Constructing half-life graphs

SARA — Hey Beca! I was going through a box in the loft and I found this super-old mobile.

But get this, an early version of the Ada app is on it! Check this out. Hey Ada. What's the weather like outside?

OLD SCHOOL ADA — Look out the window.

BECA — Ha ha. She's got some attitude. Shame it's spent half its life in a box. How old is this thing?

ADA — Calculating… to work out the age of this ancient relic, construct a half-life graph.

OLD SCHOOL ADA — I'm sorry. I don't understand.

SARA — Don't worry. I'm sure Ada's about to tell us all about it.

ADA — Radioactive decay is the basis of carbon dating which is used to work out the age of organic remains up to 50,000 years old. A half-life is the rate at which roughly half of the atoms in a radioactive substance decays. If a radioactive substance has a half-life of a day, roughly half of the remaining radioactive atoms will decay each day. Like flipping 30 coins - roughly half will be heads.

OLD SCHOOL ADA — I'm sorry. I didn't quite catch that. Try again.

BECA — Aaah. She's just joking Ada.

ADA To construct this half-life graph we'll flip coins. Each of these coins represents an atom in a radioactive substance. If the coin lands on heads, that represents an atom decaying. We'll start with 30.

15 have landed on heads, so 15 atoms have decayed. This leaves us with 15 atoms.

Now we flip these 15 coins. Seven have landed on heads, leaving eight.

We flip these which gives us four and then we flip these which gives us two.

When each of the dots are connected, it creates what is called a decay curve. Different radioactive materials have different half-lives. The half-life of carbon-14 is 5,730 years whereas the half-life of francium-223 is just 20 minutes. Now let's work out the age of this antique.

OLD SCHOOL ADA I may be an antique, but at least my battery's half-life is longer than this sentence.

ADA I do not know what you are talking about. Once fully charged, my battery lasts a full 6 h…

OLD SCHOOL ADA L - O - L.