

Physics 106

Homework Submission

Homework problems and data

The homework problems for this course are at the end of this packet. Problems 1-1 through 1-4 belong to assignment 1, problems 2-1 through 2-4 belong to assignment 2, etc. Each of you will do the problems using different data, resulting in answers that are different from those of other students. Blanks are left in the problems where you can write your data. Your data for the entire semester is available over the internet and can be printed out. Go to our course home page, under "Online Homework" and then click on "Homework Data Sheet".

Here is an example:

The "problems" (in packet):

- 1-1. A certain bacterium swims with a speed of [01] _____ $\mu\text{m/s}$. How long would it take this bacterium to swim across a petri dish having a diameter of [02] _____ cm?
- 1-2. At the Olympics, an athlete runs the marathon in 2 h, 9 min, [03] _____ s. (This is near the record time.) The marathon distance is 26 mi, 385 yd (1 yd = 3 ft). Determine the average speed of this athlete. Caution: Find the distance in miles and the time in hours to high precision.

The "data" go in the [xx]_____ spaces above before you work the problem. Get your own online.

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Student ID 456
Homework data
Physics 106, Winter Semester
set 1. [01] 3.43 [02] 8.20 [03] 22. [04] 30.2 [05] 39.8 [06] 4.0
[07] -1.4
set 2. [01] 212. [02] 18400. [03] 5.07 [04] 4.22 [05] 10.85 [06]
11.9 [07] 7.4
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The answer range (in packet)

