

# Katherine Johnson (1918-2020)



**Katherine Johnson** (26 August 1918 – 24 February 2020) was an American mathematician whose calculations of orbital mechanics as a NASA employee were critical to the success of the first and subsequent American spaceflights. During her 35-year career at NASA and its predecessor, she earned a reputation for mastering complex manual calculations and helped pioneer the use of computers to perform the tasks. The space agency noted her ‘Historical role as one of the first African-American women to work as a NASA scientist’.



Katherine showed strong mathematical abilities from an early age and graduated from high school at the early age of fourteen. She went on to enrol at West Virginia State, a historically black college. As a student, she took every maths course offered by the college and one professor even added new mathematics courses just for Katherine. She graduated in 1937, with degrees in mathematics and French, at the age of 18. She then took on a teaching job at a black public school in Marion, Virginia.

She later became the first African-American woman to attend graduate school at West Virginia University in Morgantown. She was one of three African-American students, and the only woman, selected to integrate the graduate school after the 1938 United States Supreme Court ruling that states that provided public higher education to white students also had to provide it to black students, to be satisfied either by establishing black colleges and universities or by admitting black students to previously white-only universities.

Katherine decided on a career as a research mathematician, although this was a difficult field for African Americans and women to enter. The first jobs she found were in teaching. At a family gathering in 1952, a relative mentioned that NACA was hiring mathematicians. At the Langley Memorial Aeronautical Laboratory, based in Hampton, Virginia, NACA hired African-American mathematicians as well as whites for their Guidance and Navigation Department. Johnson accepted a job offer from the agency in June 1953.



From 1953 to 1958, Katherine worked analysing topics such as gust alleviation for aircraft. Originally assigned to the West Area Computers section supervised by mathematician Dorothy Vaughan, Katherine was reassigned to the Guidance and Control Division of Langley's Flight Research Division. It was staffed by white male engineers. In keeping with state racial segregation laws, and federal workplace segregation introduced under President Woodrow Wilson in the early 20th century, Johnson and the other African-American women in the computing pool were required to work, eat, and use facilities that were separate from those of their white peers. Their office was labelled as 'Coloured Computers'. NACA disbanded the coloured computing pool in 1958 when the agency was superseded by NASA, which adopted digital computers.

From 1958 until her retirement in 1986, Johnson worked as an aerospace technologist, moving during her career to the Spacecraft Controls Branch. She calculated the trajectory for the May 5, 1961 space flight of Alan Shepard, the first American in space. She also calculated the launch window for his 1961 Mercury mission. She plotted

backup navigation charts for astronauts in case of electronic failures. When NASA used electronic computers for the first time to calculate John Glenn's orbit around Earth, officials called on Katherine to verify the computer's numbers; Glenn had asked for her specifically and had refused to fly unless she verified the calculations.



She later worked directly with digital computers. Her ability and reputation for accuracy helped to establish confidence in the new technology. In 1961, her work helped to ensure that Alan Shepard's Freedom 7 Mercury capsule would be found quickly after landing, using the accurate trajectory that had been established. She also helped to calculate the trajectory for the 1969 Apollo 11 flight to the Moon. Later in her career, Katherine worked on the Space Shuttle program, the Earth Resources Satellite and on plans for a mission to Mars.

She spent her later years encouraging students to enter the fields of science, technology, engineering, and mathematics (STEM).



Katherine Johnson had an extremely successful career with her work at NASA. She won numerous NASA Special Achievement Awards and honours from many esteemed establishments. Her career culminated in being presented the Presidential Medal of Freedom in 2015 and the Congressional Gold Medal in 2019.



**Katherine Johnson passed away in February 2020,  
at 101 years of age.**

**May her pioneering legacy never be forgotten.**