 Modelling the exponential decay of a radioactive nucleus

Resource required:

* A large number of coins or 2 sided items per student (for example – m&m or skittles)
* Grid paper for graphing

Activity:

1. Split the students into small groups
2. Each group is given 100 items (coins or m&ms or skittles – must be able to differentiate each side)
3. The items are put into a box and then tipped onto a table
4. Let the tails side represent the nuclei that have decayed. Discard all of these. Count the heads remaining and return them to the box.
5. Record the information in the table:

| Number of times the items are tipped out | Number of un-decayed nuclei (remaining heads) |
| --- | --- |
| 0 | 100 (starting population) |
| 1 |       |
| 2 |       |
| 3 |       |
| 4 |       |
| And so on |       |

1. Repeat the experiment (Steps 3 to 5) until almost the whole population has decard.
2. Graph the results.

Implications:

Each time the box is tipped out represents a specific time period. This is called the half-life of the element.

Definition: The element’s half-life is the time required for half of the substance to decay.

Examples of half-lives:

Radium 1600 years

Thorium 1.9 years

Uranium-238 4.5 billion years

Plutonium 24,119 years

All of these can be by-products of fission reactors.