Radioactive Half Life Problems (+ a couple of energy problems)   *Show All Work & Units*

1. After 24.0 days, 2.00 milligrams of an original 128.0 milligram sample remain. What is the half-life of the sample?

2. Fermium-253 has a half-life of 0.334 seconds. A radioactive sample is considered to be completely decayed after 10 half-lives. How much time will elapse for this sample to be considered gone?

3. At time zero, there are 10.0 grams of W-187. If the half-life is 23.9 hours, how much will be present at the end of the day? Two days? Seven days?

4. 100.0 grams of an isotope with a half-life of 36.0 hours is present at the time zero. How much time will have elapsed when 5.00 grams remain?

5. How much time will be required for a sample of H-3 to lose 75% of its radioactivity? The half-life of tritium is 12.26 years.

6. U-235 has a half-life of 710 million years. It is determined that a certain amount of stored U-235 will be considered safe only when its radioactivity has dropped to 0.10% of the original level, approximately how much time must the U-235 be stored securely to be safe?
   a.) 7.1×10^6 years   d.) 7.1×10^9 years
   b.) 7.1×10^7 years   e.) 7.1×10^{10} years
   c.) 7.1×10^8 years

7. The half-life of radon gas is approximately four days. Four weeks after the introduction of radon into a sealed room, the fraction of the original amount remaining is closest to
   a.) ½   b.) 1/8   c.) 1/32   d.) 1.64   e.) 1/128

8. A home uses ten 100 watt light bulbs for five hours per day. Approximately how many kilowatt-hours of electrical energy are consumed in one year by using the light bulbs?
   a.) 365   b.) 1,825   c.) 5,000   d.) 10,500   e.) 365,000

9. The combustion of one gallon of automobile fuel produces about 5lbs of carbon (in CO_2). Two autos are making a trip of 600 miles. The first auto gets 20 miles per gallon, and the second gets 30 miles per gallon. Approximately how much LESS carbon (in CO_2) will be produced by the second auto on this trip?
   a.) 300 lbs   b.) 150 lbs   c.) 100 lbs   d.) 75 lbs   e.) 50 lbs

10. If the annual consumption of petroleum in the US is about 23 barrels per capita, the total annual consumption of petroleum in the US is closet to
   a.) 12 million barrels   d.) 6 billion barrels
   b.) 240 million barrels   e.) 10 billion barrels
   c.) 2 billion barrels