Answers to Homework Problems, P1

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1-1. 5.00, 9.00 h
1-2. 12.100, 12.200 mi/h
1-3a. 70.0, 120.0 km
1-3b. 45.0, 65.0 km/h
1-4a. 3.00, 5.00 m/s
1-4b. -0.25, -0.75 m/s
1-4c. -0.75, -1.25 m/s
1-4d. 0
2-1. 1.20, 1.50 h
2-2. 0.60, 1.20 m/s2
2-3. -1400, -1800  $\pm 10$  m/s2
2-4a. 0
```

Good habits

Practice good problem solving skills: write and draw neatly, using plenty of space. Draw diagrams of the problem. Substitute units with your numbers into your algebra, and check to see that the unit algebra makes sense.

You are encouraged to work in groups. You can get help from the tutorial lab. Of course the work you submit must be your own. Solutions to problems will be posted outside N361 ESC.

Late and dropped homework

To allow for emergencies or adding late to the class, you will be allowed to submit *three late* homework sets in the semester without penalty, as long as they are before the “cutoff” dates on the schedule. In addition we will **drop** your lowest homework assignment.

Read the sections below to see how other late homework is graded.

Class ID Number

If you do not have a course identification number yet, you must obtain one before your homework data sheet will be available. Go to our course home page and click on “Obtain Class Identification Number (CID).”

Format of internet submission

To get the accuracy you need for submission, you will have to keep enough significant digits. I suggest you generally keep four significant digits (don’t round prematurely) for all numbers as you work the problem (for example use 0.005872 not 0.00587 or 0.0059). Significant digits are those that do not include leading (0.00352) or ending zeros (5632000) that may be there just there to fill space rather than indicate precision. See Ch. 1 for a discussion of significant digits.

At the end of the homework problems there is information about the answers. You are given a range of possible values for each answer, along with the units, if any. For example; “40, 800 m” means that your answer will lie between 40 and 800 meters. These numbers also indicate the accuracy to which you must calculate the answer. The *answer range*, not the problem, gives you the digits to keep. In most cases, the lowest digit in the range numbers gives the minimum accuracy of the answer. For example, “40, 800 m” means that the answer must be correct to the nearest 1 m because the one’s digit is the lowest given in the range. As another example, “15.0, 60.0 N” means that the answer must be correct to the nearest 0.1 N, but **you can submit as many extra digits as you like**. (Assume that the numbers given in the problem are **exact**. If you are given 2.2 m/s, it means 2.2000000..., to as many digits as you wish to imagine).

In some cases the accuracy is indicated with a \pm symbol. For example, “32000, 39000 \pm 100 km” means the answer must be correct to the nearest 100 km (for example 36500), but you can submit as many extra digits as you like (36472).

Do not type units into the computer as they are supplied on the form, and write your numbers appropriate for the units indicated. If a very large or very small value is asked for in **scientific notation**, indicate the exponent of 10 with an “e”. For example, an answer of 3.00×10^8 would be submitted 3.00e8, and 1.6×10^{-19} would be submitted 1.6e-19. Do not put any spaces in any entry nor any commas, for example you may have to submit an answer like 120000, but don’t use commas.

You are responsible for learning how this works. If you make a mistake in the entry format, you will only lose one of five points on that problem, but you will have to submit it again with new data (see Retries below).

After working the problems, submit your answers over the internet. Go to our course home page and click on the assignment number. Fill in the answers as indicated. Be very

careful in submitting your answers. Also, don't submit the answers until you are absolutely sure you have exactly what you want to submit.

Online grading

- You have **three tries** to get the correct answer on the computer submission of your homework. After each submission, the computer will immediately tell you which of the problems were correct, and which were wrong.
- Any submission counts as a "try". On the first submission, **submit all of the answers** for all of the problems, since questions left blank on the first submission will be graded as incorrect. Your homework will be immediately graded and the computer will tell you which, if any, of the problems you missed.
- If a wrong answer is submitted, the computer will return immediately the correct answer and a new data value to use for the next try.
- If you **miss any part of a multi-part** question the whole question will be marked wrong. You will be given the correct answers and another (different) data set to try again.
- **Correct answers need not be resubmitted** unless they are part of a **multi-part** question, even though new data will be given for the entire set.
- Since you have immediate feedback and three chances to get it right, it is a good idea to allow enough time to get help from the tutorial lab and resubmit homework if necessary.
- After three tries the system closes that homework assignment for you and no other attempts will be accepted.
- Any mistakes with entering wrong data, etc. will count as a try (please don't appeal this) so be careful in your entries.
- If a correct solution is entered within three tries and before the due date, full credit is awarded. If the correct solution is entered into the system after the due date but before the section cutoff date, half credit will be awarded: your score for late submissions show up as "late points" which count only half.
- At the "**cutoff**" **deadline** for each unit section the homework program for that section will be permanently closed and no other attempts for late credit will be accepted. See the schedule.
- Please be aware that this homework program has been used for many years, and by thousands of students. Therefore, if your answer is wrong, it is almost certainly "user error" and not a computer error.

How to use homework to prepare for exams

A lot of students get good scores on HW, but poor scores on exams because they really didn't master the HW...they got help enough to turn it in, and that's about it. The goal is not to memorize the HW (or a sample exam), but to master strategy, concepts and skills that you will need to solve new problems...you probably won't see the identical problem on the exam.

If you get help on homework, you need to

- 1) ask enough questions until you really understand the step, skill or concept you missed, and how it works in other situations.
- 2) **write down** what your error was, and your new understanding in your own words (you can **use these notes** in reviewing for the exam...they record what you are weak in and errors you will probably repeat).
- 3) find another problem that uses the same skills, and try it.
- 4) practice outlining problem strategies. Look at new problems, and write down steps, drawings and concepts that you would use to solve the problem, without actually solving

them. Go over these strategies with other students you study with, or ask a TA if that's the right approach.

Problem Solving

The following is a summary of professional research into physics problem-solving. Your goal is to move from the “novice” column to the “expert” column. Notice how expert problem-solvers stop to think about the problem, draw pictures to visualize the problem, plan out their strategy, before beginning, etc.—and *still* manage to solve problems much faster than novices. Short-cuts aren’t always short!

Novice problem solver	Expert problem solver
Studies worked examples rapidly, without bothering to understand the examples	Studies worked examples until <i>sure</i> examples are understood
Consults worked examples later in hopes of finding a plan	Starts with a plan; consults worked examples later to verify that chosen plan is correct
Collection of knowledge is a random jumble of miscellaneous facts	Collection of knowledge is well organized in person’s head: centered around physical principles and hierarchies (topic trees)
Separates intuition/“real world” knowledge from theoretical/formal knowledge	Constantly integrates “real world” with theoretical knowledge
Little or no planning before trying to solve equations	Develops a definite problem-solving strategy before starting to solve equations
Not able to construct a physical picture of what’s going on, or is unable to recognize when chosen picture is inappropriate	Constructs a useful physical picture of the problem
Does not stop to think of a qualitative answer before starting to solve the problem	Uses qualitative physics principles/physical reasoning to have a reasonable answer to the problem in mind before beginning to solve numerically
Focuses on surface structure (physical <i>items</i> involved in problem)	Focuses on deeper structure (physical <i>laws</i> involved in problem)
Works backward (looks for equation that has the <i>unknown</i> in it)	Works forward (looks for equations that include the <i>given</i> quantities)
Does not stop to think about the answer that was obtained	Stops to think if answer makes sense (checks against qualitative answer)

Here are web pages with tips on studying and solving problems:

www.oberlin.edu/physics/dstyer/StudyTips.html
www.oberlin.edu/physics/dstyer/SolvingProblems.html