

# ICT Innovators

Code Breaker Computer Designer A.I. Pioneer

## Alan Turing



1912 - 1954

Alan Turing was a mathematician, computer scientist and cryptanalyst who was pivotal in Britain's code breaking efforts of World War II. Throughout the 1930s, Turing researched and published papers that hypothesised a 'universal computing machine' that would be capable of performing any mathematical computation that was represented as an algorithm.

In 1938 Turing began working part time with the Government Code and Cypher School (GC&CS), which moved to Bletchley Park during the war time, decrypting Enigma code messages used by Nazi Germany. Turing developed a code breaking machine called the Bombe, a more effective version of a Polish machine called the Bomba. Turing's machine was more effective than the Polish version and reduced British shipping losses considerably by 1941. In July 1942, Turing developed a systematic method for breaking more sophisticated German Cipher messages, colloquially called the 'Tunny', further assisting the British war effort.

After World War II, Turing worked on many early designs and programs for the first computers that stored information. It was from his work on these computers that he formulated his thoughts on Artificial Intelligence, developing what is now known as the Turing Test: a criterion to determine whether a machine is 'intelligent'. If the responses by a computer — to questions posed by human interrogators — were indistinguishable from a human subject, then a computer would truly be called 'intelligent'.



It seems probable that once the machine thinking method had started, it would not take long to outstrip our feeble powers... They would be able to converse with each other to sharpen their wits. At some stage therefore, we should have to expect the machines to take control.



Sometimes it is the people who no one imagines anything of who do the things that no one can imagine.

Alan Turing

### Fast facts

A founding father of **artificial intelligence** and of modern cognitive science



Turing was a successful **long distance** runner who tried out for the **1948 Olympics**



Turing will be featured on a new **£50 bank note** in the UK



He would chain his coffee cup to the radiator to prevent people from taking it



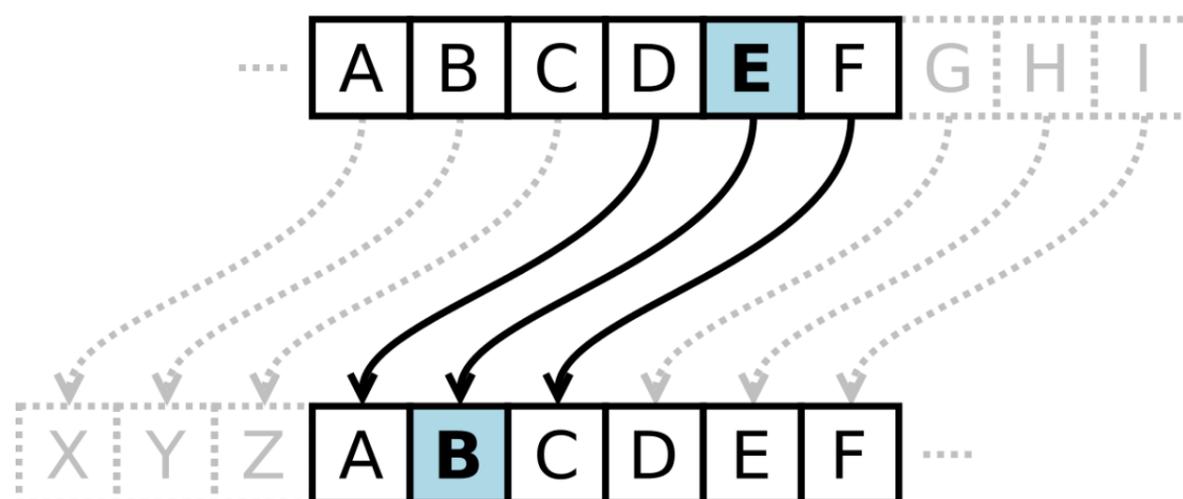
Turing was made an Officer of the Most Excellent Order of the British Empire (OBE) for his WWII code-breaking work

Encyclopædia Britannica. (2019). Alan Turing. Retrieved from Retrieved from: <https://www.britannica.com/biography/Alan-Turing> Images: Portrait of Alan Turing [Image] (1928). Retrieved from <https://www.britannica.com/biography/Alan-Turing/media/1/609739/224086> Vectors from [www.freepik.com](http://www.freepik.com)

# ICT Innovators

## Activity: Caesar Ciphers

One of the earliest methods of encryption was the Caesar Cipher: a message where each letter of the alphabet is shifted an agreed amount. For example, a shift of two where A becomes C, B becomes D and so on.



