

The untold **TRUE STORY** of four African-American women  
who helped launch our nation into **SPACE**



# HIDDEN FIGURES

**YOUNG READERS' EDITION**

*New York Times* Bestselling Author

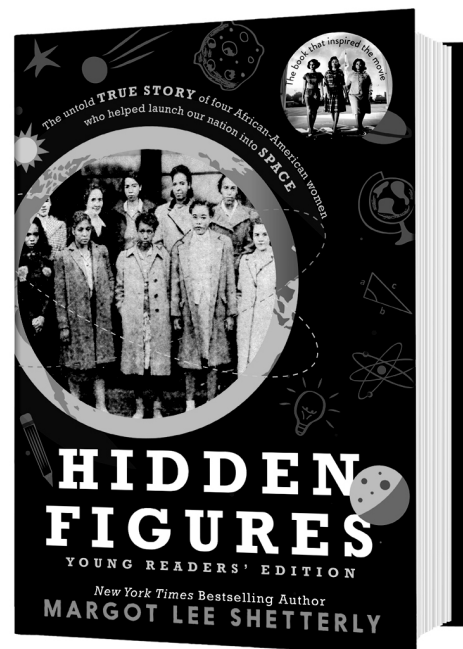
**MARGOT LEE SHETTERLY**

# About the Book

The *Hidden Figures Young Readers' Edition* is the untold story of African-American female mathematicians at NASA who provided the calculations that helped fuel some of America's greatest achievements in space. The stories of Dorothy Vaughan, Mary Jackson, and Katherine Johnson, three women computers who excelled in a male-dominated field despite the societal and political barriers that stood in their way, are as inspirational now as they were more than fifty years ago.

In addition to being a compelling story in its own right, *Hidden Figures* offers readers an opportunity to learn about critical events in American history. Spanning from the 1940s to the 1970s, students will be witness to events from WWII, such as D-Day, to the Civil Rights Movement as it unfolded through the 1950s and 1960s. Set against the backdrop of the struggle for racial equality, the stories of these "human computers" attests to their indomitable courage and determination.

Vaughn, Jackson, Johnson, and the other female mathematicians who worked at NASA were pioneers in the fields of science, technology, engineering, and math: commonly known today as STEM. Their accomplishments are truly remarkable on their own, but even more so given the racial and gender discrimination that they endured on a daily basis. Readers will marvel not only at their intelligence and work ethic, but at their fortitude in the face of injustice. Their stories will surely inspire young readers to follow their own STEM dreams.



Grades: 3-7

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## About the Author

Margot Lee Shetterly is a writer who grew up in Hampton, Virginia, where she knew many of the women in *HIDDEN FIGURES*. She is an Alfred P. Sloan Foundation Fellow and the recipient of a Virginia Foundation of the Humanities grant for her research into the history of women in computing. She lives in Charlottesville, VA.

### STEM /Additional Resources:

Blackgirlsgcode.com  
Futurekatherinejohnsons.com  
Ngcproject.org  
Aauw.org  
Stemettes.org



