (wavelength) for blue has been reflected and the other wavelengths have been absorbed by the object.**

24. Pick any object in the room. Explain the pathway of light that allows you to see the object.

Waves from the Light source (Light bulb) strike the object and some of the waves are reflected to your eyes

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25. Explain why you can see lightning before you hear thunder. **Light travels faster than sound**

26. Sort the following according to how fast sound will travel through the medium: liquid, solid, gas. Give examples of each type of medium

solid (fastest) such as metal or glass, liquid such as water, then gas such as in air (slowest)

27. Based on your answer to question 26, explain why sound travels fastest through the particular medium. **The speed of sound is usually fastest in solids, where molecules are closest together, and slowest in gases, where molecules are farthest apart. Because the molecules are closer together, they collide more frequently. The more frequent the collisions are, the faster the speed of sound is in the material. The same is true for warmer temperatures.**

28. When an object is struck and sound is produced, explain the direction of the sound wave. **The sound wave moves in all directions from the source**

29. Sonar uses sound waves to measure the distance between objects underwater. What behavior of sound waves explains how sonar is used? **Sound waves reflect off objects**

30. Describe the characteristics of white light. **White light is made up of all the wavelengths of visible light. White light can be separated into many colors by refraction. A prism can be used to refract white light. A rainbow is refracted light.**

31. Blowing through a straw will produce a sound. Which straw to the right will make the highest pitch? Explain.

When the length is changed, it will vibrate with a different frequency. Shorter straws will produce sound waves with higher frequency and therefore higher pitch.



Figure 1

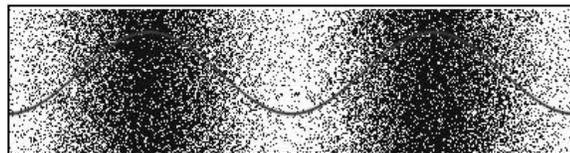


Figure 2

32. Which figure above is the loudest? Explain. **Figure 1 is the loudest because it has a higher amplitude. Additionally, the amplitude is greater when the particles of the medium are squeezed closer together in each compression and spread farther apart in each rarefaction.**

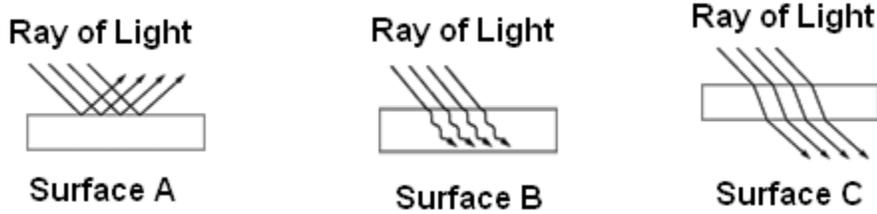
33. Which figure above has the highest pitch? Explain. **Figure 1 has the highest pitch because it has the highest wave frequency**

34. Which figure above is carrying the most energy? Explain. **Figure 1 is carrying the most energy because higher frequency and higher amplitude = higher energy transfer**

35. Which figure above has the highest frequency? Explain. **Figure 1 has the highest frequency because it has the shortest wavelength. Short wavelength = High Frequency**

Waves Unit Study Guide KEY

Each picture below shows a ray of light interacting with a different surface. One surface is a shiny metal, one surface is clear plastic, and one surface is painted black.



36. Identify which Rays of Light illustrate Refraction, Reflection and Absorption.

Surface A is Reflection; Surface B is Absorption; Surface C is Refraction

37. Identify the surfaces as shiny metal, clear plastic, or painted black. Explain your answer for each.

Surface A is the shiny metal because it would reflect light. Surface B is the painted black surface because black objects absorb all wavelengths therefore no wavelengths are reflected or pass through. Surface C is most likely the clear plastic because the ray of light passes through the plastic but is refracted due to the change in speed of the wavelength because of the change in the medium.