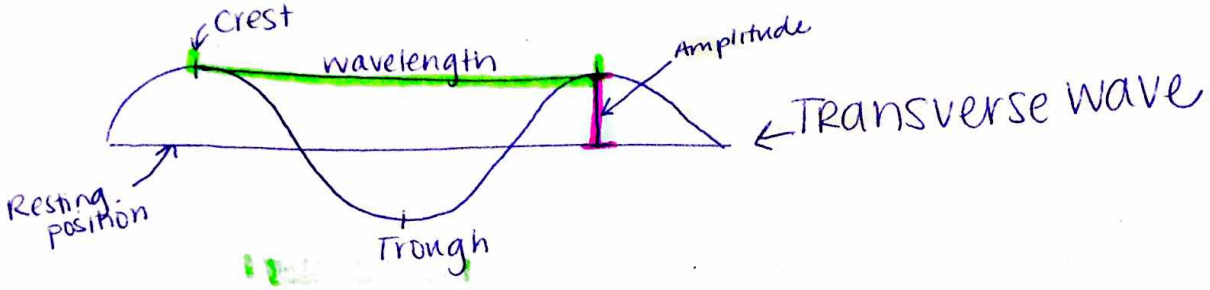
Catch a Wave Unit Study Guide **Name:** Ms. Flythe's Key :)

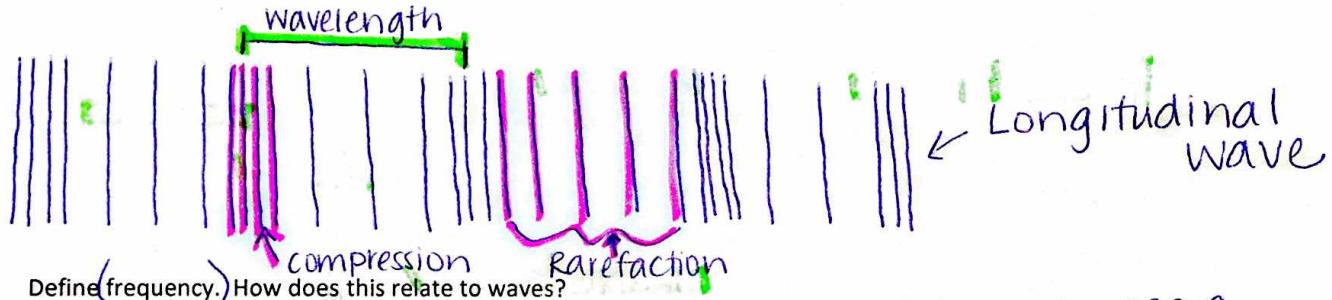
Complete the following questions, using your notes. This is to prepare you for both the Catch a Wave Unit Test and Quarter 2 benchmark.

6. P.1.1 Compare the properties of waves to the wavelike property of energy in earthquakes, light, and sound.

1. Energy is transferred by waves. Matter is not transferred by waves.

2. **Name, describe and label** the two types of mechanical waves. Include the following terms:
Compression, amplitude, crest, trough, wavelength, transverse wave, longitudinal wave, rarefaction, resting position.





3. Define (frequency.) How does this relate to waves?
↳ the number of waves that pass a fixed point in a given amount of time
↘ The more waves that pass a specific point, the higher the frequency. Frequency also determines the PITCH of a wave.

4. Compare and contrast electromagnetic waves with mechanical waves.
They both transfer energy but mechanical waves require a medium while Electromagnetic (EM) do not require a medium. Also, mechanical waves are categorized by their movement (up and down or side to side) and EM waves are categorized by wavelength/frequency.

5. Define an earthquake (in general; think about how it relates to energy and waves)
An earthquake is caused by a disturbance (vibration) underneath the surface of the earth. It is an example of a mechanical wave because it requires the earth/ground as a medium to transfer energy.

6. **Compare and contrast** longitudinal and transverse waves. Gives example of each.
Longitudinal and Transverse waves are both examples of mechanical waves because they require a medium to transfer energy. However, Transverse move up + down and Longitudinal move side to side.
Ex. Transverse — ocean waves
Longitudinal — sound waves

6.P.1.3 Explain the relationship among the rate of vibration, the medium through which vibrations travel, sound, and hearing.

7. Sound is a form of energy produced by the vibration of matter.

8. Describe, in general, the speed of sound through liquids, solids and gases.

Sound moves differently through each state of matter. Sound moves fastest in solids and slowest in gases. This is because, the closer the molecules are to each other the less space in between molecules and less collisions between molecules that would result in loss of energy. In this case, sound energy.

9. You are a sound wave. Explain the pathway you take through the ear. Make sure to include all necessary vocabulary.

First I would be collected by the outer, visible, part of the ear. I would then travel through the **ear canal** and become a vibration as I hit the **ear drum**. I would then hit the three smallest bones in the body that make up the middle ear, the **hammer**, **anvil**, then **stirrup**. After that I vibrate toward the inner ear. I enter the spiral shaped **cochlea**. In the cochlea, I encounter tiny hair cells called **cilia**. The cilia change my vibration into a signal the brain can understand. After this change, I go through the **auditory nerve** and make my way to the brain to be heard as a sound.

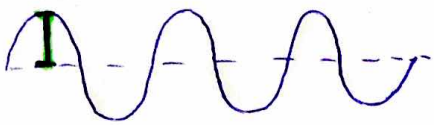
10. Describe how energy can affect frequency and amplitude of a wave.

