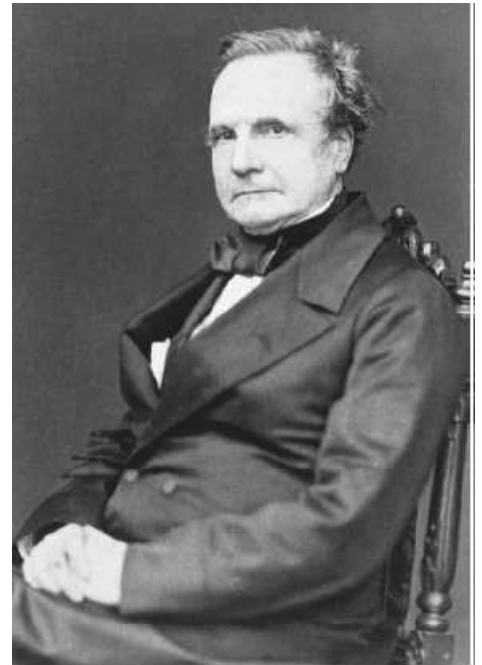
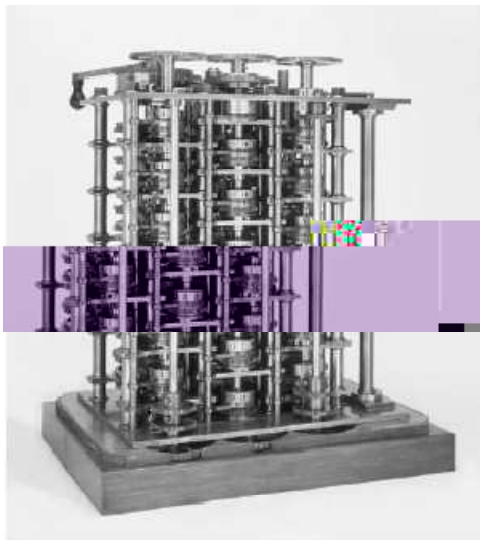


Charles Babbage (1791–1871) Born on December 26, 1791, in London, England, Charles Babbage is best remembered for his role in the design and manufacture of a mechanical calculator, the forerunner of a computer & for first constructing a 'difference machine.' Babbage devoted the remainder of his life to the construction of a superior 'analytic engine' capable of performing all mathematical operations & is credited to have laid the foundations of computer design used today, although the machine was never completed.

Babbage entered Trinity College, Cambridge, in 1810. While a student, he and a fellow undergraduate co-authored *Differential and Integral Calculus*, an influential memoir on the history of calculus & for transferring to Trinity College, Babbage received his bachelor's degree in mathematics in 1811 to then begin a career in mathematical research. Babbage published a number of influential papers on the topic of functional equations and was honored with election to the Lucasian Professor of Mathematics at Cambridge.



Charles Babbage, an eminent mathematician of the 19th century, is best known for his design and manufacture of a mechanical computer. (Photo courtesy of the Science Museum, London/ Topham-HIP/The Image Works)



Charles Babbage completed work on his "difference engine," the world's first sophisticated mechanical computer, in 1822. (Photo courtesy of the Science Museum, London/ Topham-HIP/The Image Works)

Each of Babbage's theoretical work relied on consulting tables of logarithms and trigonometric functions & are of the inaccurate of human calculation, Babbage became interested in the problem of using a mechanical device to perform complex calculations. In 1819 he began work on a small 'difference engine,' which he completed three years later & he announced his intention to the scientific community in an 1822 paper, 'Note on the Application of Machinery to the Computation of Astronomical and Mathematical Tables.'

Although the machine was capable of performing relative simple, but highly accurate, calculations (using the method of *Finite Differences* to compute values of *Polynomial* functions), his intention was well received and was understood to be a first step toward a new era in computational capabilities. Babbage was awarded a gold medal from the Astronomical Society and was given a grant from the Chancellor of the Exchequer to construct a larger, more powerful, difference engine.

In 1837 Joseph Marie Jacquard invented a loom capable of weaving patterns by making use of a set of instructions set out on cards punched with holes & a few decades later

Babbage decided to follow the same idea and design a steam-powered engine that would accept instructions and data from punched cards. With the assistance of Lord Byron's daughter, *Lady Augusta Ada Lovelace* (1815–1842), Babbage took to work on creating a sophisticated calculating device. In 1832 he published a book, *On the Economy of Machinery and Manufactures*, offering a theoretical discussion on the topic—his could be considered the first published work in the field of *Operations Research*.

Unfortunately, due to financial and technological difficulties, the machine was never completed (the metalworking technology of the mid-1800s was not capable of the levels of precision Babbage's machine demanded). The device in its unfinished state is preserved today in the Science Museum of London. Although he never realized his dream of building an operational, mechanical computer, his design conceits have since been proved correct. It is not an exaggeration to say that the modern computers constructed on Babbage's theoretical design have revolutionized almost all aspects of 20th-century life.

Babbage died in London, England, on October 18, 1871.

Excerpted from the book

James Tanton *Encyclopedia Of Mathematics*, Facts on File, 2000.



Augusta Ada Byron Lovelace, assistant to 19th-century scholar Charles Babbage, was the first to develop a theory of mechanical computation and the first to write the equivalent of a computer program. (Photo courtesy of the Science Museum, London/Topham-HIP/The Image Works)