

10 (a) State what is meant by radioactive decay.

.....

.....

..... [2]

(b) A radioactive sample consists of an isotope X of half-life T that decays to form a stable product. Only X and the stable product are present in the sample.

At time $t = 0$, the sample has an activity of A_0 and contains N_0 nuclei of X.

(i) On Fig. 10.1, sketch the variation with t of the number N of nuclei of X present in the sample. Your line should extend from time $t = 0$ to time $t = 3T$.

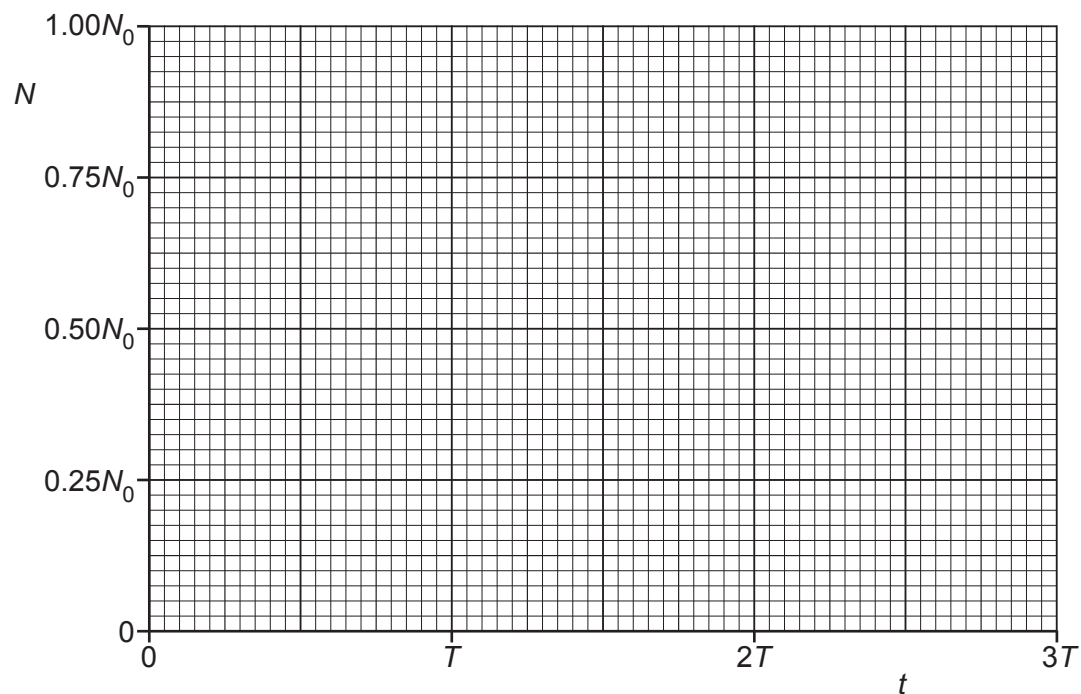


Fig. 10.1

[3]

- (ii) On Fig. 10.2, sketch the variation with N of the activity A of the sample for values of N between $N = 0$ and $N = N_0$.

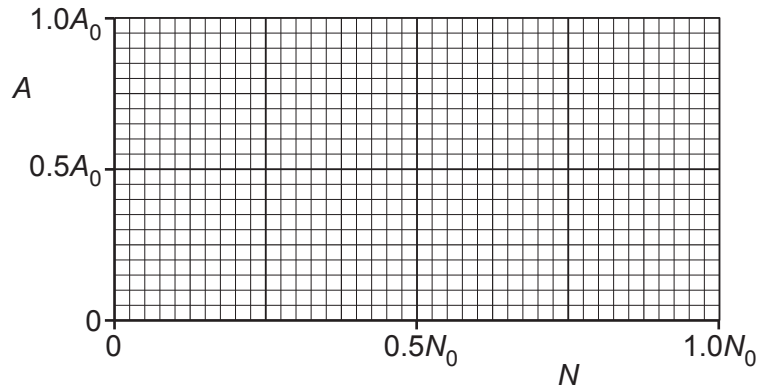


Fig. 10.2

[2]

- (c) State the name of the quantity represented by the gradient of your line in:

- (i) Fig. 10.1

..... [1]

- (ii) Fig. 10.2.

..... [1]

- (d) For the sample in (b), calculate the fraction $\frac{N}{N_0}$ at time $t = 1.70T$.

$$\frac{N}{N_0} = \dots\dots\dots [2]$$