Date _____

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Aim :- To simulate the decay of a radioactive substance by the generation of ~~relator~~ random numbers.

Apparatus :- Scientific calculator

Theory :- The spontaneous breakdown of an atomic nucleus of a radioactive substance resulting in emmission of radication from the nucleus is known as radioactive decay.

The nuclide which undergoes decay in radioactive process is a parent nuclie and the nuclide which is produced in the radioactive process is a daughter nuclide.

The Radioactive formula is given by :-

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

Where $N_0 =$ the initial quality of the Substance and N is the quality still remained and not yet decayed.

t is the half life of the decaying quality Euler's number equal to 2.71828.
The differential equation of Radioactive decay formula

Obs. Table 1:

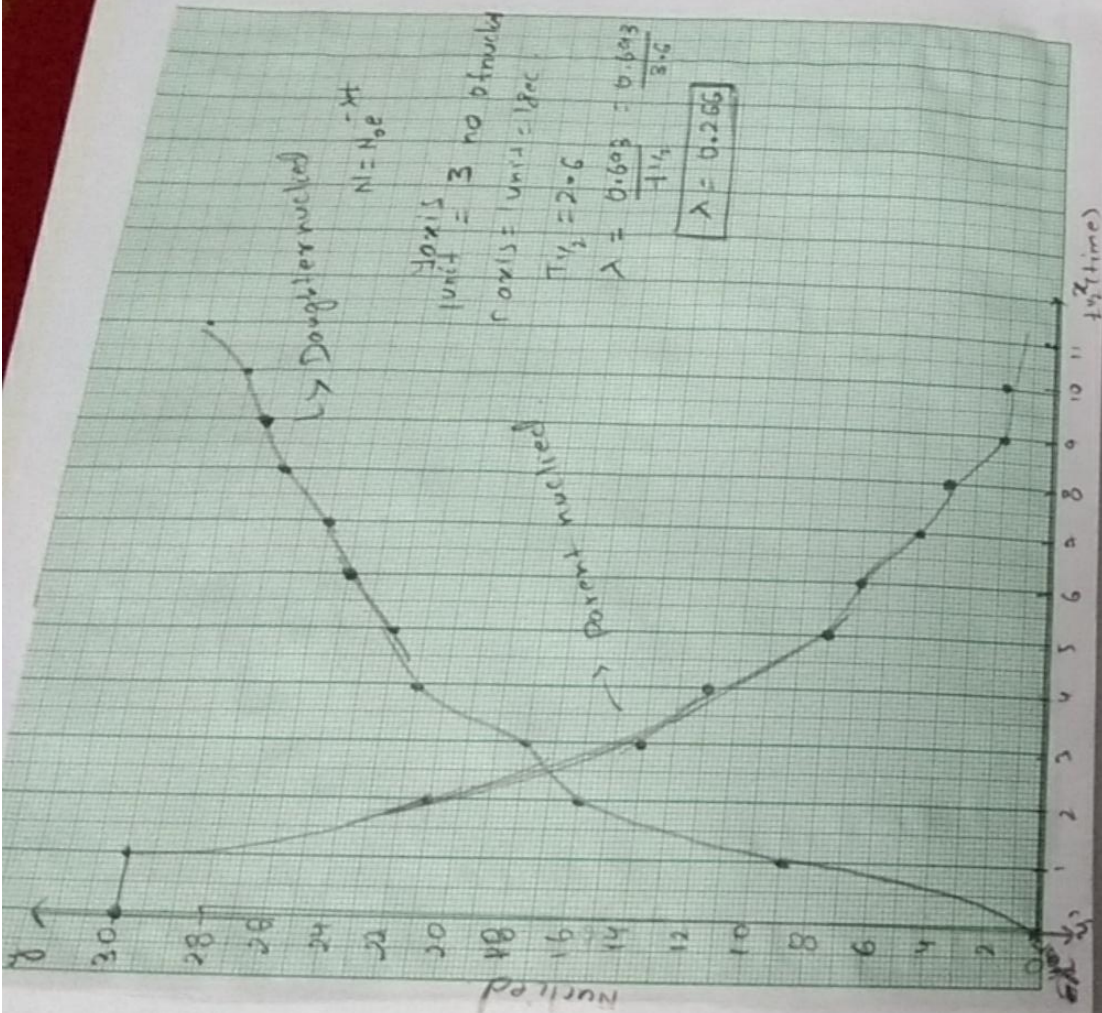| Sr. No	Time	Name of Parent nuclie	No of daughter nuclie
1	0	30	0
2	1	30	9
3	2	21	16
4	3	14	18
5	4	12	22
6	5	8	23
7	6	7	25
8	7	5	26
9	8	4	20
10	9	2	28
11	10	2	29
12	11	0	30

is defined as

$$\frac{dN}{dt} = -\lambda N$$

The half-life of an isotope is the time taken by its nucleus to decay to half of its original number. It can be represented as.

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

Procedure:-

(1) we have to use scientific calculator to obtain random which indicates the no of nuclides.

(2) Given total no of nuclide is 30 and chosen probability is 0.

(3) so, firstly we have to obtain 30sec and write down in a table as shown in derivation table.

(4) We have to find the nos which are less then 0.22sec. the no's less then 0.22 are called. as daughter nuclides as they are decayed and converted to daughter nuclides from parent nuclieds.

(5) Now again we have to obtain remain no of random nos.

Daughter nuclied

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

Y axis 1 unit = 3 no of nuclei

x axis 1 unit = 1 sec

$T_{1/2} = 2.6$

$\lambda = \dfrac{0.693}{T_{1/2}} = \dfrac{0.693}{2.6}$

$\lambda = 0.266$

Parent nuclied

Nuclied

$t_{1/2}(time)$

(6) Again fixed no of daughter nuclied.

(7) Repeat this process untill we get all so parent nuclied converted to daughter nucliedes.

——————— x ——————— x ———————