

bio.1 Alan Turing

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Alan Turing was born in Maida Vale, London, on June 23, 1912. He is considered the father of theoretical computer science. Turing's interest in the physical sciences and mathematics started at a young age. However, as a boy his interests were not represented well in his schools, where emphasis was placed on literature and classics. Consequently, he did poorly in school and was reprimanded by many of his teachers.

Turing attended King's College, Cambridge as an undergraduate, where he studied mathematics. In 1936 Turing developed (what is now called) the Turing machine as an attempt to precisely define the notion of a computable function and to prove the undecidability of the decision problem. He was beaten to the result by Alonzo Church, who proved the result via his own lambda calculus. Turing's paper was still published with reference to Church's result. Church invited Turing to Princeton, where he spent 1936–1938, and obtained a doctorate under Church.



Figure 1: Alan Turing

Despite his interest in logic, Turing's earlier interests in physical sciences remained prevalent. His practical skills were put to work during his service with the British cryptanalytic department at Bletchley Park during World War II. Turing was a central figure in cracking the cypher used by German Naval communications—the Enigma code. Turing's expertise in statistics and cryptography, together with the introduction of electronic machinery, gave the team the ability to crack the code by creating a de-crypting machine called a “bombe.” His ideas also helped in the creation of the world's first programmable electronic computer, the Colossus, also used at Bletchley park to break the German Lorenz cypher.

Turing was gay. Nevertheless, in 1942 he proposed to Joan Clarke, one of his teammates at Bletchley Park, but later broke off the engagement and confessed to her that he was homosexual. He had several lovers throughout his lifetime, although homosexual acts were then criminal offences in the UK. In 1952, Turing's house was burgled by a friend of his lover at the time, and when filing a police report, Turing admitted to having a homosexual relationship, under the impression that the government was on their way to legalizing homosexual acts. This was not true, and he was charged with gross indecency. Instead of going to prison, Turing opted for a hormone treatment that reduced libido. Turing was found dead on June 8, 1954, of a cyanide overdose—most likely suicide. He was given a royal pardon by Queen Elizabeth II in 2013.

Further Reading For a comprehensive biography of Alan Turing, see [Hodges \(2014\)](#). Turing’s life and work inspired a play, *Breaking the Code*, which was produced in 1996 for TV starring Derek Jacobi as Turing. *The Imitation Game*, an Academy Award nominated film starring Benedict Cumberbatch and Kiera Knightley, is also loosely based on Alan Turing’s life and time at Bletchley Park ([Tyldum, 2014](#)).

[Radiolab \(2012\)](#) has several podcasts on Turing’s life and work. BBC Horizon’s documentary *The Strange Life and Death of Dr. Turing* is available to watch online ([Sykes, 1992](#)). ([Theelen, 2012](#)) is a short video of a working LEGO Turing Machine—made to honour Turing’s centenary in 2012.

Turing’s original paper on Turing machines and the decision problem is [Turing \(1937\)](#).

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Alan Turing, p. 1: Portrait of Alan Mathison Turing by Elliott & Fry, 29 March 1951, NPG x82217, © National Portrait Gallery, London. Used under a Creative Commons BY-NC-ND 3.0 license.

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