Photograph by Aran Shetterly



# Discussion Questions



1. On page six, the author introduces Dorothy Vaughan, Mary Jackson, Katherine Johnson, and Christine Darden. Discuss how the author describes these four women. What important personal qualities did they possess? Why do you think they needed to be willing to pioneer, fight, and dream to achieve their goals? As you read through the book, note and discuss other ways in which their characters and personal values help them succeed.
2. What is a mentor? What is a role model? How are mentors and role models alike and different? On page 95, you learn that Katherine Johnson's high school math teacher acted as both a mentor and a role model. How might Katherine's life have turned out differently without her teacher's guidance and support? On pages 78 & 79, you learn how Mary Jackson's work as a Girl Scout troop leader influenced her personal life. Discuss Mary's decision to stop her scouts from singing the slave song "Pick a Bale of Cotton." Why did Mary feel it to be "her duty to try to make sure the girls didn't put limits on themselves?"
3. Discuss the personal sacrifices that Dorothy, Mary, and Katherine had to make to work at NACA/NASA. On page 49, the author describes how the West Computers stuck together in a "sisterhood," double-checking one another's work and policing each other "to prevent tardiness, sloppy appearance, or the perception of bad behavior." Why was it necessary for them to "police" each other? How did Dorothy, Mary, and Katherine not only meet, but exceed the standards that were expected of them
4. What is independence of mind and strength of personality" (p. 92)? How do Dorothy, Mary, and Katherine exhibit both?
5. The West Computers had to endure and navigate racial and gender discrimination at work. A Langley advertisement read: "Reduce your household duties! Women who are not afraid to roll up their sleeves and do jobs previously filled by men should call..." (p. 10). What is meant by "household duties?" Discuss the excerpt from Air Scoop, found on page 56. How does this "joke" reflect the prevalent gender discrimination of the era?
7. Discuss the statement on page 113: "Evolution occurred in scientific progress just as it does in nature: positive traits continued and obsolete ones died off." How did Dorothy Vaughn evolve over her time at NACA/NASA? Why is continual learning important? How did their willingness to educate and train themselves beyond the scope of their immediate jobs contribute to Dorothy, Mary, and Katherine's success?
8. Reread chapter 11, "The Area Rule" (pgs. 86-91). Discuss how Mary Jackson's treatment by white workers around using the bathroom "demoted" her from "professional mathematician to second-class human being." Why did most African-Americans wear a "mask" around whites to keep from saying what they really meant?
9. On page 100, the author refers to how Katherine and the other black mathematicians mounted a "charm offensive." Discuss the pressure that these women must have felt to know that "the interactions that individual blacks had with whites could have implications for the entire black community."
10. On pages 7 & 8, you read about some of the "Jim Crow" laws that existed in the South which legalized racial segregation. These regulations also existed inside Langley. Discuss the courage and defiance shown by Miriam Mann (pgs. 43 & 44), and her response to her colleagues' warnings that she could be fired. How did Katherine's decision to "block out" racial discrimination at Langley allow her to move forward and succeed?
11. During the 1960 sit-ins in Greensboro and other Southern cities, a rumor circulated on the Hampton Institute campus that the Mercury astronauts supported the student protests. Discuss why "the very idea that those buzz-cut, middle American men were standing with the student activists, adding their voices to the call for equal opportunity for all Americans, was thrilling. It didn't matter if it was true. It inspired them either way (p. 163)."
12. Reread and discuss: Race and Patriotism on pages 33-36. Many African-Americans questioned the idea of fighting for a country that discriminated against them in all walks of life. Discuss the question: Should African-Americans fight for their freedom overseas when they did not experience it for themselves at home?
14. Discuss Mary Jackson's belief that "achievement worked like a bank account. It was something you drew on when you were in need and made deposits to when you had a surplus" (p. 158).
15. How did astronaut John Glenn's demand, "Get the girl to check the numbers" (p. 178) publically acknowledge Katherine Johnson's intelligence and dedication in a male-dominated workplace, but also bestow on her the respect she deserved?
16. Discuss Katherine Johnson's belief that "You have to expect progress to be made" (p. 197).
17. Discuss how the power of imagination and self-belief contributed to Dorothy, Mary, and Katherine's success. Why is it important to imagine possibilities for yourself? Discuss how Katherine fulfilled her dream of doing something "untried, untested, and unexplored" (p. 136).
18. The following statement appears at the conclusion of the book's prologue. "These women should be celebrated not just because they are black or because they are women, but because they are an important part of American history". Now that you have completed reading the text, discuss what you think the author means by this statement.



# Classroom Activities



## We Have Liftoff!

The *Hidden Figures Young Readers' Edition* describes many of the historic projects that NASA undertook during the early 1960s. Visit the NASA website at [nasa.gov](http://nasa.gov). Give students time to explore the site to learn what NASA is currently doing to further humankind's understanding of the universe. Have each student choose one topic highlighted on the NASA site to research and report on. Younger students can visit the NASA Kids Club, also on the [nasa.gov](http://nasa.gov) website.

## Women by the Numbers

While the number of women in the sciences has increased dramatically since the 1960s, women are still underrepresented, especially in the engineering field. Practice research and math skills by locating and comparing percentages of women in the physical sciences and engineering over the past decade.

## Race for Space

Take students on a trip back through time to when the United States was engaged in a battle for space with the Soviet Union. Gather online footage of Sputnik, the early test rocket launches, the Mercury program, and Alan Shepard's and John's Glenn's historic missions. Have a screening after reading the *Hidden Figures Young Readers' Edition*.

## One Po-Data, Two Po-Data

After computations, gathering data is the most commonly used mathematical skill. Give students an opportunity to gather data to answer some simple questions, such as how many students buy school lunch in a given month versus those who bring lunch from home. The following resource offers additional tips and strategies for teaching data-gathering to students: <https://www.teachervision.com/professional-development/collecting-data>.

## Dear Katherine

Give students the opportunity to write a letter to Katherine Johnson. Encourage students to share what they learned from reading about her remarkable life in the *Hidden Figures Young Readers' Edition* and how her story has inspired them to "expect progress to be made."

## Soap Box Derby Revisited

On pages 153-158, the author describes how Mary Jackson helped her son Levi design and build a car that eventually won the local soap box derby. Reread these pages aloud. Challenge students, working in small teams, to design and build a vehicle. Like Mary guided Levi to do, have student make sketches and measurements of their design before they set off to build it. Ask parents to donate used materials that can be recycled for the project. When all vehicles are complete allow each group an opportunity to explain their process and demonstrate the vehicle in motion.

