

Katherine Johnson

Teacher's Guide

This document is addressed to the instructor. Other documents in this lesson packet are addressed to students.

Overview:

Katherine Johnson was a NASA research mathematician who contributed to the Project Mercury spaceflights and the Project Apollo lunar missions, as well as many other efforts in her 33 years in the space program. Johnson gained worldwide respect and notoriety after *Hidden Figures*, a bestselling book by writer and entrepreneur Margot Lee Shetterly, captured her life as a gifted mathematician whose tenacity and skill defied racial and gender discrimination in science and engineering during the 1950s and 60s.

Lesson Prompt:

What kind of limits did people place on women and people of color in the workplaces of mid-twentieth century America?

How did the “space race” between the Soviet Union and the United States create an opportunity for a Black woman to use her incredible math skills to serve her nation and its scientific goals?

What role does the media play in giving young people role models from their country’s history?

This lesson includes a prepared PowerPoint slide deck detailing the journey of Katherine Johnson, who began as a little girl with a gift for numbers, became one of three Black students to integrate a university graduate program, and eventually, as a “human computer”, helped American astronauts explore outer space and the moon.

The lesson introduces the benefit of STEM programs and the reality of Black progress and career advancement. Share the slide show and have students discuss the questions it contains. Select activities from the accompanying Activity Pack according to your time allowance and student appropriateness. Included in this lesson pack are:

Coloring Page

Multiple Choice Questions (grades 2-8)

Critical Thinking Exercises (grades K-5 with guidance; 6-8 unassisted)

Crossword Puzzle (grades 2-5 with word bank; 6-8 without word bank)

“Ex-NASA scientist is a star among students” by Sarah A. Reid (2010)

Suggested Videos

Vocabulary:

accolades	aeronautics	Cold War	computer
cosmonaut	dramatic license	lunar	module
orbit	parabola	precocious	prodigy
RAM	ROM	state-of-the-art	synchronize
trajectory			

Recommended Resources:

Websites

[Katherine Johnson Biography](#)

[Virginia Aeronautical Historical Society: Virginia Aviation Hall of Fame – Katherine Coleman Goble Johnson \(2017\)](#)

[Smithsonian Curators Remember Katherine Johnson, NASA Mathematician Highlighted in ‘Hidden Figures,’ Who Died at 101](#)

[NASA Figures – An MIT Constellation](#)

[NASA Dedicates New Facility to Katherine Johnson, the Pioneering Mathematician of ‘Hidden Figures’](#)

[A New Memoir Tells The Life Story Of NASA ‘Hidden Figures’ Katherine Johnson](#)

[“Racism, Sexism, And Space Ventures”: Civil Rights At NASA In The Nixon Era And Beyond](#)

[State Launches Career Of Pioneering NASA Mathematician Katherine Johnson](#)

[“Hidden Figures” and Human Computers](#)

Books

There are plenty of books on Katherine Johnson out there, many of them intended for elementary or middle school reading levels, including the following books which are appropriate for middle school readers.

Reaching for the Moon: The Autobiography of NASA Mathematician Katherine Johnson. Katherine Johnson. Atheneum Books for Young Readers, 2020.

Hidden Figures: Young Reader’s Edition. Margot Lee Shetterly. Harper Collins, 2016.

Other Resources

Want students to watch the film version of *Hidden Figures*? Here are some useful articles about the film *Hidden Figures* and how it compares with the non-fiction book and the real events it describes, both in terms of the events and the science and technology featured:

[Katherine Johnson, Hidden Figures, and John Glenn’s Flight](#)

[A Curator Goes to the Movies: The Stuff of Hidden Figures](#)

[History vs. Hollywood: *Hidden Figures*](#)

Standards and Learning Objectives

Mapped to the College, Career and Civic Life (C3) Framework for Social Studies State Standards published by the National Council for the Social Studies

Grades K-2

English Language Arts:

D1.3.K-2. Identify facts and concepts associated with a supporting question.

Civics:

D2.Civ.1.K-2. Describe roles and responsibilities of people in authority.

D2.Civ.2.K-2. Explain how all people, not just official leaders, play important roles in a community.

D2.Civ.8.K-2. Describe democratic principles such as equality, fairness, and respect for legitimate authority and rules.

D2.Civ.10.K-2. Compare their own point of view with others' perspectives.

