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Among the Stars: The Incandescent Legacy of Katherine Johnson



Figure 1: An image of “Katherine Johnson, Mathematician” (© Creative Commons)

Katherine Johnson (1918 – 2020)

We will always have STEM with us. Some things will drop out of the public eye and will go away, but there will always be science, engineering, and technology. And there will always, always be mathematics.

- Katherine Johnson

In 2016, the film *Hidden Figures* popularised Katherine Johnson, Dorothy Vaughan and Mary Jackson, three African American mathematicians who worked at NASA’s Langley Research Centre during the Cold War Space Race.¹ Based on the book by Margot Lee Shetterly, *Hidden Figures* is a story of overcoming oppression and adversity, a “triumph of meritocracy” in a world rich in discrimination and prejudice.² Katherine Johnson is a figure with whom many are now familiar; in 2015, President Barack Obama awarded her the Presidential Medal of Freedom, the highest civilian honour in the US.³ There is a Katherine G. Johnson

¹ A. Heathman, ‘Hidden Figures: the true story behind the women who changed NASA’s place in the Space Race,’ *Wired*, February 28, 2017. <https://www.wired.co.uk/article/hidden-figures-nasa-director>, (accessed 28/03/2021).

² S. M. Malcolm, ‘Katherine Johnson (1918-2020): Groundbreaking U.S. space program mathematician,’ *Science* Vol. 368 (6491), (2020), p. 591.

³ S. D’Agostino, *How to Free Your Inner Mathematician: Notes on Mathematics and Life*, (Oxford: Oxford University Press (2020), p. 42.

Computational Research Facility at NASA, alongside a satellite in her name and even a Barbie.⁴ However, despite the respect and attention given to her legacy in the present, Johnson path through life was far from an easy one.

Katherine was born on 26 August 1918 in White Sulphur Springs, West Virginia, a state that was firmly part of the segregated South.⁵ Her father, Joshua Coleman, was a farmer and her mother, Joylette, was a teacher. Katherine's natural inclination to mathematics was evident from an early age; she counted everything, 'the steps in the road, the steps up to the church, the number of dishes and silverware [she] washed...'.⁶ However, education for black children in her area extended only through grade school. To overcome this, she moved with her mother and siblings over a hundred miles away to a house rented by her father to attend the laboratory school at West Virginia Collegiate Institute, a historically black public land-grant institution.⁷ It is important to remember that Katherine entered secondary education at the age of ten in a world where it was more likely for her to die before thirty-five than complete high school.⁸ In an incredible feat that overcame the overwhelming odds stacked against her, Johnson graduated summa cum laude in mathematics and French in 1937 and went on to become a teacher, a path often taken by black college-educated women of her generation.⁹ During this period of her life, Katherine married and started a family, though her love of education and mathematics presented itself once again when West Virginia State University invited her to join a graduate mathematics programme as one of the first black students to enrol at the college.¹⁰ When her husband James grew ill, she left the University to support her family.

Johnson would return to the world of mathematics in 1952 when she seized an opportunity to work at the Langley Aeronautical Laboratory, a research centre of the National Advisory Committee for Aeronautics (NACA, the predecessor of NASA).¹¹ While at Langley, Johnson worked as a 'human computer,' assigned to complete complex calculations in navigation and astronomy. She worked surrounded by a predominately white, male staff, in a rapidly evolving technological era where 'computers' were expensive hardware rather than 'underpaid female

⁴ L. Mundy, "Katherine Johnson: The NASA 'Computer' Who Launched a Man into Space and Women into STEM," *Politico*, (December 26, 2020), <https://www.politico.com/news/magazine/2020/12/26/katherine-johnson-nasa-hidden-figures-obituary-stem-448187>, (accessed, 29/03/2021).

⁵ S. M. Malcolm, 'Katherine Johnson (1918-2020): Groundbreaking U.S. space program mathematician,' *Science* Vol. 368 (6491), (2020), p. 591.

⁶ J. Hughes, 'Biography: Katherine Johnson, Space Scientist,' *The Heroine Collective*, August 31, 2015, <http://www.theheroinecollective.com/katherine-johnson-space-scientist/>, (accessed 28/03/2021).

