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 on the last page of this document. 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

On loose paper or the white-board, write out solutions to the following problems as a team. You can use your own scratch paper, paper provided, or the white-board, whichever you prefer. You may each want to take a photograph of the solution when you are done for future study. 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" Mazur 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

In the TERM booklet which each pod will turn in at the end, 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 TERM booklet :
Everything you do in the lab should be recorded in your booklet 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.

- Write your **Pod Number** clearly on the front of the booklet, and fill in "1" for the *book no*. – If you require more than one booklet during today's practical, ask your TA and fill out the book number and *total number of books used* on each booklet.
- List the **Names** of all participants on the cover of the booklet. You do not need to write your student numbers. Note if any participants arrived late or left early.
- Fill in the **Date** on the front page of the booklet.
- It is good practice to number the pages in your booklet as you use them, 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 booklet(s).
- Use "diary format". 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.
- All relevant computer codes, program output, graphs, etc, should be printed out and stapled into the booklet neatly beside the description of your work. 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 booklet, or "rewriting history". Treat the booklet as a log of what actually occurred.
- 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.

Physics 151: Practical Evaluation

The practical mark will be out of 8 points: 2 of these points are individual marks based on effort and participation, and 6 of these points will be a pod/group score based on work in the TERM booklet(s) your pod turns in. The expectations for these points are defined below.

Pod Mark (6 points)

	Excellent (3)	Average (2)	Acceptable (1)	Unacceptable (0)
Results	All of the questions in the activity have been answered correctly	Most of the questions in the activity have been answered correctly but some have flaws or are incorrect	A few of the questions in the activity have been answered correctly	The majority of the questions in the activity have been answered incorrectly
Methods	Analysis/procedure is logical and well thought out, assumptions have been clearly stated, relevant concepts have been clearly explained, it is clear the pod understood the main point of the activity, measurements have been repeated for better accuracy, all steps have been justified, analysis includes a good discussion of error (if applicable)	Most of the criteria explained in the "excellent" section are satisfied, with the exception of one or two	A few of the criteria explained in the "excellent" section are satisfied	Very few of the criteria explained in the "excellent" section are satisfied

Individual Mark (2 points)

	Acceptable (2)		Unacceptable (0)
Effort	Student is a contributing member of the pod, student works proactively in a group, facilitator stops to ensure the entire group is keeping up with the group's progress, student respects other members of their pod and the TA, student has a positive attitude		Some aspect of acceptable behavior is not being met, which is holding the pod back

Total Mark for Student (8 points)