Hand-In-Problem (HIP) and Enhancement (ENH) Guidelines

One key objective of this physics class is to make you confident in recognizing and solving (physics) problems from real life situations – situations in YOUR real life. This will help you become a problem solver who 'thinks outside the box'. You will practice answering questions based on facts and quantitative reasoning. Are you willing to jump off a bridge with a rubber band fixed around your ankles (some people call this a bungee jump – I call it crazy ☺), or will you do some tests first?

Like everything else, we learn thinking outside the box by practicing it. Each week I will present to you a physics problem (the HIP – "Hand-In-Problem") so that you can practice your understanding and problem solving skills. The HIP problem might even challenge you to use physics outside of the box of the materials discussed in class. You will be mainly graded on the path that you take to work on each of these problems. Don't panic, we will gradually get you accustomed to this so that you will be ready to take on whatever task it is that somebody might ask you to do.

The second part of your homework that you will hand in each week will be an enhancement (ENH) of the problem (HIP) of your own creation. I hope that this will inspire you to see 'Enhancements' each time you solve a physics problem or think about the universe. The goal is for you to transfer content learned in class and to evaluate the world around you. Wouldn't it be fun, to find yourself inspired enough by our physics class to solve problems that you did not even know you have ☺?

You are welcome to discuss homework problems and enhancements with your peers, the TA's, and your instructor. Note that what you submit **must be your own work, fully understood by you, and that you can defend all your work**. If you work in groups – and I encourage to use your peers as a resource – then note on your assignment whom you worked with. You should use homework as an opportunity to practice how to write up problems in physics: set it up clearly, provide appropriate diagrams, explain what is needed, show appropriate mathematics, show answers clearly and with correct units, all as you would on an exam or in a report at your workplace or an article in a newspaper.

Please note that your enhancement should be directly inspired by the HIP problem given to you that week. Imagine solving a problem in the back of the book that has parts a), b), c) and d). I am asking you to add part e), a problem that you make up yourself, take the problem one step further.

An equally valid enhancement would be to create a problem from something the HIP has inspired you to think about - on the same physics material but perhaps but a different scenario. There is physics all around us, and you are always invited to ponder: You bicycle to the supermarket; you run uphill trying to catch the bus, you ski down a hill, your kids may play on a teeter totter or on a merry-go-round, or you might like to play in a swing yourself. One year a student gave me every enhancement related to baseball – yes, he was a former baseball professional player and we had a lot of fun discussing his work ☺

Important: When you are inspired by the HIP problem, you need to **quantitatively** expand it to a new insight beyond the question asked in the HIP. It might happen that you ask yourself a question that you might not be able to solve to your own satisfaction. Do not be frustrated. Find me, and we might be able to solve it together. Most times when somebody was stuck, we had the greatest time working through the problem together - and I should not need to mention that in this instance, you often will have already achieved an 'accomplished' grade for most of the points on the rubric.

SUGGESTIONS ON HOW TO APPROACH THE HAND-IN HOMEWORK:

The hand-in homework is designed to test whether you have grasped the physics of that week to a level of being able to solve a problem without guidance through an example in the textbook. Ideally you can solve it without any other materials but paper and a pen, because you do it after you have completed your homework on Mastering Physics, and after you have written your Journal that week. Sure enough, you can always open the book when you need help, you ideally read about the topic you need a refresher, and then close the book, while you work on your HIP. You do not want to mix up "problem solving" with "pattern matching". Here are some suggestions for how to approach a problem in order to make the best use of your time.

- Try follow the steps in the rubric and see how far you can get.
- Draw a good and clear picture.
- Really it has been shown that the brain works like working memory. If you draw a picture, or write out information, you free up working memory in your brain that you might need to fully grasp the problem.
- If you get stuck, take a break and try again later – this has, personally, been really useful to me. Often one can get so bogged down by a problem that you can't see the forest for the trees! Sometimes just getting up and walking around the building or the block helps me get a clearer perspective.
- Describe the problem to someone – not necessarily even someone who understands physics! It is amazing how just articulating a problem out loud, in your own words, can help you wrap you brain around a tricky concept. That being said – drawing another picture of the problem might help you visualize the problem.
- Seek out help! – Learn to ask the right questions; get together in a group and brainstorm; go to the physics help desk; stop by a physics instructor's office hours – after all, this is what we have office hours for! Do not ask for the solution. Ask people to help you understand what is asked and what it might be you are missing.
- Set yourself a time limit. If you are not getting anywhere on a part of a problem in, say, 15 minutes, stop! Find help, or take a break.
- One last tip: Just like Mastering physics, you can choose to spread the load over a few days. Look at the problem when it is posted, draw it out, and start thinking about it, so that by the time you sit down to solve it you already have a good idea of what you will do. You might even be done early!
- If you have other tips that work for you, please let me know, it might help others …

