

You've earned your summer vacation, and it goes by all too quickly ... I don't want you doing anything for me that feels like schoolwork. But I /would/ like you to keep reading (reading is like showering or exercising: you should do it every day, your whole life), and I'd like you to be thinking about physics a bit between now and August. So here's what I'm going to ask:

(1) First, read "The Character of Physical Law", by Richard Feynman. These are seven talks he gave at Cornell in the 1950s, written up in essay form. If you'd like to watch one or two of them as a change-up from reading, all seven are on Youtube, starting at

<https://www.youtube.com/watch?v=j3mhkYbznBk>

but I think you'll get more out of reading than watching. I've put the book up at

<https://tinyurl.com/DrB-AP2021>, in the directory "Lending Library"

so you can download the PDF. Some of the physics in these lectures will be familiar from 9th grade, and some of it will be completely new and very strange. I /do not/ expect you to read deeply and study and learn the physics; I'd like you to read quickly, and focus instead on the /kinds of arguments/ that Feynman is making, and telling stories about earlier physicists making. Try to formulate some thoughts about what kind of understanding comes from "a law of physics", but be prepared to change your view several times! Get this done in the next couple of weeks, so it has time to soak in. No written assignment with this part. (see note at bottom *)

(2) Next, read /and reflect on/ one of the three choices listed below. By "reflect", I mean think about it as hard as you would to write an honest three to five page paper; by all means write the actual paper if you like, but I'd honestly rather you expressed yourself some other way. Email some questions (reply-all) to this group and get a discussion started, read a chapter aloud to someone in your family who would enjoy it, draw a picture, write a poem, send me a private note (or a loud public one!) complaining that you didn't like it, get together with classmates and argue about /why/ you didn't like it and then complain to me ... whatever you like. I'd like to see some concrete evidence of reflection from each one of you by no later than mid-July.

- Choice A. "Mission of Gravity" by Hal Clement, on Lending Library as the first half of a two-novel volume titled "Heavy Planet" in PDF form. This is a novel about some people (and aliens) who solve practical problems in an unusual place: as with a detective novel, the problems are the interesting part and the fiction itself is competent but not profound. A perfectly good form of reflection here would be to "do the math" -- that is, to treat quantitative things in the book as physics problems, and plug in the numbers and work them out yourself, checking that the author did his homework. Some of this will involve physics you might not know yet, or might not remember from 9th grade, so another good form of reflection would be to spot a physics problem you /can't/ solve, and ask me for help. A less quantitative approach would be to discuss how the aliens' psychology, culture, and technology is affected by the unusual place where they live.

- Choice B. "The Dispossessed" by Ursula LeGuin, on Lending Library as a PDF. This is a much more literary novel; its background concerns a political crisis between a planet much like ours and its estranged colony, but it is mainly the personal story of a great physicist whose life is caught up in world events. "Why did Dr. Burton assign this book?" is a perfectly good starting point for reflection; some other approaches that come to the same place would be: "what is the most important sentence in this book?" or "why did the author tell the story in alternating chapters?" or "how does Shevek's understanding of time as a physical concept relate to his understanding of time in his own life?"

- Choice C. "Structures, or Why Things Don't Fall Down" by J. E. Gordon, on Lending Library as a PDF. This is non-fiction, a survey of some important physical ideas and their application to practical engineering from the ancient past to the present. A good starting point for reflection would be to find ten or more examples of non-obvious ideas from the book that went into the design of the built world you see around you this summer.

Finally, (3) go back and look at "The Character of Physical Law" again /after/ reading and reflecting on one of the three choices. This time, think about the author rather than the subject: what makes Feynman a physicist? What would he have to say to Dondragmer, or Shevek, or J. E. Gordon? Get an email discussion going about this, if you can.

If you would like to get to know Feynman better, I also uploaded his autobiography, "Surely You're Joking, Mr. Feynman", which is a wonderful light read. And if (as I once did) you decide that you'd like to learn physics from Feynman instead of the teacher in front of the classroom (me), I have uploaded his Caltech lectures from a full-year elementary physics course he taught in the early 1960s. These three volumes are better than anything I will manage to do this year, so if you can learn for yourself by reading alone, I urge you to keep them and look at them often, now and in years to come.