

STUDENT WORKSHEET
Longitudinal and Transverse Waves

INSTRUCTIONS:

- 1. Work in groups as requested by your teacher.**
- 2. Use complete sentences when answering questions.**
- 3. Refer to the Student Instructional Guide for assistance with GEE software. This is available in the “Instructions” tab of GEE for this module.**

ENGAGEMENT

1. Your teacher will explain that the local seismometer recorded an earthquake very recently, and show you the seismogram that was recorded on that instrument.
2. What can we learn from this?

EXPLORING – PART I

1. What are the three kinds of waves that are produced by an earthquake? These waves are not always easy to work with on every seismogram, so let’s start by examining a seismogram that shows these waves very clearly, and then return to our recent seismogram.
2. Your teacher will show the classic seismogram. How are the waves on this seismogram distributed?
3. Have the computer show all three components of the classic earthquake simultaneously. What are the three seismic traces?
4. What differences between the different waves on the three components do you observe?

Downloadable at: <http://www.seis.sc.edu/scepp/teach/module.html>

CONCEPT DEVELOPMENT PHASE – PART II

1. Click the button on the computer marked “Particle Motion Animation”. Observe all three animations. What do these show? Explain the function of the little moving balls or dots on the computer screen. [This feature is not available on Apple computers yet.]

1. Describe what each of the three components of a seismograph is recording.
2. What are the best traces for determining the direction to the epicenter? Select only these for the next part of the exercise.

APPLICATION PHASE

2. With the cursor, draw a window around the first half period of the P waves on each trace.
3. Make a Particle Motion plot as explained in the Student Instructional Guide.
4. What is the relationship between the S-wave particle motion and the direction to the earthquake?

Downloadable at: <http://www.seis.sc.edu/scepp/teach/module.html>

5. Repeat steps (3) and (4) for the S wave. Both analyses will be plotted on the screen simultaneously.

6. In what direction should the best-fit line for the particle motion due to the S wave be?

EXTENSION PHASE

1. Can you determine if surface waves are longitudinal, transverse, or some other type of wave?

2. Can you determine the direction from your station to the classic earthquake or the earthquake recently recorded?

3. Can you determine the ANGLE OF INCIDENCE of the P-wave of your classic earthquake? This is the angle with respect to the vertical of the P-wave particle motion. Which components would you use? Is the angle of incidence what you expected?