FPS – Unit 5 Review – Chapter 17-18

Name_____ Period_____

Conceptual Understanding

1. Define a wave.

   Oscillations, cycles, or vibrations caused by disruptions/sources of energy that transmit energy through a medium or through space by particle vibrations.

2. What is a medium? Give several specific examples.

   Material/matter through which waves travel and transmit energy

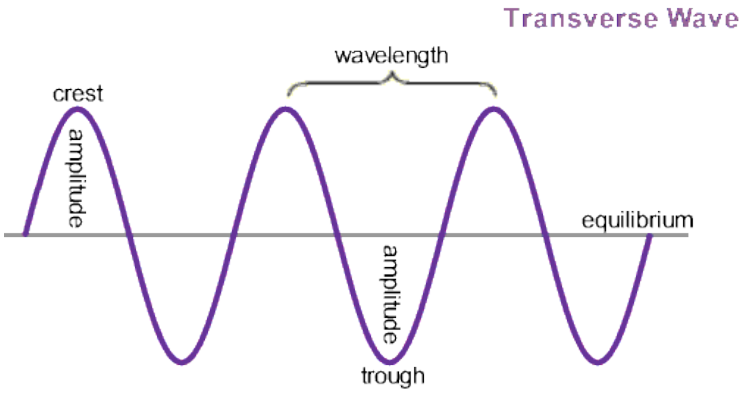
3. What are three types of mechanical waves?

   Longitudinal, transverse, surface

4. How are the two main types different?

   Longitudinal waves have particle vibrations that are parallel with the direction of the wave energy transfer, which transverse vibrations are perpendicular.

5. Draw and label the parts of a wave.



6. Describe the relationship between energy, frequency, and wavelength.

   As frequency increases, energy increases, but wavelength decreases. Therefore, wavelength and frequency are INVERSELY proportional.

7. What is the frequency of a wave?

   How many oscillations per second

8. What is the period of a wave?

   The time it takes one oscillation to occur

9. What is the speed of a wave?

   The velocity at which a wave transmits energy—directly related to the frequency

10. How can we find the speed of a wave?

    multiply wavelength and frequency

11. What happens to sound as you increase the amplitude?

    Sound becomes more intense (louder)

12. What happens to sound as you increase the frequency?

Sound becomes higher-pitched

13. What happens to light as you increase the amplitude?

Light becomes brighter

14. What happens to light as you increase the frequency?

Light changes color—lower frequency is more red/orange, higher frequency becomes more blue/violet

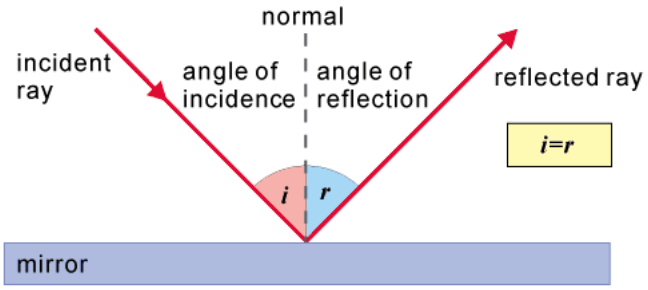
15. Describe the Doppler Effect in a scenario using sound waves.

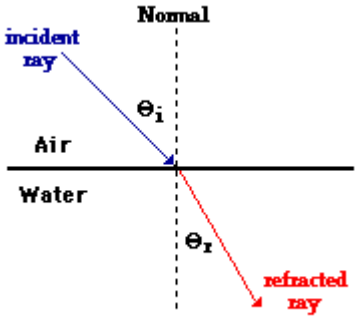
A moving sound source changes the frequency of the waves. Approaching, its frequency of sound waves is higher and is higher pitched. As it is moving away, the frequency of the waves is lower causing the wavelengths to be longer, creating a low pitch.

16. Describe the Doppler Effect in a scenario using light waves.

As objects move away, the frequency of the light waves appear lower and longer in wavelength so they look redder. Approaching, the frequency is higher and the wavelength is shorter causing it to appear blue.

17. Draw and label the law of reflection and refraction.





18. Why do we lose hearing of higher pitches first?

They are the first hair cells by location in our ear that get bombarded by waves.

19. What are the parts of the electromagnetic spectrum?

Radio, microwave, infrared, visible, ultraviolet, x-ray, gamma

20. What, in order of largest to smallest wavelength, is the spectrum of visible light?

ROYGBIV (red, orange, yellow, green, blue, indigo, violet)

Applying Concepts

21. WHY do we see celestial bodies that are moving away from us as redder? Use the Doppler Effect to explain your answer. Be specific and use terms like *frequency*, *wavelength*, observer, and *sound source*.

The moving sound source changes the frequency of the sound waves. Approaching the observer, the frequency of the waves is higher and the wavelength is shorter, cause the sound to be higher pitched. As it moves away, the frequency is lower, wavelength is longer, and the pitch is lower.

22. Explain WHY colors like violet and indigo have a higher energy than red light.

Violet colors have higher energy because of their higher frequency that colors like red, since the wavelength is shorter and there are more waves transporting energy per second.

Mathematical Problems

23. If a wave has a wavelength of 1.2 m and a frequency of 0.9 Hz, what is its speed?

1.2 x 0.9 = 1.08 m/s

24. If a wave has a wavelength of 0.99m and a speed of 62 m/s, what is its frequency?

(62)/(0.99)= 62.62 Hz

25. If a LIGHT wave travels at the speed of light at a frequency of 1,114,000 Hz, what is its wavelength?

(300,000,000)/(1,114,000)=269 m

26. Calculate the frequency of a radio wave with a wavelength 1500 m.

(300,000,000)/(1500m)=200,000 Hz

27. Calculate the frequency of a sound wave of speed 1500 m/s and wavelength 6 km.

250 Hz

28. Calculate the period of a wave that has speed 5 m/s and wavelength 20 m← good bonus

5/20 = 0.25 Hz period = 1/0.25 = 4 s

29. Calculate the speed of a wave that has period 0.04 seconds and wavelength 20 m← good bonus

Frequency = 1/0.04 =25Hz x 20 = 500 m/s

30. Calculate the speed of a wave that has period 0.2 seconds and wavelength 10 m← good bonus

Frequency = 1/.2 =5 Hz x 10 = 50 m/s