

## Physics 180A/B, 195, 196 Student Assessment (Testing)

I will provide students with **three versions of the actual test two days before the test date**. You will receive one of these three versions at random on the test date. It is important that you keep up with the homework, lectures and readings before the test. You need to practice working on the **DRS method**. You will not become competent at solving problems by watching your Instructors solve the problem. You should practice solving these problems in front of friends or classmates. *One cannot learn how to hit a baseball by watching alone. . . you will eventually have to actually step up to the plate and swing yourself. The sooner the better. A few misses or foul balls are part of the game. The blackboards in the classrooms and labs belong to you, too. Chalk is free. Talk is cheap.*

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### **Physics Concepts Section I (50%)**

There will be **3 physics concept questions** (25%). These questions will require a written explanation with a possible diagram and/or mathematical relationship (equation). This section will demonstrate your ability to communicate in a written format. Expressing yourself in written, oral and logical mathematical communication is important in understanding any physics concept. Avoid writing in paragraphs. Utilize bullets or numbered steps to separate your thoughts. *Be clear, concise and complete.*

There will be **3 basic physics problems** (25%) that will assess your ability to solve basic problems. These problems will demonstrate your ability to utilize mathematical relationships with either numbers or variables associated with the physics concepts. A diagram or explanation is required if it is necessary to show how you arrived at the answer. *Be clear, concise and complete.*

### **Problem-Solving Process Section II (50%)**

Physics is all about expressing yourself in a clear and logical manner. This section will demonstrate your ability to express yourself from start to finish. There will be **2 DRS problems** (25% each) that require a complete explanation. You will be required to draw a complete organized diagram, provide necessary and sufficient reasoning and solve the problem. Avoid writing in paragraphs. Utilize bullets or numbered steps to separate your thoughts. *Be clear, concise and complete.*

### **Alternate Section III - Individual Student Physics Competency (25%)**

In an effort to provide students with an opportunity to demonstrate their physics competency, I will offer a third section to the test. **The student may choose to complete this section (25%) in place of either one DRS problem (25%) or any combination of three questions and problems (25%).** This is not extra credit. Your advantage is that you can plan ahead of time to do this section. It's what you know!

Is there a physics concept that you would like to demonstrate that you understand very well? Is there an associated problem that demonstrates your ability to understand the current physics concepts? Have you read a good book that enhances your current physics knowledge? Have you investigated, researched, or talked about physics related articles that could help demonstrate your competency in the current physics concepts? There is certainly something that you would like to demonstrate to me and to yourself that you have indeed understood some of the physics concepts. Obviously, I am looking for, **diagrams, explanations, and mathematical relationships**. Have you solved the problem of Global Warming? . . . anti-gravity machines? Have you studied Maxwell's papers? Have you made a connection between a physics concept and your field of study?

**If you choose this section, you must complete this section.** It is very possible that you are more competent in some concepts that I have not included on the test. So that you can fully prepare for this section, please see me for more clarification. This section is not intended for alternate problem-solving or desperation writing. Only serious, planned attempts will be considered. *Be clear, concise and complete.*

## Grading Criteria

To provide partial credit to students, all problems and questions will be graded on the following criteria (based on 10 points per answer). You should always be clear, concise and complete and show your work.

- 1) One to four points deducted for **unclear** or **disorganized solution or answer**. One should not have to struggle to read your handwriting. Avoid writing in paragraphs. Utilize bullets or numbered steps to separate your thoughts.
- 2) One point deducted for a numerically wrong answer based upon using the right mathematical relationship (equation). Your answer is wrong but your solution is correct. You made a **simple mathematical error**. Show your work.
- 3) One point deduction for one too many or too few **significant figures**. Two point deduction for two or three too many sig figs. One point deducted for **unitless answers**.
- 4) Two to four point deduction for correct answer or solution but a **missing simple diagram** that is necessary to prove your answer or solution. Show your work.
- 5) Two to four point deduction for a correct answer or solution but a **missing brief explanation** that is necessary to prove your answer or solution. Show your work.

I will award partial credit down to 6 points. So you will receive a 10, 9, 8, 7, 6 or 0 on each individual problem. These criteria will also apply to the 2 **DRS** problems.

*I maintain the right to modify these criteria to better reflect student understanding. I will let you know before the tests and practices if there is a change.*

### **\*Diagram, Reason and Solution Method**

- 1) **Read the Problem**. Many of these problems are quite relevant. Reread the problem. This is really important. Read it slowly. Relax. There are no tricks. The strict wording of the problem is to train you to look closely at the question.
- 2) **Draw a Diagram**. Visualize the problem. Your diagram demonstrates your understanding more than you think! Can artwork sum up your mood? Do artists find patterns that resonate with your personality? Your diagram speaks for you. They are not your dirty laundry. Imagine that someone is analyzing your diagram. What do you think they think of your representation of this problem? Be meticulous, be complete, be clear, and be artistic. If your diagram is all of this---there should be few questions asked!
- 3) **What is given in the problem?** Start to use the clues given to you. What else do you know that is not given?
- 4) **What are you solving for?** Keep returning to this. You will forget.
- 5) **Reason out your path to a solution**. Explain it to yourself or a group member. What were the main concepts and guideposts that will help you discover the solution to this problem? Internalize this process! You will use it again and again. **You must articulate your learning process through dialogue, diagramming and reasoning.**
- 6) **Find and utilize appropriate equations**---manipulate them. Do not use derived equations. It's like getting a birthday cake from Von's. Someone else put standard equations together. These equations are maps created by people before you. Do you always follow the map? Look at the equation for what it is and---it is not. Equations have feelings, too! Give them quality time.
- 7) **Plug, Shove and find the Solution**. This is the easy part. The calculator does the work. Monkeys can punch in numbers!
- 8) **Check and reflect on your answer**. How did this particular solution process relate to other solutions you have already done? How can you generalize this solution process for future problems? How does the answer compare to your prediction