(TA INITIALS)

FIRST NAME (PRINT) LAST NAME (PRINT) BROCK ID (AB17CD) (LAB DATE)

# Experiment 5

# Standing waves

## Hardware

The experimental setup consists of a string that is fixed at one end, extends horizontally, wraps a quarter-turn around a pulley, then continues vertically where its end is connected to a mass holder. The tension $F = mg$ applied to the string can be varied by placing different masses $m$ on the mass holder.

A wave driver causes a mechanical vibrator attached to the string near the fixed end to oscillate the string in a vertical plane. The frequency $f$ and amplitude of the sinusoidal vibration can be adjusted to form visible standing wave segments and to vary their number.

The necessary conditions for the production of standing waves on a stretched string fixed at both ends is that the length of the string be equal to a whole number of half wavelengths so that there can be a node at each fixed end of the string.

For this experiment, one fixed end is where the string rests on a pulley and the other is where the string attaches to the mechanical vibrator. The end attached to the pulley is a true node, but the end attached to the metal wand on the vibrator is not exactly a node since the wand vibrates up and down a little. Close examination shows that the true node is a little closer to the fixed end, so the effective string length will be a bit longer than measured. However, the difference will not be more than a few millimeters, so the error introduced is only a fraction of a percent.

## Procedure

Carry out your procedure to collect data.

## Data analysis

Use available tools that you think are appropriate to analyze your data.

Once you have analyzed the data, draw appropriate conclusions. How confident are you in your conclusions? Quantify your confidence.

(!) Important! Be sure to have this printout signed and dated by a TA before you leave at the end of the lab session. All your work needs to be kept for review by the instructor, if so requested.

## Lab report

Complete a discussion of your results and submit it to Turnitin before the lab report submission deadline, late in the evening six days following your scheduled lab session. Do not wait until the last minute. Turnitin will not accept overdue submissions. Unsubmitted lab reports are assigned a grade of zero.