

Wave Modeling

Purpose:

- model transverse and longitudinal waves
- identify and measure wave characteristics

Materials:

- “butcher” paper (5-7 feet long, 2-3 feet wide), stopwatch, meter stick, markers

Procedure:

Each group should have three members.

Place the large sheet of butcher paper on the lab table.

One group member steadily pulls the paper across the table while another member moves the marker back and forth over the paper. The arm should swing freely as a pendulum.

The third group member uses the stopwatch to measure the amount of time needed to sketch the wave motion across the entire length of paper.

A **transverse** wave may be modeled when the marker moves back and forth perpendicularly to the direction of the moving paper. A **longitudinal** wave may be modeled when the marker moves back and forth across the paper parallel to its direction of movement. If done carefully, you should see nice consistent shapes for these two wave models.

For each of these two wave models:

- Record the **total time** of the wave motion on the paper.
- Label, measure, and record the **wavelength** of the wave.
- Label, measure, and record the **amplitude** of the wave.
- Count the number of complete vibrations and divide by the total time to obtain the **frequency** of the wave.
- Divide the total time by the number of complete vibrations to obtain the **period** of the wave.
- Find the wave's **velocity** by measuring the total distance the wave traveled and dividing this value by the total time.
- Now calculate the wave's **velocity** by multiplying the recorded frequency of the wave by the measured wavelength. Compare this result with the velocity obtained using the total distance and time.

Show all work and calculations on the butcher paper.