

# Katherine Johnson

White Sulphur Springs, West Virginia | Langley Research Center, Hampton, Virginia

## In Sixty Seconds

**Origins.** Creola Katherine Coleman was born on August 26, 1918 in White Sulphur Springs, West Virginia, the youngest of four. She read through every book in the house before she turned six. Her father drove the family 120 miles each fall to Institute, West Virginia so she could attend high school, because the school in her home county would not enroll Black students past the eighth grade. She enrolled at West Virginia State College at fifteen.

**Work.** She graduated summa cum laude at eighteen with degrees in mathematics and French. She taught school, raised three daughters, and in 1953 joined the National Advisory Committee for Aeronautics, the agency that became NASA, as a "human computer" at the Langley Research Center. Over 33 years she calculated the trajectory for Alan Shepard's 1961 Freedom 7 flight, hand-verified the electronic computer's numbers for John Glenn's 1962 orbital flight, and computed the Apollo 11 trajectory that put men on the moon in 1969.

**Impact.** The electronic computers in use at Langley in 1962 were new and unreliable. John Glenn was preparing to become the first American to orbit Earth. He requested, by name, that the woman in the colored computing pool rerun the IBM numbers by hand. She worked through them over a day and a half. The flight went. Her verification stood. The method she used, and the flight-plan mathematics she wrote over 33 years, put every Mercury and Apollo astronaut in the sky and brought them home.

**Legacy.** She received the Presidential Medal of Freedom from Barack Obama in 2015 at age 97. NASA Langley dedicated the Katherine G. Johnson Computational Research Facility in her honor in 2017. The 2016 film *Hidden Figures* and Margot Lee Shetterly's book of the same year recovered her record from the technical reports where it had been filed under male engineers' names. She received the Congressional Gold Medal in 2019 and died on February 24, 2020, aged 101.

## The Network

### Dorothy Vaughan

Supervisor, West Area Computing. Head of the West Area Computing section at Langley and the first Black supervisor in NACA/NASA history. Assigned Johnson to the flight research division in 1953 and taught herself FORTRAN in the late 1950s to keep her women employed when the electronic computers arrived.

### Christine Darden

Successor and fellow mathematician. Joined Langley in 1967, eventually leading NASA's sonic boom research program. One of the four West Computing mathematicians, with Johnson, Vaughan, and Jackson, to receive the 2019 Congressional Gold Medal.

### Mary Jackson

Colleague and friend. NASA's first Black female aerospace engineer. Worked in the same West Computing section and went through a segregated University of Virginia night-school program to earn the engineering credentials Langley required for advancement.

### John Glenn

Astronaut, Friendship 7. The first American to orbit Earth. Personally requested in February 1962 that Johnson recheck the IBM 7090's trajectory numbers by hand before he would fly. His trust put her name into the public record of the Mercury program.

## For Discussion

1. John Glenn refused to fly Friendship 7 until Katherine Johnson personally re-checked the IBM 7090 numbers by hand. What is the nature of trust between a mathematician and an astronaut in 1962, and what relationships have replaced that one as computing has become inscrutable to the humans it supports?
2. Johnson was the first woman credited as author on a NASA Space Task Group technical report in 1960. Her calculations had appeared in prior reports under other men's names. What institutional mechanisms enabled that invisible authorship, and what changes to scientific publishing practice eventually shifted the pattern?
3. Johnson was taught advanced mathematics by W. W. Schieffelin Claytor, the third Black American to earn a PhD in mathematics, at a West Virginia state college that designed advanced courses for her alone. What does that teacher-student relationship show about the internal infrastructure of Black higher education in the 1930s, and which contemporary academic relationships carry a similar one-to-one mentorship load?
4. Johnson computed the Apollo 11 Lunar Module rendezvous mathematics. The calculations had to work within seconds or leave a crew on the moon. What is the professional experience of doing math where a small error costs human lives, and which contemporary occupations carry that same weight?
5. Johnson received the Presidential Medal of Freedom at ninety-seven, the Langley facility naming at ninety-nine, and the Congressional Gold Medal at one hundred and one. What does late institutional acknowledgment accomplish for the honoree at that age, and what does it accomplish for the institution that finally offers it?

## Primary Sources

<https://ledger.newbws.com/rise/katherine-johnson>

1.



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