

WOMEN IN NASA

Dorothy Vaughan fought race and gender discrimination at the National Advisory Committee for Aeronautics (NACA), which later became NASA. She was the first black female supervisor at NASA. Vaughan is celebrated in the 2016 movie “Hidden Figures,” along with famous women mathematicians like Katherine Johnson and Mary Jackson. After obtaining a bachelor’s degree in mathematics at the age of 19, Vaughan taught high school mathematics in Virginia. A little more than 10 years later, she responded to the call for workers who could support home-front efforts during World War II. She applied and was accepted as a “human computer,” or someone who makes mathematical calculations, at NACA, where she worked in the segregated West Area Computing unit. Her group was responsible for computations that engineers needed to conduct aeronautical experiments. About six years into her time at NACA, Vaughan was promoted to lead the unit, which continued when the NACA transitioned to NASA, also ending segregation of facilities. She advocated for other women to receive pay raises and promotions, regardless of race. Vaughan paved the way for machine computers in the 1960s by teaching herself and her staff FORTRAN, a computing language used for numeric calculations. She also collaborated with human computers Vera Huckel and Sara Bullock to develop an algebraic methods handbook.

Katherine Johnson is known for her work in complex manual calculations at NASA, and specifically, her work in orbital mechanics, which helped with initial and subsequent U.S. manned spaceflights. She received the Presidential Medal of Freedom in 2015. Johnson grew up in a small town in West Virginia that didn’t offer schooling for black students past eighth grade. Her father drove more than 100 miles so that she could continue her education. Johnson flourished in high school, graduating by the age of 14, and her success extended in college. One of her professors — W.W. Schieffelin Claytor, who was the third black person to earn a Ph.D. in mathematics — was so impressed that he took it upon himself to help prepare her to become a research mathematician. That included creating a class in

analytic geometry of space just for Johnson. Another notable fact is that in graduate school, she was handpicked along with two men to integrate West Virginia University. Johnson joined the NACA, starting a 35-year career there at what would become NASA. She was assigned to an all-male flight research team, where she performed trajectory analysis for Alan Shephard, the first American to enter space. Later, she completed what she would become most well-known for: checking computers' orbital equations for John Glenn's mission. According to NASA, Glenn specifically asked for Johnson. "If she says they're good," Glenn reportedly said, "then I'm ready to go."

Mary Jackson worked as a mathematician and aerospace engineer at the NACA and NASA. She was NASA's first black female engineer and became an advocate for hiring and promoting women in NASA. Jackson earned a dual degree in mathematics and physical sciences, and then worked several jobs before joining the NACA as a human computer. After two years, Jackson worked for engineer Kazimierz Czarnecki in the Supersonic Pressure Tunnel, a 4-by-4-foot, 60,000-horsepower wind tunnel that could produce winds nearly twice the speed of sound. To qualify, she had to take graduate-level courses at an all-white high school. Jackson petitioned the school and received permission to do so, enabling her to become the first black female engineer at NASA. She studied air flow to enhance United States planes, also working in multiple NASA divisions and co-authoring 12 technical papers across NACA and NASA. With nearly two decades of experience as an engineer, Jackson made a drastic career change: she accepted a demotion to become the Federal Women's Program Manager. That allowed her to help women and other minorities advance their career in science, engineering and mathematics at NASA.

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