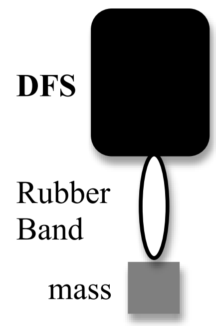
HARMONIC MOTION LAB

This lab is intended to work with TI-83+ graphing calculators used with Vernier LabPro's in collecting data. It is not exhaustive but does examine basic procedures.

Purpose:

Examine the motion that occurs when one suspends a mass on the end of a rubber band and pulls it down a few cm. Specifically, the lab will look at forces exerted on the rubber band during this motion.



Materials:

TI-83+ Calculator
LabPro w/ calculator cradle and connecting cable and power supply
Dual Force Sensor (DFS-BTA)
Rubber Band(s)
Hooked Weights

Procedure:

1. Connect a TI-83+ calculator to LabPro using the cradle and short connecting cord. Power up the LabPro using either batteries or an ac power adapter.

2. Mount the Dual Force Sensor on a ring stand or simply hold with your hand so the hook is at the bottom. Set the range to ±10 N. Plug the connector into one of the analog ports on the LabPro.

3. Make sure the LabPro is powered up (push center button and if it sings back to you it's powered). Start the TI-83+. Press [**APPS**] then select **EasyData**. When the program launches, it will show the force sensor, indicate the current reading and the collection mode: **Time Graph 3.6 (s)**. Press the button under **Setup** and choose "**7**" to **Zero** the setting.

4. Place the hanging mass and rubber band on the DFS. Start the mass oscillating up and down with a movement of about ±2 cm. As it is oscillating, press the button under **Start** to collect data. You should get a trace that resembles a sine wave. If unsuccessful, choose **Main** then **Start** and say **OK** to overwrite the last run.

5. Once you have a good run, determine the period of the oscillation. There's a blinking cursor at the left side of the graph. The **X (time)** and **Y (force)** values are given on the screen. Move the blinking cursor across the trace until it reaches a peak. Note this time. Then move it until it is either one or several peaks later. Note that time. The difference in time divided by how many peaks you moved is the period, the time for one oscillation.

6. Record the mass used and the period. Change the mass by adding or subtracting, then repeat steps 1 to 5.

Data Table:

Mass (g)	Period T (s)

Again, this is a demonstration lab. More analysis could be done focusing on various aspects of the situation like the rate at which the oscillations decay, whether a Period versus Mass graph matches the ideal found in Simple Harmonic Motion, would things change if you used a spring rather than a rubber band, etc.

C. Bakken
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