

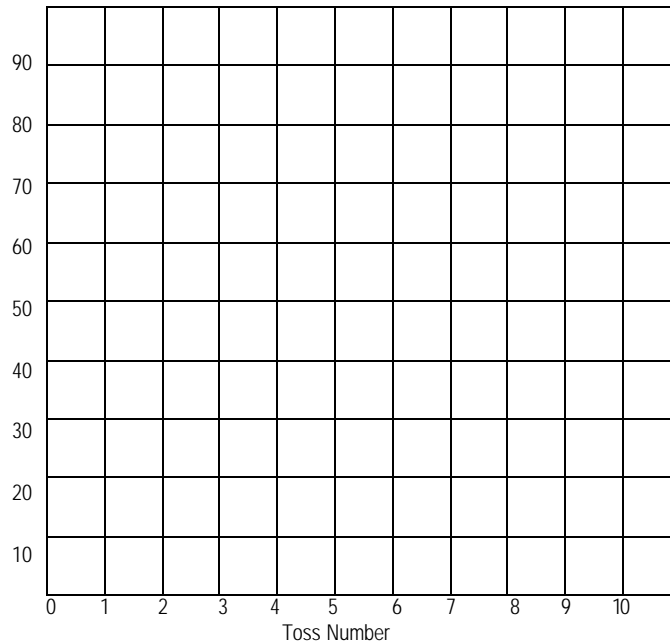
# Unit 6 • The Nucleus – Radioactivity

## HALF-LIFE

1. As a class, we collect data as though we are radioactive atoms. Fill in the data chart below:

Toss#	1	2	3	4	5	6	7	8	9	10	
# standing											
# standing											
# standing											
<b>Total</b>											

Graph this data:



- How long does it take for half the “atoms” to decay? \_\_\_\_\_ toss(es). This is the half-life.
- Using a different color, plot a graph for a group of atoms that have a half-life of 3 tosses.
- $^{24}\text{Na}$  has a half-life of 15 hours. If we start with 64 grams of  $^{24}\text{Na}$ , fill in the chart for how much  $^{24}\text{Na}$  we will have after each time interval.

<b>Time</b>	0 h	15 h	30 h	45 h	60 h	75 h	90 h	105 h
<b>Mass of <math>^{24}\text{Na}</math></b>	64 g							

half-lives



- $^{257}\text{Lr}$  has a half-life of 8 seconds. If we begin with 80  $\mu\text{g}$  of  $^{257}\text{Lr}$ , how long will it take before only 5  $\mu\text{g}$  remains? \_\_\_\_\_ seconds

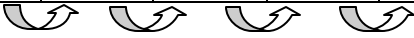
<b>Time</b>	0 s	8 s	16 s	24 s	32 s	40 s	48 s	56 s
<b>Mass of <math>^{257}\text{Lr}</math></b>	80 $\mu\text{g}$							

half-lives




6. A sample of  $^{253}\text{Fm}$  decays to 6.25% of its activity in 18 days. What is its half-life?

<b>Time</b>	0 d							
<b>Mass of <math>^{253}\text{Fm}</math></b>	100%	50%	25%	12.5%	6.25%			


  
 half-lives


7.  $^{24}\text{Na}$  has a half-life of 15 hours. If we need to have 2 grams of  $^{24}\text{Na}$  after 45 hours, how much must we begin with?

<b>Time</b>								45 h
<b>Mass of <math>^{24}\text{Na}</math></b>								2 g


  
 half-lives


8.  $^{257}\text{Lr}$  has a half-life of 8 seconds. How long will it take for 75% of the sample to decay?

<b>Time</b>								
<b>Mass of <math>^{257}\text{Lr}</math></b>								


  
 half-lives


9.  $^{14}\text{C}$  has a half-life of 5570 years and is used to date fossils. A sample is only 3% as radioactive as it should be compared to carbon from a living organism. How old is the fossil?

<b>Time</b>								
<b>Mass of <math>^{14}\text{C}</math></b>								


  
 half-lives

10.  $^{24}\text{Na}$  has a half-life of 15 hours. If we start with 90 grams of  $^{24}\text{Na}$ , how much will we have after 75 hours?

<b>Time</b>								
<b>Mass of <math>^{24}\text{Na}</math></b>								


  
 half-lives