The higher the energy of the wave, the higher the amplitude of the wave, or height/volume.

The higher the energy of the wave, the higher the frequency of the wave, or amount of waves in a given time, or pitch.

11. Explain how amplitude and frequency compares to loudness and pitch of sound waves.

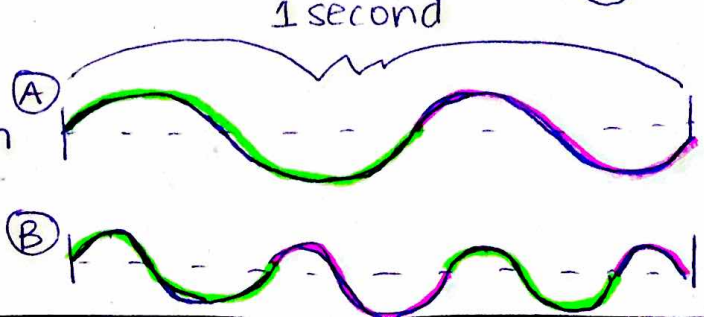
Amplitude (height of a wave) = loudness/volume



high amplitude = high volume/loudness

low amplitude = low volume/loudness

Frequency = Pitch (amt. of waves in a given time)



2 waves/1 second

3.5 waves/second

In the given amt of time (1 sec) wave B has a higher frequency.

6.P.1.2 - Explain the relationship among visible light, the electromagnetic spectrum and sight.

12. Explain the relationship between light and the electromagnetic spectrum.
Visible light is a small fraction of the Electromagnetic Spectrum. It is the only part of the spectrum that is able to be seen by the human eye.

13. Which type of radiation in the electromagnetic spectrum is related to colors such as red, green, and blue? Visible light

14. Explain the relationship between wavelength and visible light.
Visible light, or White light, is made of all colors of light. Each color of light (ex. Red, Orange, yellow etc.) has its own wavelength. Red has the longest and violet has the shortest.

15. Describe what happens when light enters the eye.
When light enters the eye it passes the protective layer, the cornea. The light then moves past the iris which is a muscle that expands and contract to let in the perfect amount of light through the pupil, the hole in the iris. After passing the convex lens, the light is projected as an upside down image on the retina, the inner lining of the back of the eye. The rods and cones, cells in the retina, change the image into a signal to go through the optic nerve and understood by the brain.

6.P.3.2 - Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature.

16. Explain what can occur when light strikes an object.
Light can either be reflected, trasmitted, or absorbed when it hits an object. It depends on what type of object it hits. Transparent, or see through objects transmit light. Translucent or objects that are somewhat see through both transmit and Reflect light. Opaque objects reflect and absorb light. in the form of scattering

17. A light colored object and a dark colored object are placed in the sun. What happens to the temperature of the objects?
Because light colored objects reflect light and dark objects absorb light, the darker object will be slightly warmer than the light colored object.

18. White light shines on an object. What color do we see?
The color of the object. Objects reflect the wavelengths of light of the colors of pigment included in the object and absorb all others. Ex. Green grass reflects green + absorbs all others. Because white light includes all colors, you will see the object as the color it is intended to be.

19. Mr. Boayue is wearing a blue sweater. He stands on stage in the auditorium to give his reenactment of the play *Julius Caesar*. The lights shining on his sweater make it appear black. What CANNOT be the color of light shining on his sweater? Explain your reasoning. The light can not be Blue or White. In order for Mr. Boayue's shirt to appear Black, it must absorb all the light shining on it. For example, the light shining on his sweater could be Red. His shirt would then absorb that color of light and appear Black.

6:P:3:1 - Conduction, Convection and Radiation are methods of energy (heat) transfer. Heat energy will travel in the direction of high to low temperatures.

20. If you placed a hot stone in a beaker of cold water, what would happen to stone and water after 10 minutes? After 10 minutes, the water would increase in temperature and the stone would decrease in temperature. The heat from the stone would transfer to the colder water, heating it up. When this transfer occurs, the stone loses heat energy which causes it to decrease in temperature.

21. As you are cooking, you place a pot on a hot stove. Describe how the energy is moving as it is being conducted?
Conduction is energy transfer through direct touch. In this case the pot is sitting directly on the stove. Heat is being transferred from the stove to the pot.

22. As you are cooking dinner, you boil water on a stove. Describe convection in this scenario.
Convection is the energy transfer through the motion of molecules. In this scenario, the warm molecules of water at the bottom of the pot rise and heat up the cooler molecules at the top. This creates a convection current where the molecules are constantly moving and being heated

23. Heating your lunch in the microwave is an example of which type of energy transfer?
Using the microwave is an example of radiation because it uses Electromagnetic waves to transfer heat.

6.P.3.3 – Matter can expand and contract based on exposure to or removal from heat. Materials are chosen based on their response to heat and electrical energy.

24. Copper is commonly used as a material in electrical wiring. Explain why.
Copper is a common material used in wires because it is a good conductor of heat (Energy) and electricity. This means that it moves the energy and Electricty very well.

25. Explain why cooking utensils are often made with a rubber or plastic handle?
Rubber and Plastic are often used in cooking utinsils because they are insulators of heat energy. This means that they do not move energy very well, which helps keep us safe from burning when cooking

26. Why are metals used for making pots and pans that are used for cooking? Explain your reasoning.
Metals are used for making pots and pans because they are good conductors of heat. They allow heat to move through the pot, keeping the food hot.