TIMING:

You will all have time to ask questions about the HIP Monday in class or during office hours. For this term I envision the following options … let me know if you think I am crazy.

a) You hand in your HIP Monday before class. I will return it Tuesday and you have the opportunity to correct if by Wednesday. You will be able to improve each row of the rubric by one step. You will be able to ask questions, and most of the time I might even show you the solutions in office hours if you ask for them.
b) You hand in your HIP Tuesday before Lab. There is no possibility for corrections. (You can also do corrections to your work when defending it in office hours, see c))
c) You schedule 20min during office hours and hand in your HIP/ENH after orally defending your work. You can do this any time in the term, as long as there is time in office hours. You can hand in only one HIP per office hour.

PH 201: HIP#_____ Scoring Rubric **Name:_____**

CATEGORY	EXEMPLARY	**ACCOMPLISHED**	**DEVELOPING**	EMERGENT
Timeliness		**In time or completely explained in office hours**	**Late within 2 days**	
Problem Statement and Introduction	A new learning tool for our class is written	**The problem is clearly presented for reader**	**The problem is mentioned**	No Introduction: You jump into some calculation
Picture	Your sketch could be dropped into a graphic novel as it stands.	**There is a clear sketch larger than a credit card of the problem set-up with important features and data noted**	**There is some sketch of the problem setup**	What sketch?
Model and Assumption	A model learning tool	**There is a clear model and assumptions are clearly listed.**	**Some assumptions listed.**	What are assumptions? What is a model?
Equation Introduction	All variables introduced and equations explained for out of class reader	**All variables introduced, equations are motivated**	**Equations were used without introduction**	
Physics Tools	Appropriate physics tools are correlated to the exercise in text book quality and size	**Appropriate physics tools are correlated to the exercise with a clear coordinate system and is larger than a credit card**	**Appropriate physics tools are correlated to the exercise with a clear coordinate system**	What is a physics tool?
Problem Solution Presentation	Solution is very clearly presented with intriguing asides or annotations	**Solution is complete and clearly presented making no significant intuitive demands on the reader.**	**All steps of the solution are there although I have to read between the lines**	Cliff notes that might be connected to the problem…
Form	Your solution can serve as solution manual.	**Drawing is larger than a credit card and organization is fluid**	**I could figure the path of your solution with effort.**	Only you can read it.
Units	Units correct and checked	**All units correctly given**	**Calculations & quantities are presented with units**	What are units?
Significant Figures		**Correct Sig Figs**	**Makes effort to use correct significant figures**	Copies unreasonable digits from the calculator
Solution	Wow! Correct & elegant	**Correct (significant figures are)**	**Could be correct**	None/Not reasonable
Reasonableness	'Accomplished' + considers related settings or variations	**Gives clear rationale for appropriateness of the solution**	**Asserts that the answer is reasonable**	No discussion
ENH: Personal Connection	You created interest in your problem to every reader.	**You clearly introduced to the reader why you have an interest in solving this problem**	**There is some personal connection**	What personal connection?
ENH: Problem Solution Presentation	Solution is very clearly presented with intriguing asides or annotations	**Solution is complete and clearly presented making no significant intuitive demands on the reader. You might need a new picture…**	**All steps of the solution are there in some form although I have to read between the lines**	Cliff notes version of solution with only high points present
ENH: Calculations	Can't help themselves and go way beyond the basics in some sense.	**Extends the calculations in useful and relevant directions to create added insight**	**Makes effort to extend calculation in some direction**	Only qualitative discussion, no calculations.
Solution		**Could be correct**	**None/Not reasonable**	
ENH: Reasonableness	'Accomplished' and considers other related settings or variations	**Gives clear rationale for appropriateness of the solution in the setting**	**Asserts that the answer is reasonable**	No discussion
Reflection	Instant Classic: Must read	**Motivates added insight**	**Claims added insight**	No insight into insight
All Self Graded	Grader fully agrees.	**Thoughtfully Done**	**Done**	Not Done

Any comments: