$\frac{1}{2^n}$ $X_f = X_i\left(\frac{1}{2^n}\right)$

Half Life Practice

Name_____Per_____

1) Chromium-48 decays. After 6 half-lives, what fraction of the original nuclei would remain?

$\frac{1}{2^6} = \frac{1}{64}$

2) Fluorine-21 has a half-life of approximately 5 seconds. What fraction of the original nuclei would remain after 1 minute?

$\frac{60 \text{ seconds}}{5 \text{ seconds}} = 12 \text{ half lives}$ $\frac{1}{2^{12}} = \frac{1}{4096}$

3) Iodine-131 has a half-life of 8 days. What fraction of the original sample would remain at the end of 32 days?

$\frac{32}{8} = 4 \text{ half lives}$ $\frac{1}{2^4} = \frac{1}{16}$

use $\frac{1}{2^n}$

4) The half-life of Uranium-238 is 4.5 billion years and the age of earth is 4.5×10^9 years. What fraction of Uranium-238 that was present when Earth was formed still remains?

$\frac{4.5 \text{ billion}}{4.5 \times 10^9} = 1 \text{ half life} = \frac{1}{2}$

(4.5×10^9 same as billion)

5) A medical institution requests 1 g of bismuth-214, which has a half-life of 20 min. How many grams of bismuth-214 must be sent if the shipping time is 2 h?

(2 h = 120 min)

$\frac{120 \text{ min total}}{20 \text{ min/half life}} = 6 \text{ half lifes}$ $\frac{1}{2^6} = \frac{1}{64}$ $1g \times \frac{64}{1} = 64g$

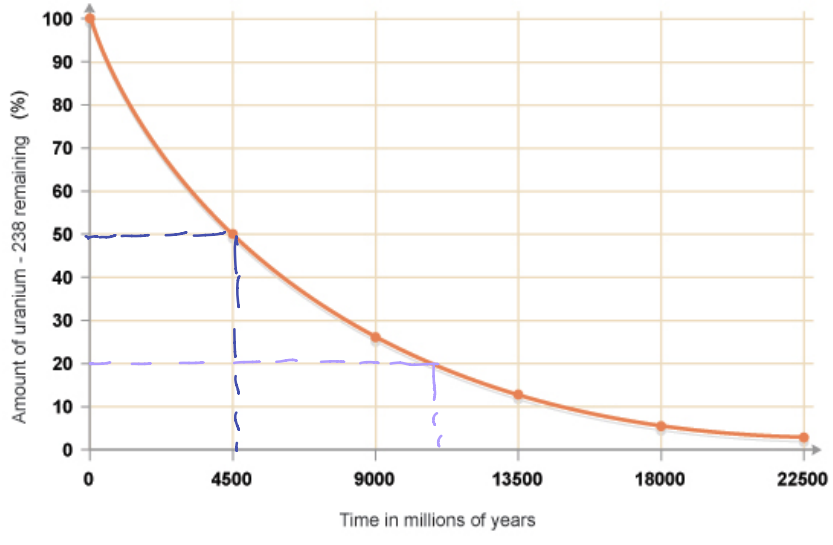
(flipped because you are finding original amount)

6) (Warning! This problem contains completely made up numbers!) An archeologist uncovers a human skeleton and would like to know how long it has been there. The archaeologist knows that a living human's bones contain about 8 grams of C-14. C-14 has a half-life of about 5000 years. If the skeleton contains only 1 g of C-14, how old is it?

$\frac{1g}{8g} = \frac{1}{8} \rightarrow 3 \text{ half lives}$ 5,000 years x 3 = 15,000 years total

7) According to the graph pictured here, what is the half-life of uranium-238?

Half life = 4500 years



8) If a rock sample had only 20% of its original amount of U-238 left, how old is the rock?

~11,000 years old