**Characteristics of Waves Lab:**

**Part I – Energy in a Wave (Water Container)**

1. Use a dropper to drop a drop of water into the center of the container of water.
   1. **Describe which direction the waves travel when the drop of water hits the surface of the water?**
2. Use the dropper to make a several drops in different parts of the tub of water. Or make two drops at the same time.
   1. **Is the pattern of the waves always the same regardless of where you drop the water? Describe.**
3. Drop a marble into the water.
   1. **How do the waves created with the marble differ form the waves made with the drop of water?**       **Why?**
4. Gently push on end of the tub to create a series of waves in the tub.
5. Place a cork in the center of the tub of water. Observe the cork as the waves reach the cork.
   1. **Describe the motion of the cork as the waves pass the cork.**  **Does the cork bob up and down in one place or does the cork move with the wave?**
   2. **If you were on a boat on a wavy day, how would the motion of the boat be similar or different from the motion of the cork?**

**Part II – Transverse Waves v Longitudinal Waves (Slinky)**

1. Stretch a slinky out 1-2 meters
2. **(Transverse Wave)** Make a series of waves by moving the slinky from side to side causing a wave to travel down the slinky.
   1. **Describe the shape of the wave.**
   2. **Which direction do you move the spring to create the wave?**
   3. **Which direction does the energy move through the slinky?**
3. Stretch a slinky out to about 1-2 meter.
4. **(Longitudinal Wave)** Make a series of waves by pushing the slinky forward and backward.
   1. **Describe the wave.**
   2. **Which direction do you move the spring to create the wave?**
   3. **Which direction does the energy move through the slinky?**

**Part III – Amplitude (Long Spring)**

1. Make a small wave in the slinky. Then make a larger wave in the slinky.
   1. **What did you do differently to make the different sizes of waves?**
   2. **Why was one wave larger than the other?**
2. Repeat step one but this time record the amount of time it takes the small wave and the large wave to travel to the other end of the spring and back.
   1. **Which wave, large or small, takes the longest to travel to the other end and back?**
   2. **Why do think this is so?**

**Part IV – Frequency and Wavelength (Long Spring or Slinky)**

1. Make a series of waves in the long spring by moving the spring back and forth sideways along the floor at a regular pace.
2. Increase the rate at which you vibrate the spring back and forth and count the number of waves produced in 30-seconds.
   1. **What happens to the frequency of waves that are produced when you increase the rate of your arms vibration?**       **How does this affect the wavelength of the waves?**
   2. **What happens to the frequency and the wavelength of the waves if you increased the rate at which you vibrated the spring?**
   3. **What is the relationship between frequency and wavelength?**

**Part V – Vibrations (Tuning Forks)**

1. Lightly tap the longer of the two tuning forks on the lab table and observe the ends of the tuning fork. What do you notice?
2. Again tap the tuning fork on the lab table a stick just the tips of the tuning fork into the 1000-ml beaker of water. Observe the water between the tips of the tuning fork. Describe what you see?
3. Do the same thing using the shorter tuning fork. Compare the difference between the short tuning fork and the long tuning fork.
4. Which tuning fork is vibrating faster?
5. Listen to the pitch of the two tuning forks. Which tuning fork has the higher pitch? Which tuning fork made the most waves in the water?

**Analysis and Conclusions:**

1. What creates waves?
2. A child throws a small stone into a pond. Describe how the energy from the stone moves through the water.
3. Compare and contrast transverse and longitudinal waves.
4. What is the relationship between the rate the slinky is moved back and forth and the frequency of waves that are produced per second?
5. What is the relationship between the frequency of the waves that are produced and the wavelength of the waves?
6. What affects the size of a wave?  How does the size of the wave affect the speed at which it travels?