History Albert Einstein and the Atomic Bomb

<https://www.youtube.com/watch?v=oCqjjVgXOg4>

1. Albert Einstein’s famous equation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ changed history.
2. He had a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the name of Leó Szilárd visit him from Europe.
3. Leó came to warn Einstein about Germany making an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and convinced him to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to Franklin D Roosevelt.
4. Einstein’s famous equation sums up two truths about the universe.

* every object has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* moving objects have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* mass can be transferred into \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and energy can be transferred into \_\_\_\_\_\_\_\_\_\_\_\_
* E=mc2 means you can get a lot of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from tiny amounts of mass.

1. Einstein’s published E=mc2 in \_\_\_\_\_\_\_\_\_.
2. In a conference in\_\_\_\_\_\_\_\_\_\_\_\_\_ Einstein’s was asked whether he thought the atom would ever yield its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* His answer was to go down in scientific history. In other words Einstein believed that it was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. In 1933 \_\_\_\_\_\_\_\_\_\_\_came to power in Germany.
2. Unlike Einstein, Leó Szilárd feared energy could be released from the atom according to \_\_\_\_\_\_\_\_\_\_\_\_\_ and then used to construct a \_\_\_\_\_\_\_\_\_\_\_\_\_.
3. In 1920 a young Leó Szilárd had gone to study in \_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Szilárd was fearful it was only a matter of time someone would use the power of E=mc2 and make a bomb.

* In fact the first step had already inadvertently been taken. Scientists had identified the type of substance they might need to turn \_\_\_\_\_\_\_\_\_\_\_\_ into \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. Radioactivity is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in action.
2. Unstable elements like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ break down into other smaller elements in order to become \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. In Germany, Britain and America machines were built to achieve nuclear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the splitting open of the atomic nucleus.
4. It looked like Einstein had been \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, E=mc2 was not a practical solution to generating vast amounts of energy.
5. Einstein’s friend Leó Szilárd had his first brain wave.

* He suddenly realized everyone had been going about it the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Attempts had involved \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and Szilárd thought they were simply the wrong tool.
* Alpha particles consist of two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and carry a positive electric charge.
* The problem was the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the alpha particles.
* He came up with the idea to use the recently discovered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which is a subatomic particle with no electric charge.

1. Leó Szilárd had another idea crucial to the making of the atomic bomb.

* He calculated that if you hit an atom with a neutron it would release not just energy but two or three more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which could be free to break apart further atoms.
* Energy at each step of the chain would \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It was a chain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. In 1938 news came from his former colleagues in \_\_\_\_\_\_\_\_\_\_\_\_\_ that the German physics had used the neutron to split the atom.
2. By July 1939 in a lab at Colombia University Szilárd showed a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_was possible, E=mc2 could be used to make a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Later Szilárd called on his old friend \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to warn him about Germany making an atomic bomb and Einstein began to write a letter to the president.
4. Roosevelt called the military into action.

* Set up was in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ under the code name Manhattan.

1. In May \_\_\_\_\_\_\_\_\_ before the bomb was complete Nazis surrendered and the war was over in Europe.
2. Although there was no longer any threat from the Germans, work at \_\_\_\_\_\_\_\_\_\_\_\_\_\_continued.

* The war against Japan was still raging and the generals believed the atomic bomb could save thousands of allied lives.

1. A target had been selected, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ city of Hiroshima.

* On August 1945 the first \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was dropped.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ people were killed immediately
* Radiation and death by fire killed another \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* 80-90% of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the city were destroyed
* Destruction was because of an application of \_\_\_\_\_\_\_\_\_\_\_\_\_

1. Einstein felt \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the atomic bomb.

* With time he felt writing the letter was a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.