Let $n = n[t]$ be the number of radioactive nuclei at time t and let Δt be a small change in time t. We know that the change in the number of nuclei is proportional to the number of nuclei at the start of the time period. Hence, the word equation translates to

$$\mathrm{d}_t n = -kn\,, \tag{1}$$

where k is a positive coefficient indicating the rate of decay per nucleus in unit time. We write n in the right-hand side for $n[t]$ as the dependance on t is implied by the derivative d_t. We assume k to be fixed although it will have a different value for different elements or isotopes.