Name(s): _____ Date: _____ Period: _____

Student Handout to Physics Cinema Classics C Wave Propagation - Wave Vocabulary Lesson 1 To Accompany Activity #1 Human Wave

Purpose: Estimate the speed of a transverse wave in a Slinky™.

Procedure:

Go to Lesson 1. Note the number of frames per second. Place a transparency over the screen and mark the position of a wave crest on the Slinky™. Record the initial frame number below.

Advance the movie frame by frame until the crest has moved about half way across the table, and mark the position of the wave crest now. Record the final frame number below.

On the transparency, mark the distance across the diameter of the Slinky™.

Measure the diameter of the slinky and the distance the crest moved.

Data:

Final frame: _____ Frames / second: _____

Initial frame: _____ Diameter of Slinky™: _____

Elapsed frames: _____ Distance crest moves: _____

Calculations: (Show equations if appropriate.)

Elapsed time = _____

If a Slinky™ has an actual diameter of 0.07 m, then calculate the actual distance the crest traveled? = _____

Speed = _____

Summing Up:

1. Describe the motion of the Slinky™. _____

2. Compare the motion of the Slinky™ coils to the motion of the pulse.

3. What is actually traveling at the value for speed that you calculated? Is it the coils or the pulse? Explain. _____

4. How confident are you that the speed you report is the actual speed? Give reasons for your confidence level. _____

Physics Cinema Classics C Wave Propagation – Wave Vocabulary
Lesson 1 (Teacher Notes)
To Accompany Activity #1 Human Wave

Purpose: Estimate the speed of a transverse wave in a Slinky ™.

Procedure:
As an introduction, lead a class discussion reviewing speed terms like frequency, wavelength, and speed of a wave. Then have students use the worksheet to determine the velocity of a transverse wave in a slinky. Students will need transparencies and markers to collect data for the worksheet. If you have only one monitor for the DVD, students may watch you mark the points on the monitor and count the frames, and then you can give the students photocopies of your transparency from which to measure data.

The first three lessons show transverse waves traveling along a slinky. Audio track A1 in C/01.1 suggests that students determine the speed of the wave. However, only a small portion of a person appears in this segment, and the camera angle is rather sharp. Therefore, estimation of distance is difficult and not too reliable. The diameter of the slinky is a more reliable basis for setting a scale.

A wavelength is shown at the end of chapter 2, and although it is not a part of this lesson, **later** you can have students determine the wave velocity using frequency and wavelength from chapter 2.

Go to Lesson1and follow the procedures listed in the student version of this activity.

Data:

Final frame: _____

Initial frame: _____

Elapsed frames: *9*

Frames / second: *24*

Diameter of Slinky ™: *0.045m*

Distance crest moves: *0.30m*

Calculations: (Show equations if appropriate.)

Elapsed time = *9/24= 0.38s*

If a Slinky ™ has an actual diameter of 0.07m, then calculate the actual distance the crest traveled? = *(0.30m/0.045m)(0.07m) =0.47m*

Speed = *0.47m/0.38s =1.2m/s*

Summing Up:

1. Describe the motion of the slinky. *The slinky moves back and forth across the table's surface.*

2. Compare the motion of the slinky coils to the motion of the pulse.
   The motion of the wave is perpendicular to the motion of the slinky coils. Waves that propagate perpendicular to the direction of vibration are called transverse.

3. What is actually traveling at the value for speed that you calculated? Is it the coils or the pulse? Explain. *The speed that is calculated is the speed of the pulse. The pulse travels the distance measured, not the coil.*

4. How confident are you that the speed you report is the actual speed? Give reasons for your confidence level. *Student answers will vary. Watch for estimation of data. See notes above.*