Lesson:
I gave out two versions of Karen King's lesson. One was a version she initially wrote and then she revised it using the Inquiry Guidelines. I didn't tell the participants which came first and I ask them to figure out which was the revised one, which guidelines she applied and I had them talk to their partner about what things in particular Karen changes and why. We used handouts to help focus the discussions: "Note card for Reflecting" "Guidelines" "Writing Learning Goals"

Name _____ Period _____ Date _____

Wave Simulation Activity

Objectives:

- Calculate and measure different wave characteristics (frequency, period, amplitude, wavelength).
- Describe the relationships among each of these wave characteristics

1. Open http://www.colorado.edu/physics/phet/simulations/stringwave/stringWave.swf
2. Play with simulation for 5 minutes. What things do you think change the wave shape?

3. In what ways is this similar to the wave demonstration with the slinky?

4. Now hit the "reset" button. Make the following changes:
   - Change the option from Manual to Oscillate.
   - Change the end from "fixed end" to "no end".
   - Set the damping to zero.
5. How does the amplitude affect the shape of the wave?

6. How does the frequency affect the shape of the wave?

7. You go to the beach on both days of the weekend. On Saturday, the weather is stormy and the waves are hitting the shore very frequently. On Sunday, the weather is calmer.

Draw the Saturday waves with high frequency, high amplitude	Draw the Sunday waves with low frequency, high amplitude
	

8. Check your answers on the next two questions before going on.
    a. Using the timer, how would measure the frequency of the wave in the simulation. Assume you don't know the number?

    b. How would measure the period of the wave in the simulation?

9. Find the relationship between period and frequency by filling in the table.

10. Keeping the wave on these settings, notice what happens to the green dots. As the wave travels forward (from left to right across your screen), what happens to the green dots? How do they move? (Focusing on just one dot at a time may help you figure this out.)

11. Play with the damping, frequency and amplitude. What additional observations do you make? List at least three. (Remember to change only 1 variable at a time, and control the rest of your variables!)

Name _____ Period _____ Date _____

Wave Simulation Activity

Objectives: To explore the concepts of frequency, period, amplitude, wavelength, and damping.

1. Open http://www.colorado.edu/physics/phet/simulations/stringwave/stringWave.swf
2. Change the option below "wiggle me" from Manual to Oscillations. Play with the damping, frequency and amplitude. What observations do you make? List at least four:

3. Change the frequency from 55 to 20, which was approximately the frequency with which I shook the rope on Tuesday.
4. In what ways is this similar to the rope demonstration?

5. Move the damping value up or down. How does the wave change?

6. Set the damping to zero, the frequency to 22, and the amplitude to 33. Set the end of the rope to "free".Click "reset". Turn on the ruler and timer. Hit the "pause" button at a momentum when you can see two peaks. You can drag the rulers around to measure lengths on the wave.
    a. Measure the amplitude:

    b. Measure the wavelength:

7. Click the "pause/play" button again. Reset the timer. Calculate the frequency (f) of the wave using the timer. It may help to have a friend check the timer, while you count the oscillations. Then switch roles. Show your calculations below. Does your calculation agree with the setting?

8. Calculate the period (T), based on the value you found in #8. Show your work.

9. Next, calculate the wave velocity (v). Show your work.

10. Keeping the wave on these settings, notice what happens to the green dots. As the wave travels forward (from left to right across your screen), what happens to the green dots? How do they move? (Focusing on just one dot at a time may help you figure this out.)