This is radiation, this is radiation, this is radiation, and this is atomic structure.

Atoms are the smallest units of matter. Everything is made up of atoms. Overtime, understanding of the structure of the atom has changed. Atoms was first described as solid spheres by John Dalton. Later, JJ Thompson suggested the plum pudding model. The plum pudding model was described as a positively charged sphere with negatively charged electrons scattered randomly inside. Later, Ernst Rutherford conducted the gold leaf experiment, in which he concluded that the atom is mostly empty space. He also concluded that most of the mass of the atom is centred in a nucleus. At the start of the 20th century, Niels Bohr discovered that electrons orbit the nucleus is fixed orbits. Finally, in 1940, James Chadwick discovered the subatomic particles, neutrons.

Isotopes are atoms of the same element with a different number of neutrons. Some Isotopes are unstable, which means that they hold too many or too little neutrons than can be sustained, and, as a result, they decay and give out radiation. Ionising radiation is the type of radiation that can knock electrons out of atoms.

Alpha radiation is an alpha particle that is emitted from a nucleus of a radioactive nuclei. An alpha particle is made up of two protons, and two neutrons. Alpha particles can't travel too far in the air, and, out of the three main types of radiation, is the least penetrating. They can be stopped by skin and paper for example. They are, however, the most ionising out of the three main types of radiation, because of their relatively large size.

Beta radiation is a fast moving electron. Beta particles an be stopped by a piece of aluminium for example. Beta radiation is emitted by an atom when a neutron splits into a proton and electron.

Gamma radiation is a wave of radiation. Gamma radiation is the most penetrating and can be stopped by thick concrete or lead.

Radioactive decay can be represented by equations. During alpha decay, two protons and two neutrons are emitted from the atomic nuclei, so the atom's atomic number goes down

by two, and its mass number decreases by 4. During Beta decay, a neutron turns into a proton, and releases an electron. The mass of the atom does not change, but the number of protons increases. Gamma radiation does not change a nucleus as it is just the nucleus getting rid of excess energy.

A radioactive material will never be able to become non-radioactive, so we use half lives to calculate the amount of time taken for the number of radioactive nuclei in an isotope to half.

Irradiation is a process that occurs when materials are near a radioactive source, exposing it to radiation. Contamination is when unwanted radioactive atoms get onto an object. It is even possible for radioactive particles to get inside the body. Alpha radiation is more dangerous inside the body, as it is highly ionising and able to cause a lot of damage. However, outside the body, alpha radiation is not so dangerous as it cannot penetrate the skin. Beta radiation is not so dangerous inside the body as some of the radiation is able to escape. Outside the body, beta radiation is more dangerous because it can penetrate the skin. Gamma radiation is the least dangerous inside of the body because it is the least ionising.

Background radiation is a measure of the level of ionizing radiation present in the environment at a particular location which is not due to deliberate introduction of radiation sources. Background radiation comes from natural sources like rocks, food and air. It also comes from madmade sources such as nuclear weapons, waste, and accidents.

We can obtain energy from radioactive nuclei from a process known as nuclear fission. Nuclear fission is the splitting of a large nuclei into smaller ones. Fission occurs when a neutron is absorbed into a large, unstable radioactive nucleus. This makes the nucleus so unstable, that it splits into smaller nuclei. As this happens, more neutrons are released. The neutrons released go on to cause more reactions. This is called a chain reaction. Fission is carried out in a nuclear reactor in oder to generate energy.

Nuclear fusion is the joining together of smaller radioactive nuclei to make a larger atom. Fusion occurs naturally in the sun. The process of fusion releases a lot more energy than

fission, but, as a very high temperature and pressure is needed for fusion to occur, we do not use it to generate energy as of yet.