Announcements

• New additions to the Course Web Site:
  http://astro.caltech.edu/~leonard/inventingreality/
In addition to the weekly reading assignments and class handouts, you will now find Powerpoint lecture slides and Web links to things discussed and/or shown in class. In case you miss class, the weekly reading assignments are generally posted on the web site by Wednesday afternoon of each week; handouts missed can be picked up outside my office, Rm. 6 Robinson.

• Optional, but potentially very interesting, special talk tonight (Tuesday April 5) in downtown Pasadena, 7:00 PM at Vroman’s bookstore, 695 E. Colorado Blvd.: Michelle Feynman, daughter of famed Caltech physicist Richard Feynman, speaks about the new book: “Perfectly Reasonable Deviations from the Beaten Track: The Letters of Richard P. Feynman”.

Assignment for Tuesday, April 12

• Primary Writings: Pythagoras. Although no writings of Pythagoras survive, here’s one take on his philosophy, told from the point of view of a citizen of Croton that did not opt to follow his Brotherhood (as dreamed up by your humble Professor).

• Primary Writings: Socrates, from Theatetus, as told by Plato. Almost all of the work that has come down to us from Plato is in the form of dialogs, many of which feature his teacher and friend, Socrates. Socrates (470-399 BC) was an engaging and infuriating figure in ancient Greece, known for his ruthless questioning of others’ knowledge. Since Socrates never wrote any of his dialogs down, we are beholden to Plato’s works for insight, of which Theatetus is one of the most famous. Historians and philosophers have long debated the influence of Socrates’ thinking on Plato, and, indeed, the extent to which “Socrates’” words in Plato’s dialogs actually bear resemblance to what the man himself might have said. Ultimately, it is probably an unanswerable question. For our purposes, though, what Socrates said is less important than the method he used to ruthlessly inquire into so many of the cherished beliefs held by his fellow Athenians, and the results he extracted. Here, we eavesdrop on a conversation among a group of people, the only notable one being Socrates (note that ‘Euclid’ is not the famous geometer who lived later). As you read this, I want you to ask yourself: What is Socrates’ point? Why is he putting this youth through such a grilling inquisition?

• Primary Writings: Archimedes. I thought I’d include this snippet from the great mathematician, Archimedes, since we discussed it in class. Here, he is trying to prove that he had developed a powerful form of mathematics that could handle very large numbers, and he wanted to show that he could calculate the number of grains of sand it would take to fill the universe. The paper, The Sand Reckoner, addressed to his friend and kinsman King Gelon II, was intended as a little royal entertainment. What makes it vitally important today is that Archimedes, wanting to make the numbers as large as possible, based his calculations of the dimensions on the most colossal universe he had ever heard of – the universe according to the novel heliocentric theory of Aristarchus. Though Archimedes didn’t believe in the reality of such a universe, he concludes that it would take $10^{63}$ grains of sand to fill the Aristarchian universe. Interestingly, $10^{63}$ grains of sand equals $10^{80}$ atomic nuclei which, coincidentally, is “Eddington’s number”, the number of particles in the universe as calculated in the 1930s by the English astrophysicist Arthur Eddington.

• Contemporary Writings: Abell. This is the first of several readings from George Abell’s classic astronomy text, Exploration of the Universe. It describes what we covered (and a bit more, e.g., lunar phases) this week regarding ancient Greek contributions to astronomy. It goes into some more detail on a few topics than we did in class; make sure you understand the concepts, and come armed with questions to ask in class about anything.
• Optional Reading (on reserve at the library): Koestler, The Sleepwalkers. Chapters 1 and 2. A vivid introduction to the Pythagoreans and the first mathematization of the human experience.

• Optional Reading: Kuhn, The Copernican Revolution. Chapters 1 and 2. Covers in great detail (more than given in class) the “2-sphere universe”, and the “problem of the planets”, retrograde motion. Includes a hefty dose of philosophy and history of science as well.

Weekly Thought Question

Imagine that you were suddenly given eyes able to perceive things that are 200 million times fainter than your present eyes can; for example, from Los Angeles you would be able to see the headlights on a car driving in New York. Now imagine that you focus these powerful eyes on a “blank” patch of sky (blank to normal humans’ eyes) that subtends an area only as big as a grain of sand held at arm’s length (i.e., a very tiny patch of sky). Draw or describe what you think you would see.