



Knowledge

1. Cosmic rays
2. Rocks, food, air, building materials
3. Medical equipment, nuclear bomb testing
4. Alpha
5. Gamma
6. The splitting of the nucleus of an atom
7. Neutrons
8. Control rods
9. The joining together of the nuclei of two smaller atoms to make a larger atom
10. Stars

Application

1. Radiation can ionise cells and cause tissue damage. Large doses can kill cells completely and cause radiation sickness. Smaller doses can cause cell damage which can later lead to mutations and cancer.

2. Any **four** from:

- neutron
- (neutron) absorbed by U (nucleus)

ignore atom

*do **not** accept reacts*

*do **not** accept added to*

- forms a larger nucleus
- (this larger nucleus is) unstable
- (larger nucleus) splits into two (smaller) nuclei / into Ba and Kr
- releasing three neutrons and energy

WAGOLL

- A **neutron** is absorbed by the **nucleus** of a Uranium atom, which destabilises the **nucleus and it splits** into **two smaller nuclei** – one Ba and one Kr. The process also releases **3 neutrons**, and **energy**. The neutrons can go on to destabilise other nuclei in what is known as a **'chain reaction'**

2 (ii) The control rods can be lowered to slow down the chain reaction. The control rods absorb some of the neutrons, which reduces the number of nuclei being split, controlling the energy release. The control rods can be lifted to speed the reaction back up again;

(iii) 56 (Ba)

57 (La)



3. Fusion reactors are very difficult to build and run because the temperatures and pressures needed to get the fusion reaction to occur are huge, and this makes them very expensive to run.

4. Radioactive decay is a random process

19.