Laboratory 1: Searching for Regularity in Timing

This is a lab to get us started on the challenging task of how **we** can measure time. Tune out the sight of the clocks in the room and do not consult a watch or other timer.

A. Your Own Pulse

We start with the timer we all have handy, our own heart rates. Practice finding your own pulse, putting your forefinger and middle finger together on an easy-to-access vein. The two likeliest candidates are on the forearm side of your wrist, and on your neck just under your chin.

To test the regularity of your pulse, pair up with someone. We will call out a *start* and a *stop* signal, count your pulses over that interval. Compare your count with that of your partner for a few trials. Comment on how well you agree with each other.

Now, one of you get up and climb the Hegeman stairs and come back. Compare your pulse counts now, giving yourself a *start* and *stop* signal. What do you observe?

B. Timing a Pendulum

Now make a pendulum with:

1) length 1.00 meters mass of 100 grams starting angle 20°

and time this using your pulse for 10 complete cycles. How consistent are repeated measurements? How much variation between the pendulum and your pulse do you observe? Give good reasons why one time-keeper might be more reliable than another.

C. What Does the Period of a Pendulum Depend On?

We will set up a reference pendulum for everyone to use. As our time unit, we will use half a cycle of this pendulum, which in the spirit of Dutchess County, we will call a **tick**.

Take your 1.00 m pendulum and time it for ten cycles under these conditions:

2) length 1.00 meters mass of 100 grams starting angle 40°
3) length 1.00 meters mass of 100 grams starting angle 60° .

Then, take your 1.00 m pendulum and time it for ten cycles under these conditions:

4) length 1.00 meters mass of 200 grams starting angle 20°
5) length 1.00 meters mass of 500 grams starting angle 20° .

Note: in these last cases, you might have to adjust the string to keep L = 1.00 m.

Discuss the level of variation you see. Are we justified in saying that the mass and the amplitude of oscillation don’t affect the period? We will return to these ideas later.

Finally, make these pendula and time them for ten cycles under these conditions:

6) length 0.50 meters mass of 100 grams starting angle 20°
7) length 1.50 meters mass of 100 grams starting angle 20° .

Are we justified in looking for a dependence of the period on length?

Next week, we will explore that length dependence more systematically.