Exponential Decay

Radioactive decay:

Initial number of nuclei is N_0

Rate of decay =

This is the ***activity*** of the nuclei.

The same proportion of nuclei decay in the same ……

This is the same as saying that the probability of a nucleus decaying is λ, where

$\frac{dN}{dt} = -\lambda N$ λ is the ……..

there is a '-' sign because ……..

The solution of this differential equation is:

N = from this, we can use the log relationship to obtain

ln

Half-life

When the number of nuclei has dropped to half, N = ……..

The half-life, $t_{1/2}$ =

Eg There were 100 dice in the experiment. The probability of a 'decay' was …….

λ =

a) What is the predicted 'half-life', $t_{1/2}$?

b) How many throws are likely to be needed for 20 dice to remain?

c) If there were 10 000 dice to start with, how many dice would be likely to remain after 10 throws?

Straight Line Graph

The solution of $N = N_0e^{-\lambda t}$ is

$\ln N - \ln N_0 = -\lambda t$ or $\ln N = -\lambda t + N_0$ this will give a straight line graph

$y = mx + c$

the y axis will be ……..

the x axis will be ……..

the value of the y-intercept will be ……

the value of the gradient will be ……