

- Aim : To simulate the decay of a radioactive substance by the generation of random numbers.
- Apparatus : Scientific Calculator
- Theory : The spontaneous breakdown of an atomic nucleus of a radioactive substance resulting in emission of radiation from the nucleus is known as Radioactive decay.

Radioactive Formula is given by -

$$N = N_0 e^{-\lambda t}$$

N_0 - initial no. of nucleides
 N - active nuclei remaining

Half life is given by

$$t_{1/2} = \frac{\ln 2}{\lambda}$$

• Procedure :

1. We have to use scientific calculator to obtain random no. which indicates the no. of nucleides.
2. Given total no. of nucleides is 30 and chosen probability is 0.25.
3. So, firstly we have to obtain 30s and write down in a table as shown in derivation table.
4. We have to find the nos. which are less than 0.25. The nos. less than 0.25 are called as Daughter

nucleides as they are decayed & converted to daughter nucleides from parent nucleides.

5. Now again we have to obtain remaining no. of random nos.
6. Again find no. of daughter nucleides.
7. Repeat this process until we get all 30 parent nuclide converted to daughter nucleides.

OBSERVATION TABLE -

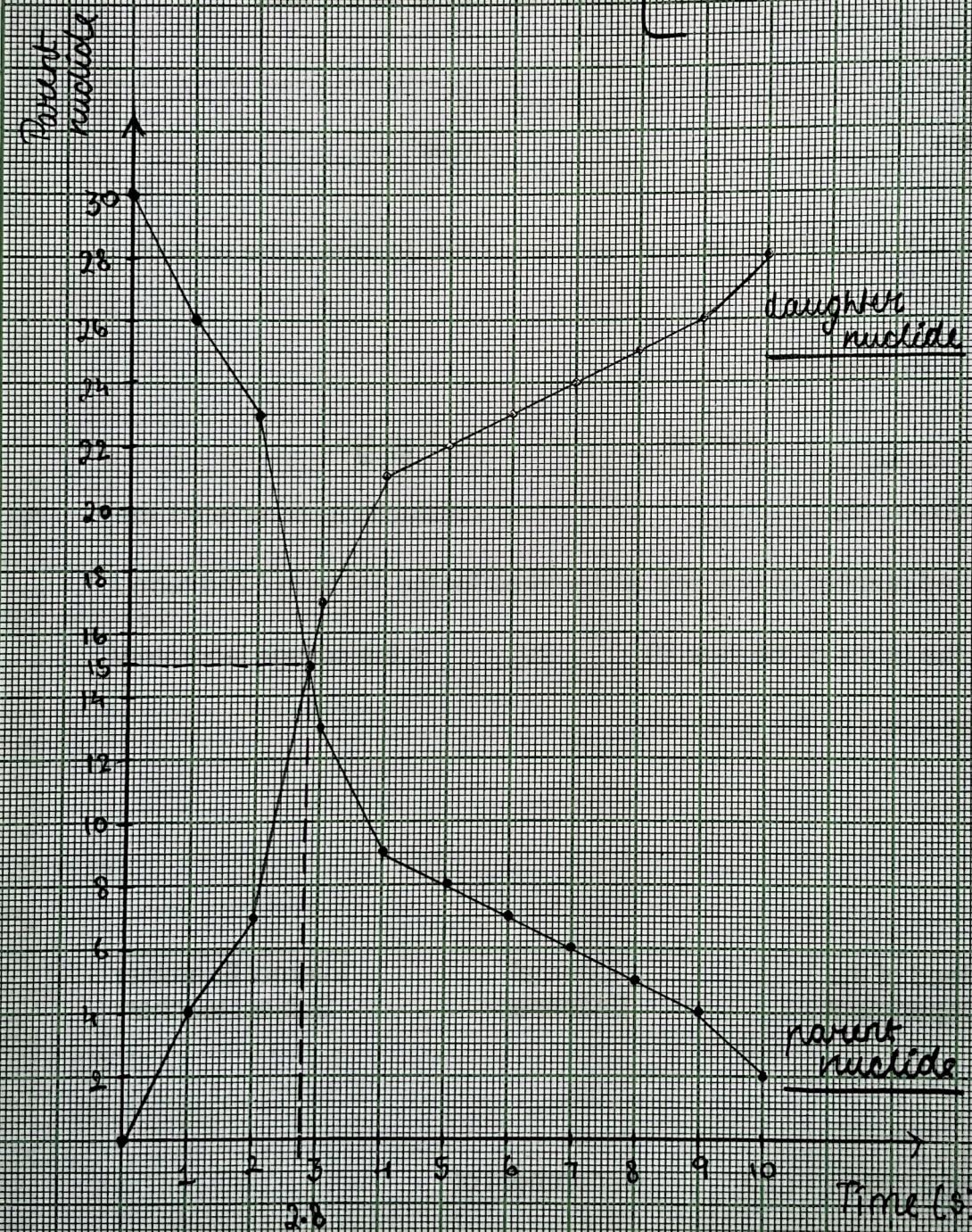
Total nuclides - 30 | Chosen probability = 0.25

Sr no.	T=1	T=2	T=3	T=4	T=5	T=6	T=7	T=8	T=9	T=10
1	0.76	(0.11)								
2	0.36	0.87	(0.88)							
3	0.49	0.65	0.75	0.72	0.52	0.91	0.9	0.99	0.58	(0.08)
4	0.29	0.55	0.87	(0.08)						
5	(0.05)									
6	0.92	0.6	0.69	0.92	0.45	0.51	0.34	0.45	0.85	(0.17)
7	0.57	0.66	(0.06)							
8	0.61	0.93	(0.19)							
9	0.38	0.29	0.95	(0.01)						
10	0.65	0.36	0.77	(0.13)						
11	(0.04)									
12	0.91	0.4	(0.07)							
13	0.47	(0.15)								
14	0.15									
15	0.6	(0.23)								
16	0.28	0.77	0.25	0.3	0.58	0.86	0.68	0.72	(0.12)	
17	0.85	0.66	(0.16)							
18	0.52	0.59	0.59	(0.15)						
19	0.27	0.6	(0.11)							
20	0.41	0.44	0.74	0.54	(0.14)					
21	0.36	0.78	(0.18)							
22	(0.15)									
23	0.56	0.37	0.32	0.7	0.73	(0.17)				
24	0.65	0.93	(0.2)							
25	0.63	0.16								
26	0.67	0.41	(0.17)							
27	0.25	0.95	0.83	0.44	0.78	0.53	0.49	(0.01)		
28	(0.13)									
29	0.73	0.79	0.39	0.88	0.52	0.37	(0.17)			
30	0.99	0.84	(0.08)							

Exp 01

SCALE

X-axis 1 unit = 2 nuclide
Y-axis 1 unit = 1 s



OBSERVATION TABLE :

Sr no.	Time (sec)	No. of Parent Nuclei	No. of daughter Nuclei
1	0	30	0
2	1	26	4
3	2	23	7
4	3	13	17
5	4	9	21
6	5	8	22
7	6	7	23
8	7	6	24
9	8	5	25
10	9	4	26
11	10	2	28

Calculations

From graph

$$t\gamma_2 = 2.83$$