

# Pre-Lecture Reading Questions

## ASTR/PHYS 109

Last updated 8/29/2017

### Introduction

It is important to learn how to ask good science questions (or tell if a question is a good question), and to be well prepared for lecture. For these reasons we will have a number of Pre-Lecture Reading Question (PLRQ) assignments. In particular, you will be writing down questions (in a particular way) while doing the reading and turning in those questions in TurnItIn on eCampus. Each of these assignments will be part of your grade.

Before describing what makes for a good question we note two things:

1. There will be 6 assignments. One for each Unit of the reading.
2. For each assignment, you will do the reading (before the text is gone over in lecture) and write down 4 questions based on the reading, and turn in those questions online.

### Submitting Your Assignment

For each Unit in the textbook (1-6), you will submit four questions relating to the reading into TurnItIn in eCampus. Please number and format your questions as follows:

1. *First question*
2. *Second question*
3. *Third question*
4. *Fourth question*

Each questions will be reviewed on a pass/fail basis. If all of your questions pass, you will receive full credit. If not, you will be provided feedback and offered the option to do a revision for partial credit. In general, late submissions are also accepted for partial credit. Extra questions submitted in the same assignment will be ignored. Multi-part questions should be avoided.

Note: The exception to this is Unit 1, where we will require you to keep resubmitting until you pass without penalty.

*How long do I have to submit questions?* They are assigned with the reading, and they are due before the start of the next class.

*What if I have more than four questions?* If you are curious about something and want to submit EXTRA questions, or unrelated questions, you should submit those to the instructor or TA directly. Alternatively, you can just ask them in class.

## Grades, Misgrades, and Revisions:

Each PLRQ assignment is worth a maximum of 10 points, while each question is reviewed as either a pass/fail. You must have all questions pass in order to receive full credit. With the exception of Unit 1, the grading rubric is as follows:

All Pass = 10/10

Any Fail = 5/10

Revision = Max 7.5/10

Late = Max 7.5/10

Unit 1 is Pass/Revise - Revised until you submit a set of passing questions. The way you can tell if you passed is if the grade shows a 10/10. Note: For the first Unit you are allowed to ask question about the Recommended Reading.

*How do I submit a revision?* Revisions are submitted to their corresponding TurnItIn Revision assignment, located through the e-campus homepage.

*What do I do if I feel I was misgraded?* You are encouraged to defend your work. If you feel you were misgraded, send an email to [109help@physics.tamu.edu](mailto:109help@physics.tamu.edu) with your name, list of questions, and an argument for why each question deserves a pass.

## What are the topics that make for a good PLRQ question?

One of the greatest skills a scientist (or any human for that matter) can have is the ability to ask a good question. Well-posed questions are interesting and fun, and can break down a complex topic into smaller, more tangible sets of goals. In short, good questions can help keep you focused, and have the added benefit of bring rigor to a complex and open-ended discipline. Good scientific questions take many forms, but they all have many similarities between them.

We consider two different types of questions, and either is fine:

1. Questions about anything in the reading you find unclear or need help understanding.
2. Questions related to the reading that go beyond what is in the text. Something in the reading that made you think of a question you really want to know the answer to.

While there are many interesting questions that can be asked, in this assignment we are only interested in questions that are directly related to the reading. Said differently, this is not supposed to be a time for you to ask random questions that are only tangentially related. They need to be clearly tied to the reading, or go beyond the reading. Touching on issues outside the scope of the chapter, like in a later chapter, is fine. Since this is hard, we'll make it more explicit below, and give examples after that.

## How can I tell if my question is well asked?

- Is it relevant to the reading?
- Is it clear and well phrased?
- Does it reflect critical thinking?
- Is it relevant to the *science* in the reading?
- Is there only one question mark in the actual question?

Excellent questions are clear, well phrased, and thoughtful. Each question should reflect that you are thinking critically about the material in the reading and asking for clarification about something that is unclear, or asking for more information. It is ok to ask a question that may well be answered in a later chapter. In addition, topics that are closely related to the reading, even if they are not explicitly mentioned in the reading, are fine.

