Half-Life

When discussing radioactive decay, it is important to look at the half-life of a particle. So half-life measures how long it takes for half of the nuclei of a sample to decay. In other words, how much time does it take to decay by 50%?

So if you start with a sample of two, how long does it take to get to one? Or if you start with a sample of 10, how long does it take to get to five? Of course, that's what we're going to be measuring is a unit of time. So our equation here is T, or the half time-- or half-life is equal to 0.693 divided by lambda, which in this case is known as the decay constant.

Example problem number one, the half-life of gold, 198, is 2.33 times 10 to the fifth seconds. A sample contains 3.5 times 10 to the 16th nuclei. What is the decay constant for this decay?

So we're looking at the half-life being 2.33 times 10 to the fifth seconds. We're looking for the decay constant lambda. And we're going to use our formula right here, plugging in our values appropriately. We're going to get a decay constant of 2.97 times 10 to the negative sixth seconds, negative one or inverse seconds.