The diagram shows one of the four naturally occurring decay chains.

a) Which decay chain is this?

b) There are only two types of decay shown. Explain what they are.

c) Choose 5 other nuclides that feed into this decay chain and add them to the diagram. Try to spread out your additions so that they connect with different portions of the decay chain. You may find the “Interactive Chart of Nuclides” to be helpful.
B) In the 1950s and 1960s nuclear weapon tests added large amounts of tritium ($^3$H) to the atmosphere. Most of this was quickly bound into water molecules and rained into the ocean. If some of this tritium-tagged water sank below the surface then it is isolated from new additions of tritium. The decay product of tritium is also prevented from escaping the water. Suppose you get a sample of water from a current deep within the ocean and you find that the ratio of $^3$He to $^3$H in the sample is 5.5 to 1. How long has this water been isolated from the surface?

C) $^{149}$Sm has a half-life longer than the age of the universe. Assume you had a sample containing 12 grams of $^{149}$Sm and you measure the activity to be 2.65 Bq. Use this to calculate the half-life of $^{149}$Sm.