If an experiment would be needed (or was needed) to answer the question, that is usually a good indication that it is an excellent question.

Good, but not great, questions indicate that the reading has been done, but there is no demonstration of critical thinking. Questions about definitions or simple facts that can be looked up in a dictionary are typically not good. However, just because it can be looked up these days, doesn't necessarily mean it is a bad question.

Bad questions typically indicate that the reading was not done, that no thought was given to the subject material, or the student did not understand the assignment. There is sometimes the case that the question is so poorly worded that they did not make any sense.

The worst questions are already directly answered in the textbook (although one has to be careful about what is directly answered, and what is only kinda answered)

## Example Questions and Feedback

*How many known quarks are there?* This is a bad question because it is directly answered in the chapter (the answer is 6, on page 21, Table 3.1). It is also a bad question because it is too simple. This is a basic fact that doesn't require any thought to answer.

*What is the difference between up quarks and the top quark?* This is a good question because it is asking for important information that goes beyond what is in the chapter. The answer is not directly in the text itself. A question that is similar to the original question that appears to be a bad question but is in fact an excellent question is *How many quarks are there?* There is no reason to believe that there are not more quarks in nature to be discovered. Indeed scientists are actively looking for more, and many papers are published every year on this subject.

*What is the mass of the Sun?* This is a borderline question. In some ways it is a good question because it can be answered with an experiment. It's not such a good question because it does not show any real thinking, and can be easily looked up. If the question made it clear why this is interesting, that would help. For example, *If a whole bunch of new mass were to fall into the Sun, would that have an impact on the speed of the Earth around it?* As it stands, this question would fail.

*Do all stars have the same mass?* This is a good question because it goes beyond the simple fact, and asks about new information. While many people already know the answer to this question, that doesn't make it a bad question. It is true that this question is answered in later units (and would thus not be a good question for them), it is not answered directly in the text, and is a good question for the first unit.

*What is the evidence that a big bang occurred?* This is a good question for the first unit. While it is answered in later chapters (and would thus not be a good question for them), it is not answered directly in the text.

*What are black holes really? And should I be worried?* This is an example of a case where two separate questions have been put into the same question. We kindly ask you NOT to do this. It makes it VERY hard to evaluate. Make them two separate questions. For the same reason, since you will be asked for four and only four questions, make sure you only put four. If you put five, then the grader will ignore your last question, not pick the best four.

*If we have only sent objects to the edges of our solar system, how can we know the true distances of stars beyond our solar system?* This is an excellent question because it is asking about the solar system as well as about how much we know about it using scientific methods. It is focused, easy to understand, and interesting.

*Why do we believe there is no edge of the universe?* This is an excellent question because it is clearly based on the reading, and goes beyond what is covered in Chapter 3 to something interesting. The fact that we will talk about it in a later chapter which also indicates it's likely to be a good question.

*How does the universe exist?* It's hard to evaluate this question because it's not clear what the writer means when they use the word "exist." It is not clear if it's thoughtful or reflects critical thinking. A better question would be "*How was the universe created?*" or "*What made the universe come into existence?*" At the moment, it's too broad and nonspecific.

*Where did everything come from, how did it all come to be?* This is a borderline question in some ways, and potentially excellent in others. The question of where did everything come from IS a scientific question. It would be a better question if it were more specific, and/or more clear what the question is that is being asked, but as it stands, this question would pass.

*Are the anti-matter guns on Star Trek real?* This is a borderline question and has lots of borderline qualities. It is only barely relevant to the reading, but then again, anti-matter *is* mentioned in Chapter 3 and it is interesting to know more. The question is certainly clear, but it isn't clear if it is important or critical. It could be excellent if rephrased to not sound so frivolous.

*What is reality as it really is?* There is no chapter for which this could be a relevant question. It is not really thoughtful or nor does it reflect critical thinking. It is not really asking for clarification.

*Is there anything smaller than an atom?* This is directly answered in Chapter 3. Thus, this is an automatic fail.

*What is the difference between astronomy and cosmology?* This is directly answered in the book and therefore not a passing question.