**WAVES TEST - Study Guide Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Short Answer: Please use the following in all responses:**

*\_\_\_\_I proof read my response to make sure that I answered the question!*

*\_\_\_\_ I began each sentence with a capital letter, and ended with a period!*

*\_\_\_\_ I wrote in complete sentences!*

*\_\_\_\_ I proof read my answer to make sure that it made sense!*

*\_\_\_\_ I underlined the required terms used in my answers!*

**1. Compare and contrast a mechanical and electromagnetic wave.** (*energy, medium, vacuum, force, disturbance*)

**Both mechanical and EM waves carry energy. They are caused by a force or disturbance. The difference is that an EM wave does not require a medium to travel and can travel through a vacuum or empty space while a mechanical wave requires a medium to travel.**

**2. What is the relationship between amplitude and energy in a mechanical wave?** (*energy, amplitude)*

**Bonus: Why does this not apply to an EM wave?**

**The relationship between energy and amplitude in a mechanical wave is the higher the amplitude, the higher the energy and vice versa. This does not apply to an EM wave because an EM wave’s energy is determined by its frequency and that it how it is ordered on the spectrum.**

**3. What is the relationship between frequency and wavelength? (***wavelength, frequency, increase, decrease***)**

**The relationship between frequency and wavelength is with an increase in frequency there is a decrease in wavelength and with a decrease in frequency there is an increase in wavelength.**

**4. Explain how we see colors such as grass green and a red fire truck? In your answer you must also explain what is happening when we see black and white colored objects. (***Color, absorb, reflect, visible light, wavelengths, primary colors of light)* **We can see colors such as grass green and a red fire truck because we see the visible light portion of the EM Spectrum. Visible light includes the colors of the rainbow. The fire truck appears red because the color red is being reflected or bouncing off and the other colors of the spectrum are being absorbed into other forms of energy. The wavelengths are different due to refraction. Red has the longest wavelength, is bent the least and therefore has the least amount of energy. The primary colors of light, red, green and blue will combine to form white light. We can also see black and white colored objects because of rods and cones and because the primary pigments of light mix to form black.**

**Essential Vocabulary- Write definitions for all words!**

\_\_\_Wave- a traveling disturbance that carries energy   
­­­\_\_\_Absorb- to enter into a new medium

\_\_\_Transmit- to send a signal or let out

\_\_\_Electromagnetic Spectrum- the arrangement of EM waves from least energy to greatest energy  
\_\_\_Visible Spectrum- the part of the

EM spectrum we see  
\_\_\_Sound- the noise we hear made by vibrations  
\_\_\_Retina- layer of tissue on the back of the eye with cone and rod cells

