

STUDY GUIDE ANSWER KEY

Answer the following:

1. List 3 ways that a sound wave is different from a light wave.

Light travels as a transverse wave while sound travels as a longitudinal wave.

Light waves can move through empty space but sound waves require a medium to vibrate.

Light waves are sensed by the eyes while sound waves are sensed by the ears.

2. Name the colors of visible light from longest wavelength to shortest wavelength.

Red orange yellow green blue indigo violet

3. Which color has the longest wavelength? red

4. Which color has the shortest wavelength? violet

5. Which color carries the most energy? violet

11. Which type of wave carries radio and TV signals? Radio waves

12. Which type of wave carries heat? infrared

13. Which type of wave can we see? Visible light

14. Which type of wave causes sunburn? UV

15. Which type of wave is used to examine bones? X-rays

16. Which type of wave is used to cook food? microwaves

17. Which wave carries the most energy and is very dangerous gamma rays

18. What three characteristics of a medium can affect the speed of sound? The elasticity, density and temperature of a medium affect the speed of sound.

19. Know that sound waves require a medium to move – the energy of the sound wave vibrates the particles of the medium.

- a) In materials of the SAME state of matter – such as two types of solids – sound waves travel more slowly in denser mediums.
- b) The particles of a dense material move more slowly than the particles in a less dense material.
- c) Sound travels more slowly in a medium of a lower temperature than in the same medium at a higher temperature.
- d) At a low temperature the particles of a medium move more slowly than at a high temperature so this causes the sound wave to travel more slowly.

20. What is an EM wave? EM wave is vibrating electric and magnetic fields that move through space at the speed of light.

21. What is light? Light is energy – specifically electromagnetic radiation that is transferred through space as EM waves.

22. What is a photon? A discrete packet of light energy

23. What causes a light wave to change its speed? Light waves change their speed when they enter a new medium (for example, moving from air into water) at AN ANGLE. Light loses speed as it comes into contact with denser mediums.

24. In the same medium all light waves travel at the same speed but they can differ in the amount of energy that they carry.

25. What is the speed of light in a vacuum? 300,000 km/s

26. How long does it take light from our sun to reach the earth? 8 minutes

27. In a compression area of a longitudinal wave, the particles are pressed together.
28. In a rarefaction area of a longitudinal wave, the particles are spread apart
29. For what is Chuck Yeager famous? For breaking the sound barrier in an airplane.
30. Be able to calculate the speed of a wave by multiplying its wavelength and frequency. What is the speed of a wave with a wavelength of 4.5 m and a frequency of 25 Hz? $4.5 \text{ m} \times 25 \text{ Hz} = 112.5 \text{ m/s}$
31. Whether longitudinal or transverse, a wave carries energy.
32. What does refraction have to do with the spoon looking weird in the cup of water?
- Some of the light waves from the classroom florescent bulbs are hitting the water from an angle – these waves change their speed and direction as they enter the new medium (water) which causes the part of the spoon that is in the water to appear distorted – the reflection of the spoon looks different than what the spoon actually looks like because of the refraction of these light waves.
33. Do you see reflected or absorbed light? Reflected. A green object reflects green light and absorbs all other colors of visible light.
34. Draw a longitudinal wave with 3 compressions and 2 rarefactions.

