EXPLORING WAVES

**Activity 1**

1. When you hear the word ‘wave’ what things do you think of?

*Responses may include surfing or the ocean, a swimming pool, “the wave” at sporting events, etc. Ask about sound if students do not mention it.*

1. What makes the behavior of a wave different from the behavior of something like an automobile driving down the road or a baseball flying through the air?

*Wave motion appears continuous through a medium, whereas particles are at a specific location at any point in time. Instructor can introduce the concept of waves mixing and adding, where two waves occupy the same space. Two particles do not occupy the same space. They collide and often ricochet.*

Waves are a very useful way to describe many things we recognize. They also can be used to describe the behavior of less obvious things like electrons, light, TV and radio signals, and cell phone data signals as they travel from one location to another. Let’s start learning about waves by making some waves with a spring and observing some important characteristics about them.**Investigation**

**Students work in pairs. Each pair is given a slinky. Each student fills out answers on their own activity sheet. Instructor finds space in the classroom for students to conduct the activity. Instructor assists students in measuring stretch length of the slinky. Note: Make sure students keep the slinky on a surface while making waves. When slinky is jerked around vertically in the air it will get kinked and tangled or overstretched and ruined.**

*Materials:*

Slinky or other spring

*Procedure:*

1. Get a partner and a slinky. Partner’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Find a place where you can stretch out the slinky on a table top or on a tile floor. Slinky must be on a surface, not dangling in the air!
3. Hold one end of the slinky and have your partner hold the other end and stretch the slinky 3-4 meters. Your teacher will help you mark the distance.
4. Write down your observations as you work through each of the questions below:
   1. Can you make more than one type of wave that pulses through the slinky?  
      (*try push-pull and wiggling from side to side*)

*Yes*

* 1. How many waves can you make in the slinky at one time?

*Multiple; answers will vary*

* 1. How big can you make waves? (*Think: how can we use a meter stick to measure waves?*)

*As big as you can wiggle it; answers will vary. Ask students how they would measure the wiggle.*

* 1. How is the size of a wave related to the number of waves you can make at the same time?

*More waves = smaller size*

* 1. Does making more waves on the slinky require more or less energy input?

*More*

* 1. How does the tension in the slinky affect the waves? (You can increase the tension by gathering some of the slinky at one end and holding it while you make waves)

*Increasing tension increases the number of waves on the spring (frequency)*

* 1. Does the whole slinky stay at a different location when the waves pulse through it, or does it return to its original position? Do you notice the wave accelerating as it travels, or does it travel with mostly constant speed?
* *The slinky always returns to its original position after the pulse displaces it. Pulses do not accelerate, they travel with constant speed unless tension is increased.*

*Reflection Questions:*

1. If you were describing the waves that you made to another person, what are some characteristics of the waves you would use?

*Answers vary but should include descriptions of what we will later define as frequency, amplitude, wavelength*

1. Draw a picture of one wave on the slinky.



1. Draw a picture of multiple waves on the slinky.

