



A Curriculum Guide to:

Grasping Mysteries: Girls Who Loved Math

By Jeannine Atkins

About the Book

Learn about seven groundbreaking women in math and science in this biographical novel-in-verse, a companion to *Finding Wonders: Three Girls Who Changed Science*. These women—Caroline Herschel, Florence Nightingale, Hertha Marks Ayrton, Marie Tharp, Katherine Johnson, Edna Lee Paisano, and Vera Rubin—used math as their key to explore the mysteries of the universe and grew up to do innovative work that changed the world.

Prereading Activities

The activities below particularly address the following English Language Arts Common Core State Standards: (RL.4-7.2,9)

1. Look at the title of the book. Why do you think the author used the word *grasping* and not *solving*? How do you think it applies to these women? Why might someone view mathematics as an opportunity to tackle mysteries? How can a mathematical investigation lead to great things? Do you see any examples of the impact of mathematics in your daily life? Keep a list of your favorite examples of mathematical mysteries as you're reading.
2. Look at the table of contents. Are you familiar with any of these women or their accomplishments? Do you know any other women who work in science or mathematical fields?
3. While covering real women and true events, this novel is in verse. Why do you think the author chose this format to introduce readers to these women and their stories? Read the author's note in the back of the book. What does this tell you about the book's structure and messages? What do these women have in common?
4. Find a map of the world to display in your home or classroom. As you read, place a pin where each story takes place, and mark the map with each woman's name. Consider making a time line as well with important dates for each woman to see if and how their lives overlapped.
5. Flip through the book and look at each woman's section. How is it organized? Think about what information each opening image provides, and what they add to the experience. Look at the section and chapter headers: What do they foreshadow or indicate, and what tone do they set? Why do you think the author chose to spend so much time with each woman?

Discussion Questions

The discussion questions below particularly address the following English Language Arts Common Core State Standards: (RL.4-7.1,2,3,7,9) (W.4-7.6,8,9) (RL.4-7.6) (W.4-7.6,7,8,9)

1. Of the women featured in these pages, whom do you most identify with? What qualities do you admire, and how do you see these qualities reflected in your everyday life? Provide examples from your life that illustrate this.
2. Where do you see influences of these women's lasting legacies today? How do you think their stories have impacted others beginning their careers? Think about Vera Rubin, who was captivated by a book about Maria Mitchell, or about Hertha Marks Ayrton learning that Caroline Herschel was the first woman to be awarded a gold medal from the Royal Astronomical Society. Think about implications of the work of women like Edna Lee Paisano, whose efforts adapting the US census brought much needed resources to Native American communities. Make a chart of these legacies.
3. Think about how many of these women you had heard about before reading this book. Why do you think they are not talked about more often? Write a persuasive essay introducing one of these women, and make your argument as to why she should be more well known. Be sure to include at least three reasons and specific details to support your choice. Explain your point of view using convincing language to deliver a strong message.

4. Name some of the women whom you are most excited to learn more about. What did they do? Why do you think they can be classified as women who are “grasping mysteries”?

5. What kind of credit did these women receive for their accomplishments? How did their male colleagues view them? How does this make you feel? How do these women stand up for themselves? How might these situations have had both a positive and negative impact on these women’s efforts? Choose one woman and create a graphic organizer like the ones found on this website (<https://www.eduplace.com/graphicorganizer/>) that features her name in the center and her accomplishments, the reactions, and the ways she persevered out to the sides.

6. Many of the women had strong support systems or teachers close to home, and they continued that level of encouragement and training with their own children or nephews. How did the families of these women show their support? Did you notice any changes in opportunities between generations? How can you work to raise up the people around you? Think about a friend or family member who might need encouragement, and write them a letter of support. Consider any challenges they might face, and how you might continue to support them until they’ve met their goal.

7. What does Hertha mean when she asks, “Could we be the last women asked to choose between having a family and science”? How does this statement relate to the other women’s stories? Why do you think women often felt their options were limited?

8. How did these women go about getting their educations? How did they learn more about subjects they were passionate about? What obstacles did they come up against in terms of resources and opportunities? How might the passing of Title IX impact today’s girls and women interested in science and math? What does Madame Bodichon mean when she tells Hertha, “Curiosity will help you more than high grades on tests”?

