

# Nuclear Fission SIM Homework

(When this activity was written, the simulation was called Nuclear Physics. Since then the simulation was divided into 2 simulations: Alpha Decay and Nuclear Fission)

**1)** Imagine that you are in the very first stages of trying to figure out how to build a nuclear power reactor or a nuclear weapon using fission. The first step you would consider is what kind of nuclei could live for a reasonable length of time so that you could keep it around, but would also be able to decay by some process that would give off lots of energy.

**a)** (1 pt) Explain why you could be pretty sure that any suitable isotope would have both a lot of protons and a lot of neutrons (be sure this is consistent with your answers to question 2)

**b)** (0.5 pts) In induced fission, a neutron is used to induce fission. Why is a neutron used to induce fission instead of a proton?

**c)** For this question, play around with the chain reaction panel of the [Nuclear Fission simulation](#).

(0.5 pts) Why is the number of free neutrons emitted by U235 important in creating a chain reaction?

(2 pts) Explore the conditions that produce a chain reaction (where a substantial fraction of the nuclei fission) and those that do not. You want to design a nuclear bomb. What are three design characteristics that are critical to creating an effective bomb as oppose to a dud? Include the physics reasoning behind why these are so important.

**d)** (1 pt) Why are gamma rays emitted by the daughter nuclei?