

KEY

Half Life Practice

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

# half lives	0	1	2	3	4	5	6
fraction	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{64}$

$\frac{1}{64}$

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

# half lives	1	2	3	4	5	6	7	8	9	10	11	12
time	5	10	15	20	25	30	35	40	45	50	55	60

$(\frac{1}{2})^{12} = \frac{1}{4096}$

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

# half lives	1	2	3	4
time	8	16	24	32

$(\frac{1}{2})^4 = \frac{1}{16}$

- 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?

# half lives	1
age	4.5×10^9

$\frac{1}{2}$

- 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?

# half lives	1	2	3	4	5	6
time	20	40	60	80	100	120

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

$\frac{1}{64} \cdot \text{original} = 1$
 $\text{original} = 1 \times \frac{64}{1}$
 $= 64 \text{ g}$

- 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?

# half lives	0	1	2	3
g	8	4	2	1

$3 \times 5000 = 15,000 \text{ years}$

- 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?

11250 years