## Building a Better Airplane

At the Langley Memorial Aeronautical Laboratory one of the prime objectives was to build faster, more advanced aircraft, and eventually spacecraft. Engineers and mechanics tested complex scientific concepts such as trajectory and propulsion. Conduct a paper airplane experiment in which small groups make modifications to a basic airplane design. Have students form hypotheses, conduct tests, and form conclusions. Give each team an opportunity to demonstrate their experiment and offer analysis. Use this resource for instructions for building a paper airplane: [foldnfly.com](http://foldnfly.com).

## Not-So-Secret Code

In the mid-1950s, NACA began using its very first IBM computers. These huge machines were able to make thousands of calculations per minute. Dorothy Vaughan realized that these machines would eventually replace the human computers, and began to educate herself in the new field of computer programming. Today, children are learning to code at ever younger ages. Introduce basic coding via games and other applications, starting with the resources outlined in the following article: <https://www.edutopia.org/blog/teach-kids-coding-resources-parents-matt-davis>.

## Very, Very Few Red Dots

In the text, it is clear that the women computers were the ones with the mathematical expertise. They "crunched" thousands of numbers each day, checked each other's work, and made very few mistakes. Any data sheet with an error was marked with a red dot. Pair students of similar math ability and present them with a series of computation tasks. Instruct students to check over their partner's work, putting a red dot next to found errors. Checking the work of another (and having one's work checked by a peer), will not only produce more careful computation, but will encourage focused thought and build analytic skills. After checking is complete, students should share their discoveries. Students can correct the errors and move on to another problem.

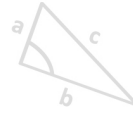
## Many Hands Get Stuff Done

The human computers were usually given so many sets of numbers on a given project that the work had to be broken down into its component parts, with each computer assigned a particular task. Create an experiment for the entire class that is too large for one student to accomplish individually, or even a small group. Present the experiment or project to the class and ask them to identify its component parts. Guide students to form "task groups" and provide each time to complete their work. Finally, have students come together, sharing each component and bringing the project to completion.





# Multimedia Connections: From Text to Film



*Hidden Figures*, Margot Lee Shetterly's adult book, was adapted to be a major motion picture. The following questions can be used to analyze and discuss the text to film adaptation.



## After Screening *Hidden Figures*:

- While all the women at NACA and NASA endured gender discrimination, the African-American mathematicians also endured race discrimination from both men and women. Describe how the West Computer supervisor treats Catherine when she is called to work in the Space Task Group. What does she mean when she says, "I never had a colored in here before, Katherine. Don't embarrass me"?
- On pages 86 & 87, the author recounts how Mary Jackson had to walk from the east campus to the west just to use the bathroom that was designated for "colored ladies." In the film, it is Katherine Johnson that must suffer the physical and emotional hardship of having to leave her desk twice a day to use the bathroom. Discuss the scene in which Katherine angrily explains why she is absent from her desk for blocks of time. How is this an example of dropping her "mask," as described on page 88? What did Katherine risk by telling the truth to Mr. Harrison?
- Review pages 7 & 8 in the text. Discuss the list of Jim Crow laws that kept blacks and whites separated in the South. How are Jim Crow laws presented in the film? Discuss how Katherine must have felt when she discovered the colored coffee pot.
- One of the through themes in the film is Katherine's determination to be credited for co-authoring reports. Why was it so important for her to have her name on the typed reports? In the book, Katherine's male colleague, an engineer, eventually advocated for Katherine. In the film, Paul said, "Computers don't author reports." Why was Paul so determined not to share credit with Katherine?
- How is Katherine's desire to do something "untried, untested, and unexplored" related to Mr. Harrison's instruction to Katherine to "look beyond the numbers that do not yet exist"?
- Discuss how the male engineers react to Katherine's presence in the Space Task Group? Why are they so threatened when she checks and/or corrects their work? How does this depiction compare to the descriptions in the book of how male engineers treated the female computers?
- On pages 116 & 117, the author briefly describes how Mary Jackson petitioned the Hampton school board to take engineering extension classes in a white-only high school. In the film she confronts a judge for the same reason. In both depictions, how does this action reveal her bravery and determination?
- How does Dorothy show both courage and loyalty when she insists that she take her "ladies" with her to the IBM processing room? What is the significance of Mrs. Mitchell addressing Dorothy as Mrs. Vaughn?
- As a class, create a Venn diagram to compare and contrast the text and film adaptation. Discuss the major similarities and differences. In which ways does the text or film convey elements of the story in a unique way?



### Common Core Correlations

The questions and activities in this guide can be correlated to the following Common Core State Standards:

CCSS.ELA-Literacy.RL 3.1, 3.3, 3.4, 4.7, 6.7

CCSS.ELA-Literacy.RI 3.1, 3.7, 4.3, 4.7, 5.3, 6.3, 6.7, 7.3, 7.4, 7.7

CCSS.ELA-Literacy.RH 6-8.4

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