PHY151H1F – Practical 1: Introduction

Welcome to the PHY151 Practicals! You have each been assigned a pod. Take a look around. Get to know your pod-mates. What famous physicist was your pod named after? Say "Hi!" to the pods that are near you. We have 3 hours together today. Here is the agenda:

- **Hour 1:** Name Game, Practice Problem Set, Student Presentations – not for marks
- **Hour 2:** Uncertainty Module 1 – Rolling dice, using Python for graphing and calculations
- **Hour 3:** Mechanics Module 1, Activities 11 and 12 [Activity 13 if you have time]

The Marking rubric for the Hour 2 and Hour 3 activities is attached. You will receive a mark out of 8 for this work, which will be entered on the portal between now and next week. In addition, materials from these Practicals, including the Uncertainty Modules, will appear on the test and final exam in this course.

Hour 1: Practice Problem Set

Write out solutions to the following problems as a team. You can use your own scratch paper, paper provided, or your white-board. Your pod may be assigned to do a particular problem on your whiteboard. This session should take no longer than 50 minutes. At the end of the week, solutions to these problems will be posted.

From page 21 of the "Practice" book:

Guided Problem 2.2 City driving

You need to drive to a grocery store that is 1.0 mi west of your house on the same street on which you live. There are five traffic lights between your house and the store, and on your trip you reach all five of them just as they change to red. While you are moving, your average speed is 20 mi/h, but you have to wait 1 min at each light. (*a*) How long does it take you to reach the store? (*b*) What is your average velocity for the trip? (*c*) What is your average speed?

Problem 2.83

83. Consider a 2.0-kg object that moves along the x axis according to the expression $x(t) = ct^3$, where $c = +0.120\ \text{m/s}^3$. (*a*) Determine the x component of the object's average velocity during the interval from $t_i = 0.500$ s to $t_f = 1.50$ s. (*b*) Repeat for the interval from $t_i = 0.950$ s to $t_f = 1.05$ s. (*c*) Show that your results approach the x component of the velocity at $t = 1.00$ s if you continue to reduce the interval by factors of ten. Use all significant digits provided by your calculator at each step. ●●

Practice Problem 3. (Not from Mazur)

A mass on a spring has a position $x = A \sin(\omega t)$, where x is the variable for position in metres, t is the variable for time in seconds, A is a constant $A = 0.05$ m, and ω is a constant $\omega = 3.14$ rad/s. The function "sin" is the sine-function, and the quantity in the brackets has units of radians. So, if you are going to use your calculator to compute x, you should have your calculator set to radians-mode, not degrees-mode.

(a) Draw a rough sketch of the motion of the mass (x versus t) for the time interval $t = 0$ to $t = 4$ seconds.

(b) At what times during these four seconds is the mass at rest?

(c) What is the maximum speed of the mass as it oscillates?

Hour 2: Uncertainty Module 1

Please complete all of the questions for Activities 1-3 in the Backgammon-101 Module, which introduces uncertainties.
http://www.upscale.utoronto.ca/PVB/Harrison/GUM/01_Backgammon101/Backgammon101.pdf

Practices in keeping a good notebook :
Everything you do in the lab should be recorded in your lab notebook while you are doing the practicals activities. There is no point in copying information that is already in this guide sheet. Nor is there any point in writing a detailed essay on your procedure; note form is quite sufficient, as long as it is complete and comprehensible to your Practicals Instructor.

- List the NAMES of all participants on the first page of each day's write-up. Note if any participants arrived late or left early.
- Put the DATE (including year!) at the top of every page in your notebook.
- NUMBER the pages in your notebook, in case you need to refer back to previous work.
- DO NOT use loose paper for data taking or calculations. All your work should be entered and appear in your lab notebook.
- Diary format means that the record is written in the order in which a procedure, calculation or inspiration actually occurred. You should NOT leave blank pages to be filled in later.
- If you write computer code, or have computer drawn graphs, or code output printouts, staple them in neatly beside the description of your experiment. There is a printer in the Practicals room. Be careful to label your work with your pod number so it doesn't get mixed up at the printer!
- You should also NOT spend much time "tidying up" your notebook, or "rewriting history"; your time is too valuable, and it vitiates the function of the notebook.
- Do not us liquid paper, or big blotchy marks, or torn-out pages to obscure parts of your work. If you have written down something that you later realize is wrong, simply put a line through it and label it as "wrong". Many times you might figure out later that what you thought was wrong was not wrong and you'll be glad you didn't blotch it out!

Hour 3: Mechanics Module 1

Please complete **Activities 11 and 12** from the Mechanics Module 1.

If You Have Time: Activity 13 from the Mechanics Module 1

http://www.physics.utoronto.ca/~jharlow/teaching/phy151f14/Mech_Module01_Student-Act11-13.pdf

[Note that every week we will assign an "If You Have Time" activity. In general, students should NOT do these! It is better that you use extra time to go over the required activities again and make sure you have done your best work. However, if you do attempt it, up to 1 'bonus point' will be awarded if the team completed and did well on the IYHT activity. A pod should have the permission of a TA before attempting an IYHT activity.]

Take-home activity (20 minutes)

[Please bring your answer to this activity to next-week's practical to share with your team-mates, and turn it in to your TA1 next week. This activity is not for marks, but will help with our discussion during week 2. Thanks!]

Imagine you have been hired by a neighbour to be a physics tutor for a high school student. This neighbour is paying you well, and the student seems to be quite smart, but the student claims to hate physics and seems unmotivated to learn. Upon talking to the student, you have discovered the issue [Please choose an issue below.] Write a short summary of your recommendations (3 - 6 sentences)

ISSUE A: The student has no friends in this particular class, because none of their friends happen to be taking physics. The student feels lonely and isolated in the class.

ISSUE B: The student took one look at the first assignment, did not understand the first question, and decided that physics was too hard.