9. Do you think the scientific and mathematical communities have made progress in terms of equal opportunities and their support of women? See if you can find more information about prizes and prestigious groups in the scientific and mathematical community, such as the Royal Astronomical Society medal, the Royal Statistical Society, and the National Oceanic and Atmospheric Administration mentioned in the book. How many women have won awards or been inducted into these societies in recent years?

10. What does advocacy mean? What does it take to become an advocate? Make a word cloud (<http://www.wordle.net/>) using words that show personal characteristics that made these women strong advocates for what they believed in.

11. If you were going to write a sequel to *Grasping Mysteries*, what criteria would you use for including other women? Consider areas of study, goals, accomplishments. Compile a list of women that fit your rationale and decide what quote(s) or fascinating fact(s) you’d include in their sections. Be sure to give reasons and examples from your current reading and research.

12. In the bibliography at the end of the book, the author describes the processes and sources she used for researching each woman. Why do you think the author included this account? Why is it important to know where your information is coming from?

Extension Activities

The activities below particularly address the following English Language Arts Common Core State Standards: (SL.4-7.1,2,3,4,5,6) (RL.4-7.5) (W.4-7.6,8,9) (RI.4-7.3) (RST.6-7.7)

1. Pretend you are interviewing one of these women for a documentary about her life. What questions would you ask? What would be the topics or messages of the film? With a partner, plan an interview exchange with one of these women. Use your school library or the Internet as well as the sources section in the back of the book to research the interviewee you've chosen that would help you to answer the questions accurately. Then perform the interview for your class, with one of you acting as the reporter and the other playing the role of the interviewee.

2. Many of the women are working on projects that lead them to exciting discoveries, such as new comets, electrical devices, and maps of the ocean floor. How did they go about learning the skills that led them to these achievements? How do they view the importance of education and being in a classroom? How did those around them view education, and how did those beliefs influence them? Think about Caroline's mother telling her she didn't need additional schooling, saying, "We're poor and you're plain, so you should expect little of life"; Hertha's mother explaining, "Girls need better educations than boys"; or Marie's father insisting, "Nothing must stop you from learning." What role does curiosity play in learning or in pushing these women toward their goals? Think about Madame Bodichon's comment to Hertha about the value of curiosity or Marie's Columbia University interview, where the interviewing doctor tells her, "You know a lot, but I'm more interested in your curiosity." Which colleges or programs weren't typically open to women or discouraged women from joining? What obstacles did Edna find related to resources for school-age children on reservations like her own?

With your classmates, divide into groups, each studying one or two of these women and the role education has played in their lives. Stage a panel about education with your teacher as the moderator, switching roles for each question posed; each group member will have a chance to participate to represent their chosen woman's view. Discuss each woman's schooling trajectory and how they went about pursuing information related to their interests. Discuss how attitudes and unequal distribution of resources can affect learning and how curiosity can be sparked and supported. Discuss women's access to continuing education and how that has changed over the last century. Talk about how having an education can both impact an individual and incite global change, and the tools and efforts needed to accomplish this.

3. With your classmates, create a time line of the women featured in *Grasping Mysteries* to post in your classroom; use the Internet or library resources to locate these dates. The time line can be constructed using lengths of butcher paper on the walls or floor. Decide with your classmates whether to use birth dates or dates of major accomplishments to mark the time line, and add pictures of the women or objects related to their work.

4. What would it be like to spend a day with one of these women? Choose one woman and write a letter to her explaining what you would like to do or discuss if you could spend the day with her. Be sure to include where you would go, what you would do, and the kinds of questions you would like to ask her.

5. Create a “Choose your own adventure” book using Google Forms or Google Slides for one of the women from *Grasping Mysteries* (<https://www.google.com/slides/about>). Consider the different consequences if she had not been encouraged, had chosen a different path, or had lived during a different time period.

*For teachers: use examples and suggestions from <http://blog.justinbirckbichler.com/2017/06/creating-their-own-adventures.html> to help set up a “Choose your own adventure” template for students to use.

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