

## Cryptology

Secret codes are not a new idea. They are almost \_\_\_\_\_ writing itself. We know that the Ancient Egyptians and Greeks \_\_\_\_\_, as did the Arabs of a thousand years ago. They were especially important in war. Commanders didn't want the enemy to capture their messages and understand their plans, so \_\_\_\_\_ . Of course, the enemy did want to understand the messages, so they would try to find the code, or 'break' it.

## The Enigma code

As a result, codes became more and more complicated. \_\_\_\_\_ most famous is the Enigma code, invented by the Germans \_\_\_\_\_ Second World War. People believed \_\_\_\_\_ impossible to break, \_\_\_\_\_ so clever. The amazing thing about Enigma \_\_\_\_\_ always changing. In one message, \_\_\_\_\_ ' \_\_\_\_\_ ' \_\_\_\_\_ , but in another message it could be 'z'. So, there were millions of possibilities in every coded message. The first people to attempt to break the code were the Polish, who were concerned about Hitler's \_\_\_\_\_. A group of mathematicians worked on the Enigma problem. They found out a lot about how it worked, but they couldn't understand it. When Hitler attacked \_\_\_\_\_, the Poles told the British everything that they knew about the code.

## Atlantic danger

Most of the British code-breakers \_\_\_\_\_ Enigma was unbreakable. They were especially concerned about the Enigma \_\_\_\_\_ used by the German navy. The submarines sent by Hitler \_\_\_\_\_ in the Atlantic were probably the greatest danger faced by the British and American \_\_\_\_\_ in the war. Britain needed food and other essentials from outside, and the Americans needed to send soldiers \_\_\_\_\_ across the ocean. Without breaking the code, there was little chance of defeating the submarines. Without control of the Atlantic, there was little chance of victory.

## Alan Turing, code-breaker

Almost alone, one man began to work on the problem. He was a brilliant young mathematician called Alan Turing. He believed \_\_\_\_\_ break the code with advanced logic and statistics. However, he needed to make a machine that could do a very large number of calculations very quickly. \_\_\_\_\_ machines that the Poles had made, he built a machine called the 'Bombe'. It worked. He broke the Enigma code. The British and Americans could read the messages \_\_\_\_\_ Hitler's submarines. Slowly, the allies won the Battle of the Atlantic. They had freedom to move at sea and could send their armies to liberate Western Europe from Hitler and the Nazis. In 1943, they went to Italy and in 1944 they successfully landed in France. This \_\_\_\_\_ shown in the film, 'Saving Private Ryan'. Without Turing and his code-breaking, the history of Europe and the world \_\_\_\_\_ very different.

## From code-breaking to computer-building

Turing continued working with machines and electronics and in 1944 he talked about ' \_\_\_\_\_ '. Turing had an idea for an electronic 'universal machine' that could do any logical task. Soon after the war, he went to work at Manchester University and in 1948 the 'Manchester Baby' \_\_\_\_\_. It was Turing's second great invention and the \_\_\_\_\_. When he sent a message from his computer to a telex machine, Alan Turing wrote the first e-mail in history. So, what happened next in the life \_\_\_\_\_ talented man? His great achievements in code-breaking and computing happened in his twenties and thirties. He was still a young man - \_\_\_\_\_ that his computer worked for the first time, he nearly ran in the Olympic Games for Britain. We know that he had many ideas to develop in digital computing, quantum physics, biology and philosophy. Sadly, he wasn't able \_\_\_\_\_ these ideas. Turing's personal life became more and more problematic.

## A genius under attack

Alan Turing was a homosexual. Nowadays, this is legal and \_\_\_\_\_ accepted in Britain and most other Western countries. \_\_\_\_\_, it was a very different story, and people were sent to prison for homosexual \_\_\_\_\_. Turing had to stop doing code-breaking work for the British government because his homosexuality was a 'security risk'. This \_\_\_\_\_, especially as it hadn't been a problem in the war years. Increasingly, Turing refused to hide his homosexuality, believing that there was nothing \_\_\_\_\_ . Perhaps he felt that he deserved individual freedom, having done so much for freedom in the world.

Finally, he was arrested by the police \_\_\_\_\_ he was found guilty at a criminal trial. He wasn't sent to prison – instead he was injected with the female hormone, oestrogen, \_\_\_\_\_ stop his homosexual behaviour.

### A tragic end

Two years later, Alan Turing was dead. He killed himself \_\_\_\_\_ containing the poison, cyanide. The apple - the symbol of the physics of Newton, of forbidden love, of knowledge itself - became the symbol of tragic death.

For many years, Turing \_\_\_\_\_. Now, more than fifty years after his death, more and more people are learning of his work in war and in peace. The BBC made a television programme about him. Some years ago, a statue designed by Glyn Hughes was \_\_\_\_\_ small park in Manchester. It is of Turing, sitting on a park bench, with an apple in his hand. The money for the statue mostly came from individual people \_\_\_\_\_ remember him. No money came from the British government or any major computer company, despite the great work that Turing had done for them.

It is a wonderful memorial, but perhaps a greater memorial \_\_\_\_\_ now because of Turing's computing work, and that I could write it in a democratic country in Western Europe.

### Exercise 1

In the table below are the second halves of 11 sentences about the text. Below that are the first halves.

#### Can you match the two halves to make sentences?

poisoned apple	1) The Ancient Egyptians used ...
enter Western Europe	2) The machine used to break Enigma was ...
Glyn Hughes	3) One of the greatest dangers was ...
Homosexuality	4) In 1944, Turing wanted to ...
secret codes	5) Manchester University was the home of ...
the first digital computer	6) The British government didn't ...
'build a brain'	7) Alan Turing died because he ate ...
give money for the statue	8) Turing was arrested by the police for ...
Hitler's submarines	9) The statue was designed by ...
Polish mathematicians	10) In 1943 the Allied armies began to ...
the 'Bombe'	11) The first attempt to break Enigma was by ...