Ada Lovelace Becomes the World's First Computer Programmer

London-born Ada Lovelace (1815–1852) had a passion and gift for mathematics from a young age. She is credited with being the **world's first computer programmer**, as she drafted plans for how a machine called the Analytical Engine could perform computations. The machine, invented by her friend, mathematician and inventor Charles Babbage, is considered to be the first general computer. Lovelace detailed applications for the Analytical Engine that relate to how computers are used today.

Lovelace is remembered annually on **Ada Lovelace Day**, held on the second Tuesday of October. The international day of recognition celebrates women in science, technology, engineering, and math (STEM).

Grace Hopper Pioneers Computer Programming

American Grace Hopper (1906–1992) was an admiral in the United States Navy and a computer scientist who was one of the first programmers for the Harvard Mark I computer, which was a general purposes electromechanical computer used in the war effort for World War II, according to **San Diego Supercomputer Center**. In 1944, she created a 500-page Manual of Operations for the Automatic Sequence-Controlled Calculator for the computer, which detailed the foundational operating principles of computing machines.

Hopper is also the inventor of the compiler, an intermediate program that translates English language instructions into the language of the target computer. This invention influenced other computing

developments, like code optimization, subroutines, and formula translation.

Hopper is remembered at the annual **Grace Hopper Celebration**, the world's largest gathering of women technologists.

Katherine Johnson Executes Critical Space Calculations

Katherine Johnson, born in 1918, is one of the women immortalized in the 2016 book and movie *Hidden Figures.* A West Virginia native and American mathematician, Johnson helped confirm the accuracy of electronic computers used by **NASA** and performed critical calculations that ensured safe space travel from the 1950s on. She coauthored a research report that used equations for orbital spaceflight in 1960, performed trajectory analysis for the first human space flight in 1961, and ran equations on a desktop mechanical calculating machine before the 1962 orbital mission of John Glenn. Johnson worked on calculations for Project Apollo's Lunar Lander, the Space Shuttle, and the Earth Resources Satellite. In 2015, she received the Presidential Medal of Freedom.

Margaret Hamilton Takes Humans to the Moon

Margaret Hamilton, born in 1936, is an American computer scientist and systems engineer from Indiana who led the Software Engineering Division of the MIT Instrumentation Laboratory. NASA credits her with coining the term “**software engineering**.” Hamilton worked on software development for Apollo 11, the first spacecraft to complete a successful mission that placed humans on the moon in 1969.

Hamilton's insistence on thorough testing is credited with the mission's success and safety of its astronauts.
The guidance software that Hamilton helped develop for Apollo was later adapted for use in Skylab, the space shuttle, and the first digital fly-by-wire systems in aircraft. Hamilton received the NASA Exceptional Space Act Award for technical and scientific contributions in 2003 and the Presidential Medal of Freedom award in 2016.