⁷ S. M. Malcolm, 'Katherine Johnson (1918-2020): Groundbreaking U.S. space program mathematician,' *Science* Vol. 368 (6491), (2020), p. 591.

⁸ L. Mundy, "Katherine Johnson: The NASA 'Computer' Who Launched a Man into Space and Women into STEM," *Politico*, (December 26, 2020), <https://www.politico.com/news/magazine/2020/12/26/katherine-johnson-nasa-hidden-figures-obituary-stem-448187>, (accessed, 29/03/2021).

⁹ S. M. Malcolm, 'Katherine Johnson (1918-2020): Groundbreaking U.S. space program mathematician,' *Science* Vol. 368 (6491), (2020), p. 591.

¹⁰ J. Hughes, 'Biography: Katherine Johnson, Space Scientist,' *The Heroine Collective*, August 31, 2015, <http://www.theheroinecollective.com/katherine-johnson-space-scientist/>, (accessed 28/03/2021).

¹¹ S. M. Malcolm, 'Katherine Johnson (1918-2020): Groundbreaking U.S. space program mathematician,' *Science* Vol. 368 (6491), (2020), p. 591.

paraprofessional[s]'.¹² Despite her minority position, Johnson contributed vastly to American space travel, becoming crucial in the Cold War Space Race. In 1959, three years after her first husband's death, Katherine married Jim Johnson and published her first research report on precise trajectory calculations for NASA's early spaceflights.¹³ Throughout the 1960s, her mathematical skills aided some of the most notable American ventures into space: contributing to Alan Shepard's 1961 mission as the first American in space, John Glenn's initial orbit around the Earth, and most notably, calculating trajectories that led Apollo 11 to the Moon.¹⁴ Her later work included plans for a Mars mission and the Space Shuttle programme, along with participating in the creation of the first textbook about space.¹⁵ She retired in 1986, after thirty-three years at NASA, co-authoring twenty-six scientific papers. Katherine changed the game not only in the arena of mathematics and science but in challenging and overcoming societal discrimination at a personal level.

Katherine Johnson faced discrimination on multiple layers; women in governmental positions faced economic inequality in title, salary, and opportunity, while black Americans experienced economic inequality, and social and educational discrimination.¹⁶ Therefore, the enormity of what she achieved should not be understated. Before taking off for his historic orbit around the Earth, astronaut John Glenn referred to Johnson, saying "...get the girl to check the numbers."¹⁷

History will view Katherine Johnson not as a nameless 'girl,' but as a woman whose name shall not be forgotten. Her legacy, scattered out among the stars, is a call not only to remember incredible individuals that have overcome barriers to change history but to recognise the fundamental need to remove such barriers and create opportunities for others to light their own futures.

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¹³ S. M. Malcolm, 'Katherine Johnson (1918-2020): Groundbreaking U.S. space program mathematician,' *Science* Vol. 368 (6491), (2020), p. 591.

¹⁴ T. C. Toole, 'She helped send Apollo to the Moon. Now she's receiving the same medal the astronauts accepted 51 years ago,' *National Geographic*, (October 8, 2020), <https://www.nationalgeographic.com/history/article/katherine-johnson-mathematician-sent-apollo-moon-wins-hubbard-medal>, (accessed, 28/03/2021).

¹⁵ J. Hughes, 'Biography: Katherine Johnson, Space Scientist,' *The Heroine Collective*, August 31, 2015, <http://www.theheroinecollective.com/katherine-johnson-space-scientist/>, (accessed 28/03/2021).

¹⁶ S. M. Malcolm, 'Katherine Johnson (1918-2020): Groundbreaking U.S. space program mathematician,' *Science* Vol. 368 (6491), (2020), p. 591.

¹⁷ L. Mundy, "Katherine Johnson: The NASA 'Computer' Who Launched a Man into Space and Women into STEM," *Politico*, (December 26, 2020), <https://www.politico.com/news/magazine/2020/12/26/katherine-johnson-nasa-hidden-figures-obituary-stem-448187>, (accessed, 29/03/2021).

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