\_\_\_Cornea- the clear covering over the eye for protection

\_\_\_Lens- tissue that bends or refracts light that helps focus pictures

\_\_\_Iris- a circular band that controls how much light enters the eye

\_\_\_Pupil- hole in the center of the eye controlled by the iris

\_\_\_Optic nerve- connects the eye to the brain and transmits signals

\_\_\_Rods & cones- rods- grey, black, white- cones- color

\_\_\_Vibrations- rapid back and forth motions

\_\_\_Pitch & Frequency- the highness or lowness of a sound

\_\_\_Intensity & Loudness- the level of sound and strength of sound

**mechanical wave**- a traveling

disturbance that requires a medium

**electromagnetic wave**- a wave that

travel through a vacuum

**amplitude-** distance between the

crest and the resting point of a wave. -

**Frequency-** the # of waves that pass

a given point in a certain amount of

time

**crest**- the highest point of a wave

**trough**- the lowest point of a wave

**energy**- the amount of force- the

ability to do work

**force/disturbance**- anything that

causes a wave

**medium**- any material through which

a mechanical wave travels

**vacuum**- empty space

**transverse**- a wave in which the

motion of the medium is perpendicular

to the disturbance

**longitudina**l- type of wave in which

the medium moves parallel to the

disturbance

**reflection**- bouncing off of a wave

**refraction-** the bending of waves due to a change in speed

**wavelength**- the length from one crest or trough to the other crest or

trough

**rarefaction-** part of a longitudinal wave where it is moving apart

**diffractio**n- the spreading of waves through an opening

**compression**- the part of a longitudinal wave where the air molecules

are pushed together

**Multiple Choice Questions**

1. Sound waves, water waves, and the waves made by a rope are all examples of mechanical waves

2. In a longitudinal wave, energy travels parallel to the disturbance

3. When a wave hits a barrier and cannot pass through it, the reaction force causes a reflection

4. Refraction occurs because waves enter a new medium and the speed changes

5. Which of the following is an example of diffraction? Sound waves traveling around a wall.

6. If the crests of two waves join up exactly, their \_\_amplitudes are added and it is constructive interference.\_\_their energy is increased.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

7. Forces can cause waves by \_\_\_\_\_\_\_disturbing the medium.\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. At the beach, Paula measures how many wave crests reach the shore in a given time. She is finding the wave's frequency

9. Martin wants to know the wavelength of the wave made when he dips his finger into a pond. What should he   
 measure? Crest to crest or trough to trough

10. A wave has a wavelength of 20 m and a frequency of 4 waves/s. What is the wave's speed? 80 m/s

11. A scientist measures a wave that has a wavelength of 0.01 m and a frequency of 200 waves/s. What is the   
 wave's speed? 2m/s

12. Will shouts "Hello!" in a canyon. The sound bounces back to him as an echo. This is an example of a wave

reflection

13. One example of diffraction is a water waves going through the opening in a pier or dock

14. Ronda put two speakers in her room. In one place, the sound was much quieter than in the rest of the room.   
 What might cause this? Destructive interference

15. When a wave’s energy moves across a pond, in what direction do the molecules of the pond move? Parallel to the energy

16. In what direction does a transverse wave transfer energy? Perpendicular to the disturbance

17. Sean is using a rope to make waves. If he increases the speed with which he creates the disturbance, he will

Increase the frequency

18. Isaac puts a solid wood barrier completely across a tank full of water. What do you predict will happen to   
 waves in the tank when they reach the barrier? reflect

19. Mika put one end of a stick into a pond. When she looked down at the stick, it appeared to be broken at the  
 point where the stick entered the water. This was caused by the \_refraction\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. What does a prism or a rainbow do to visible light to make the colors separate? \_refracts\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. If you increase the frequency you \_\_\_\_\_\_\_decrease\_\_\_\_\_\_\_\_\_\_\_ the wavelength. This is an inverse relationship.
3. What determines the energy in an EM wave? \_\_\_\_\_\_\_frequency\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What parts of your eye refract light? \_\_\_\_\_\_\_\_\_\_\_\_\_cornea and lens\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. What parts of your eye help you see color and black and white? \_\_\_\_cones and \_\_\_\_rods
6. What happens when light is absorbed into a medium?\_changes to another form of energy usually heat
7. A prism can break light into its primary colors by doing what to the light? \_\_refract\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. How is sound produced? \_\_\_\_\_\_\_\_vibrations\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. In what medium does sound travel the fastest? \_\_\_solids\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
10. Why does sound travel the fastest in this medium?\_\_molecules are already vibrating and closest together
11. What determines the pitch of a sound wave? \_\_\_\_\_\_\_\_\_\_\_\_frequency\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
12. What determines the loudness of a sound wave?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_intensity\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
13. What parts of the eye focuses light? \_\_\_\_\_\_\_cornea and lens\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
14. What parts of the eye open and close to allow more or less light into the eye? Pupil
15. Most of the light that hits a transparent window is transmitted
16. How does your ear pick up sound waves? The outer ear picks up the sound, it travels to the eardrum which vibrates

**Label the parts of the eye diagram. sclera iris retina**

cornea optic nerve

lens

pupil