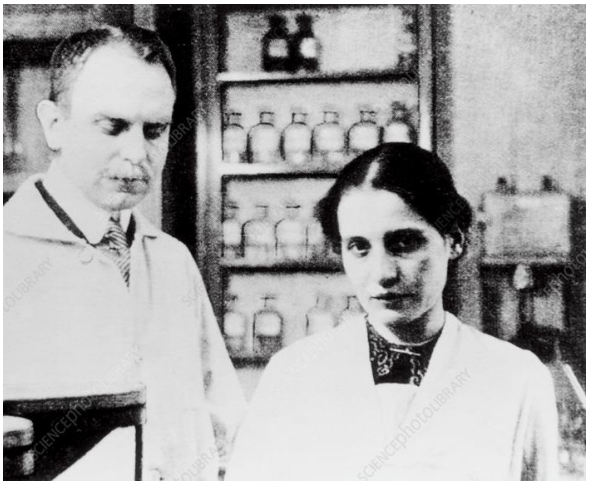
What happened after VE day?

"We may allow ourselves a brief period of rejoicing; but let us not forget for a moment the toil and efforts that lie ahead."

Winston Churchill
8 May 1945

On the 8th May 1945 the Allies celebrated 'Victory in Europe' day. This day marked the surrender of Nazi Germany. However, this wasn't the end of World War II. Conflict continued in other countries until the 2nd September 1945. This included the use of one of the most devastating weapons in history – the atomic bomb.

Scientists had been trying to develop nuclear weapons long before World War II, but the conflict started a nuclear arms race where countries invested lots of time and money in their military resources.



Lise Meitner and her nephew Otto Frisch were Austrian scientists who worked in laboratories in Germany when Adolf Hitler came to power. Because they were Jewish, they moved out of Germany. They were the scientists who discovered nuclear fission.

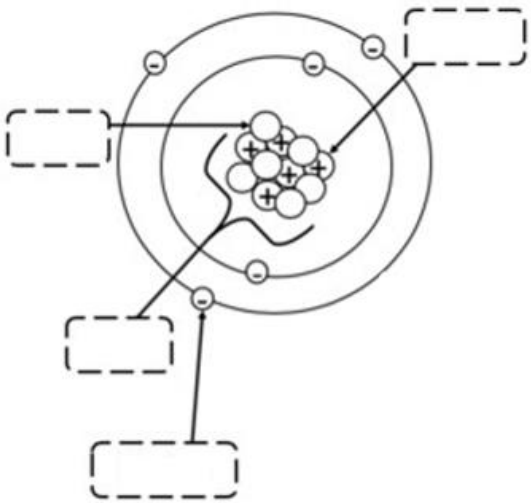
Your task is to complete research on the science behind the atomic bomb. The use of atomic bombs in World War II took the lives of many people. Make sure you take care when researching, and talk through the way this topic makes you feel with someone at home.

The activities are ranked Easy, Medium, and Hard. Try whichever ones you would like to.

Task 1: The atom

All matter (stuff) is made up of atoms. These atoms are TINY (there are billions of them in a £1 coin, for example)
Atoms are made up of other pieces called particles.

EASY - Label the diagram of the atom



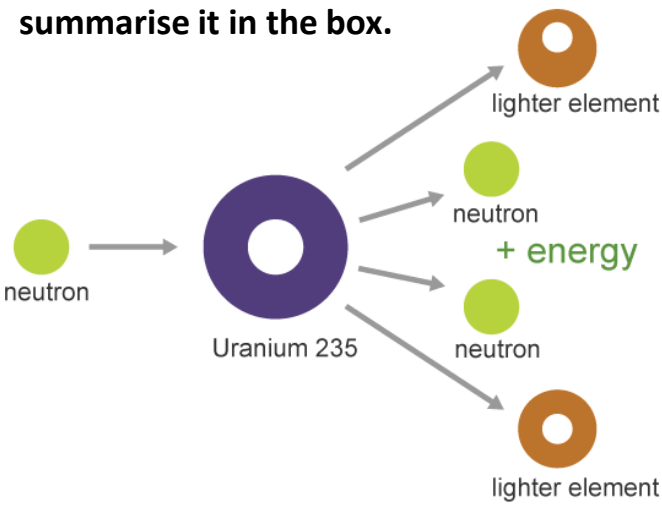
MEDIUM - Complete these sentences

All atoms of the same element have the same number of _____.

_____ are different types of the same element. They have the same number of protons but different numbers of _____.

Some isotopes are unstable, meaning they randomly give out (emit) particles and energy. Sometimes the atom splits into smaller atoms. This process is called nuclear _____.

HARD - The diagram below shows a 'chain reaction'. Research what this means and summarise it in the box.



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Task 2: What is an atomic bomb?

- On August 6th 1945, the United States detonated an atomic bomb over the Japanese city of Hiroshima.
- Three days later, they dropped another bomb on the city of Nagasaki.
- These attacks killed between 129,000 and 226,000 people. They were the first and only use of nuclear weapons in war.

EASY - What were the codenames of the atomic bombs used on Hiroshima and Nagasaki?

_____ and _____

MEDIUM - The two elements used in these atomic bombs were Uranium and Plutonium. Complete the fact files for these elements below.

URANIUM	PLUTONIUM
Element symbol:	Element symbol:
Atomic number:	Atomic number:
Appearance:	Appearance:
Who discovered this element?	Who discovered this element?
Where does its name come from?	Where does its name come from?
What are the three naturally occurring isotopes?	What are the five naturally occurring isotopes?

Task 3: Development of nuclear weapons

- Although the United States are the only country to have ever used nuclear weapons in warfare, the race to develop these involved many countries.

EASY - The first nuclear weapons project took place in the UK. It had a codename to keep it secret. What was the codename?

- A group of scientists in Paris realised that to make an atomic bomb, they needed to slow down the neutrons released from uranium atoms. They decided to use 'Heavy water' to do this.

MEDIUM – The Paris group of scientists needed Heavy water for their experiments. The only supply in the World was in Rjukan, Norway. When they contacted them to buy it, they found out that Germany had already tried to pay Norway for the heavy water! Instead, Norway sent all of their heavy water (about 180 litres) to France. This was then shipped in secret to England, where it was kept at Windsor Castle. **Colour in Norway, France, and the UK on the map. Label the places Rjukan, Paris, and Windsor. Add arrows to show the secret movement of the heavy water.**

HARD - What is Heavy water? Research and complete the sentences below.

Water, H_2O, contains two _____ atoms. Most of these atoms are the isotope H-1 (which has 1 _____ in its nucleus).

In _____ water, more of the hydrogen atoms are the isotope H-2 (which has 1 proton and 1 _____ in its _____).