SPA 3609 Tutorial 1, Questions for formative feedback

1. Calculate the wavelength of the primary gamma ray emitted when a ^{137}Cs nucleus decays.
2. A 1 GeV proton passes through 300 μm of silicon (a typical silicon strip sensor thickness). If 3.6 eV of energy is required to produce one electron-hole pair in the silicon, approximately how many will be produced?
3. Using the formula on slide 18 of Lecture 2 and the reference on slide 19, determine the percentage difference between the simple formula approximation for *Critical Energy* and that in the table for the elements C, Ti and W.
4. At approximately what distance in air (at STP) from the source would you be safe from alpha particles emitted by the decay of ^{241}Am (used in some smoke detectors)?

[NOTE gamma rays are also produced by the isotope, so don't take this value as indicative of what you need for radiation protection purposes in practice!]

5. How is the "Bragg Peak" used in "hadron cancer therapy" with protons or higher atomic number ions such as carbon?