Lesson 1: Summary

Deepak Iyer

May 14, 2012

1 Learning goals for this lesson

The following is a list of basic ideas that were covered during this lesson. You must be fairly conversant with all of them now. If you have any questions, please post them on Piazza. The link is `piazza.com/phys211`.

- What is science, and what isn't?
- What is physics?
- Quantitative and qualitative descriptions of things;
- What is a physical quantity;
- Scales and order of magnitudes;
- Measurements and standards.

2 A quick summary

This section does not aim at being comprehensive. It's more of a slightly expanded version of the above, and primary serves to jog your memory, and be a quick look back place in case you forget something. If any of this is unclear, please post a question!

We started out with a discussion of what makes something scientific. By looking at questions which you'll came up with as "science" or "non-science" questions, we figured out that one of the main things that goes into calling something scientific is that it be "verifiable". This maybe something verifiable by experiment, or by corroboration of information (esp. in the case of history, as we hit upon). Most importantly, a lot of questions, if phrased well can become questions amenable to scientific study, even if it doesn't automatically fall into one of the stereotypical categories that we know as "science". On the other hand, several questions cannot be death with scientifically. Examples are questions about opinions (*Beatles or Rolling Stones?*, to steal one of your examples), about untestable claims, about interpretations, about feelings, and other such things. Even here, some aspects of some of these maybe amenable to scientific discovery, especially as we learn more and more about the natural world.

We then saw that physics is really the study of the natural world, but because every phenomenon cannot be studied at the same level of detail, or in the same fashion, this study gets split into several disciplines such as chemistry, biology, and so on. Physics, then, is to put it generally the study of the inanimate world, although methods developed in Physics are finding applicability in several other fields of science.

Anyway, this lead us to thinking about how we start describing the world around us, even just the classroom, and we saw numbers emerge naturally. Then length of the desk or the area of a floor tile. Alongside that came units, since we need to attach these numbers to some "units" so we know what we're talking about. A length of 1 makes no sense by itself. We then saw that some things we can accurately tell (no. of doors) and some things we can only tell so well (length of the desk - only as good as our meter scale can tell us). There is always therefore an "error" in measurements coming from limitations of measuring

devices. We can however quantify this error, in other words, we know to within how much we know the answer. Something like 1 meter to within 1 cm. We also came across to very fundamental physical quantities, namely length and time. All dimensions of objects, distances, areas, volumes are really built out of lengths. And clocks measure time. They're two very different things (at least for now :-)).

3 Additional resources

- Look at the files area on angel for links. I've posted two this week, the ones we saw in class.
- *The Character of Physical Law* by R. P. Feynman is a fun read by one of the greatest and most influential physicists of 20Th century;