Half-Life and Transmutation Questions

Answer the questions on a separate piece of paper, using complete sentences when necessary.

1) Explain half-life.

2) How much of a sample of radioisotope remains after one half-life? After two half-lives?

3) A radioisotope has a half-life of 4 days. What mass of a 20 g sample of this radioisotope remains at the end of each time period?
    a. 4 days
    b. 8 days

4) A sample of thorium-234 has a half-life of 25 days. Will all the thorium undergo radioactive decay in 50 days? Explain.

5) If you started with 32 million radioactive atoms, how many would you have left after five half-lives?

6) Manganese-56 is a beta emitter with a half-life of 2.6 hrs. What is the mass of manganese-56 in a 1.0 mg sample of the isotope at the end of 10.4 hrs?

7) The mass of cobalt-60 in a sample is found to have decreased from 0.800g to 0.200g in a period of 10.5 years. From this information, calculate the half-life of cobalt-60.

8) A patient is administered 20 mg of iodine-131. How much of this isotope will remain in the body after 40 days if the half-life for iodine-131 is 8 days?

9) Why is it important that radioactive isotopes used internally for diagnosis or treatment have relatively short half-lives?

10) Half life is a concept used in areas other than nuclear chemistry. Explain how this concepts applies to:
    a. The length of time a drug remain's in a patients body following administration.`
    b. Chemical reactions consume reactants, and therefor slowdown, based on changes that decrease like half life.