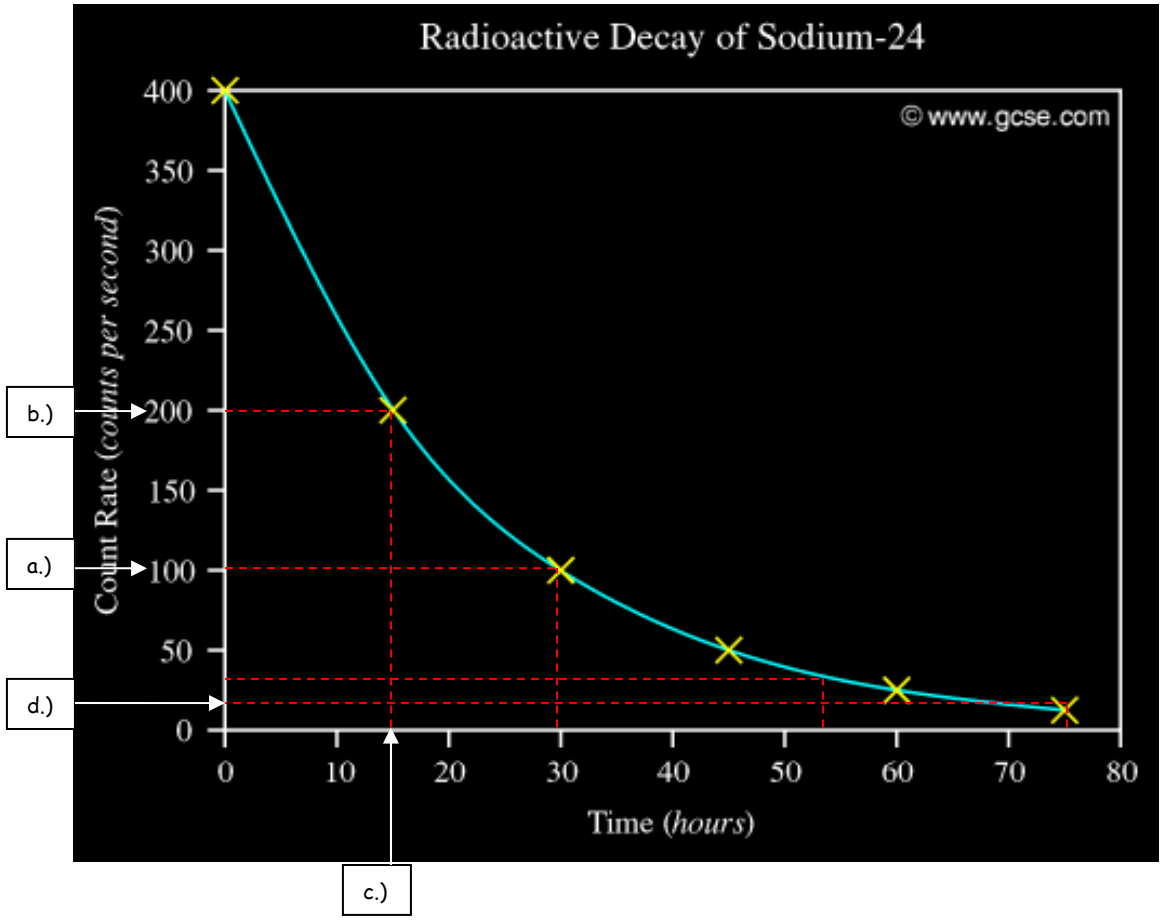
KEY

Half-Life

1.) What is the ratio of $carbon - 14$ to $Nitrogen - 14$ after two half-lives have occurred?

Answer – After one half-life 50% will be left of the parent and 50% will have been made of the daughter atoms. After the second half-life, only 25% will be left of the parent and so 75% will have been made of the daughter atoms. So, the ratio is $25:75$ for parent to daughter atoms or 1:3 if simplified.

2.) $Sodium - 24$ decays to produce $magnesium - 24$. A laboratory sample contains $400\ atoms$ of $sodium - 24$. Use the decay curve below to answer the following questions:



a.) How many $sodium - 24$ atoms will be left after $30\ hrs$?

$100\ atoms$

b.) How many **magnesium-24** atoms will be present after $53\ hrs$?

$30\ atoms$ of sodium-24 left would mean that there is now $400 - 30 = 370\ atoms$ of magnesium-24

c.) What is the half-life of $sodium - 24$?

About $14.5\ hours$

d.) How many $sodium - 24$ atoms will be present after $75\ hrs$? approximately 11 atoms

KEY

3.) A radioactive isotope has a mass of $120\ g$. If the isotope had a half-life of $20\ s$, what would be the mass of the isotope after $2.0\ min$?

If the half-life is $20\ s$ then there will be 6 half-lives to reach $2\ min$.

$6^{\frac{1}{2}} = 0.015625\%\ left$ $\quad$ $0.015625 \times 120 = 1.875\ g$

4.) A granite rock is thought to be about $2\ billion$ years old. Why can't we use $carbon - 14$ dating to find out if this is correct?

Carbon-14 dating will not work for dating items that were never alive to build up carbon. As well after a billion years there will be too small amount of carbon-14 left to accurately weigh to get a proper date.

5.) An organic sample is $28650\ years$ old. What percentage of the original $carbon - 14$ is still present in the sample?

The half-life of carbon-14 is $5730\ years$. $\frac{28650}{5730} = 5$. There has been 5 half-lives. $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$ There is $\frac{1}{32}$ left or 0.03125. This amount as a percent is 3.125%.