You have received 4 messages that you must decode, but no agreed shift!

Work as a team to decode the messages and report:

- What was the letter shift?
- Which train station does it mention?
- What landmark does it end up at?

The messages are not in order - ask your teacher for hints if you get stuck!

### Message One

Drsbn, gkvu pyb 650w kmbycc dro Gsvvskw Lkbku Lbsnqo

Psxkvvi: Iye rkfo kbbsfon kd iyeb nocdsxkdsyx - Dro WMQ

Psbcd, dkuo dro dbksx pbyw rywo dy Pvsxnobc Cdbood

Comyxn, ohsd dro cdksyx kxn gkvu okcd pyb 500w dy Lsbbkbexq Wkbb

### Message Two

Comyxn, pyvvyg dro csqxc dy ohsd yx dy Zsdd Cdbood kxn debx vopd.

Psxkvvi, pyvvyg dro rkblyeb kbyexn Msbmevkb Aeki exdsv iye rkfo kbbsfon  
kd iyeb nocdsxkdsyx: Dro Cinxoi Yzobk Ryeco!

Drsbn, gkvu xybdr nygx Zsdd Cdbood pyb 1.2uw

Psbcd, dbkfov pbyw rywo dy Dygx Rkvv Cdkdsyx

Caesar cipher left shift of 3 [Image] (n.d.). Retrieved from [https://en.wikipedia.org/wiki/Caesar\\_cipher#/media/File:Caesar\\_cipher\\_left\\_shift\\_of\\_3.svg](https://en.wikipedia.org/wiki/Caesar_cipher#/media/File:Caesar_cipher_left_shift_of_3.svg)

# ICT Innovators

## Activity: Caesar Ciphers Answers

In this activity students work in groups to decode four messages to answer three questions:

- What was the letter shift?
- Which train station does it mention?
- What landmark does it end up at?

Students may require the following hints:

**Each message begins with an ordinal number to indicate which order step it is: first, second, third, finally.**

This hint should make the shift obvious to students, as both 'first' and 'finally' begin with F. This hint should only be given if little progress is being made.

**The numerical value in the message is a distance.**

This hint should allow students to identify that the letters after the number is the unit that the distance is in, which should help them to decode the entire message.

### Message One

Drsbn, gkvu pyb 650w kmbycc dro Gsvvskw Lkbku Lbsnqo  
Psxkvvi: Iye rkfo kbbsfon kd iyeb nocdsxkdsyx - Dro WMQ  
Psbcd, dkuo dro dbksx pbyw rywo dy Pvsxnobc Cdbood  
Comyxn, ohsd dro cdkdsyx kxn gkvu okcd pyb 500w dy Lsbbkbexq Wkbb

Second, follow the signs to exit on to Pitt Street and turn left  
Finally, follow the harbour around Circular Quay until you have arrived at  
your destination: The Sydney Opera House!  
Third, walk north down Pitt Street for 1.2km  
First, travel from home to Town Hall Station  
*Above are the answers in the order they are presented.*

### Message Two

Comyxn, pyvvyg dro csqxc dy ohsd yx dy Zsdd Cdbood kxn debx vopd.  
Psxkvvi, pyvvyg dro rkblyeb kbyexn Msbmevkb Aeki exdsv iye rkfo kbbsfon  
kd iyeb nocdsxkdsyx: Dro Cinxoi Yzobk Ryeco!  
Drsbn, gkvu xybdr nygx Zsdd Cdbood pyb 1.2uw  
Psbcd, dbkfov pbyw rywo dy Dygx Rkvv Cdkdsyx

Third, walk for 650m across the William Barak Bridge  
Finally: You have arrived at your destination - The MCG  
First, take the train from home to Flinders Street  
Second, exit the station and walk east for 500m to Birrarung Marr  
*Above are the answers in the order they are presented.*

Caesar cipher left shift of 3 [Image] (n.d.). Retrieved from [https://en.wikipedia.org/wiki/Caesar\\_cipher#/media/File:Caesar\\_cipher\\_left\\_shift\\_of\\_3.svg](https://en.wikipedia.org/wiki/Caesar_cipher#/media/File:Caesar_cipher_left_shift_of_3.svg)