D2.Civ.14.K-2. Describe how people have tried to improve their communities over time.

Economics:

D2. Eco.2. K-2. Identify the benefits and costs of making various personal decisions.

D2. Eco.3. K-2. Describe the skills and knowledge required to produce certain goods and services.

D2.Eco.6.K-2. Explain how people earn income.

D2.Eco.10.K-2. Explain why people save.

D2.Eco.14.K-2. Describe why people in one country trade goods and services with people in other countries.

Geography:

D2. Geo.7.K-2. Explain why and how people, goods, and ideas move from place to place.

History:

D2. His.1. K-2. Create a chronological sequence of multiple events.

D2. His.2. K-2. Compare life in the past to life today.

D2. His.3. K-2. Generate questions about individuals and groups who have shaped a significant historical change.

D2.His.4.K-2. Compare perspectives of people in the past to those of people in the present.

D2.His.9.K-2. Identify different kinds of historical sources.

D2.His.10.K-2. Explain how historical sources can be used to study the past.

Grades 3-5

Civics:

D2.Civ.4.3-5. Explain how groups of people make rules to create responsibilities and protect freedoms.

D2.Civ.6.3-5. Describe ways in which people benefit from and are challenged by working together, including through government, workplaces, voluntary organizations, and families.

D2.Civ.8.3-5. Identify core civic virtues and democratic principles that guide government, society, and communities.

D2.Civ.10.3-5. Identify the beliefs, experiences, perspectives, and values that underlie their own and others' points of view about civic issues.

D2.Civ.12.3-5. Explain how rules and laws change society and how people change rules and laws.

Economics:

D2. Eco.1.3-5. Compare the benefits and costs of individual choices.

D2. Eco.2.3-5. Identify positive and negative incentives that influence the decisions people make.

D2. Eco.3.3-5. Identify examples of the variety of resources (human capital, physical capital, and natural resources) that are used to produce goods and services.

D2.Eco.6.3-5. Explain the relationship between investment in human capital, productivity, and future incomes.

History:

D2. His.2.3-5. Compare life in specific historical time periods to life today.

D2. His.3.3-5. Generate questions about individuals and groups who have shaped significant historical changes and continuities.

D2.His.4.3-5. Explain why individuals and groups during the same historical period differed in their perspectives.

D2.His.11.3-5. Infer the intended audience and purpose of a historical source from information within the source itself.

D2. His.14.3-5. Explain probable causes and effects of events and developments.

D2.His.16.3-5. Use evidence to develop a claim about the past.

Communicating and Critiquing Conclusions:

D4.4.3-5. Critique arguments.

D4.5.3-5. Critique explanations.

Grades 6-8

Civics:

D2.Civ.1.6-8. Distinguish the powers and responsibilities of citizens, political parties, interest groups, and the media in a variety of governmental and nongovernmental contexts.

D2.Civ.6.6-8. Describe the roles of political, civil, and economic organizations in shaping people's lives.

D2.Civ.10.6-8. Explain the relevance of personal interests and perspectives, civic virtues, and democratic principles when people address issues and problems in government and civil society.

D2.Civ.14.6-8. Compare historical and contemporary means of changing societies, “and promoting the common good.”

Economics:

D2. Eco.1.6-8. Explain how economic decisions affect the well-being of individuals, businesses, and society.

History:

D2. His.1.6-8. Analyze connections among events and developments in broader historical contexts.

D2. His.2.6-8. Classify series of historical events and developments as examples of change and/or continuity.

D2. His.3.6-8. Use questions generated about individuals and groups to analyze why they, and the developments they shaped, are seen as historically significant.

D2.His.4.6-8. Analyze multiple factors that influenced the perspectives of people during different historical eras.

D2.His.5.6-8. Explain how and why perspectives of people have changed over time.

D2.His.6.6-8. Analyze how people’s perspectives influenced what information is available in the historical sources they created.

D2.His.13.6-8. Evaluate the relevancy and utility of a historical source based on information such as maker, date, place of origin, intended audience, and purpose.

D2. His.14.6-8. Explain multiple causes and effects of events and developments in the past.

D2. His.15.6-8. Evaluate the relative influence of various causes of events and developments in the past.

Communicating and Critiquing Conclusions:

D4.4.6-8. Critique arguments for credibility.

D4.5.6-8. Critique the structure of explanations.