

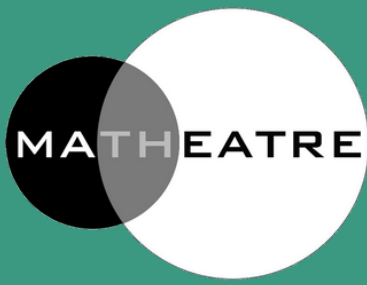
# Activity and discussion guide



## Caroline Herschel

History Science Theatre ON DEMAND  
A production of Matheatre

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# Caroline Herschel



Dear Teacher,

Thank you for bringing Matheatre's *History Science Theatre ON DEMAND* into your classroom or home learning curriculum. Matheatre's mission is to use live theatre to tell stories that inspire excitement about math and science. We hope that the personal storytelling and character interpretations in this video series will make the many faces of science relatable and alive for modern students.

In this guide you will find:

- A brief biography of the historical figure
- A summary of key concepts presented in the video story
- Suggested discussion questions
- Suggested activities
- Suggested reading

We believe that *stories* hold immense power to engage the imagination, foster empathy, encourage creative and critical thinking, and educate by way of entertainment. We hope the stories in this series inspire lively conversation, exploration, experimentation, curiosity, and perspective for each of your students as they make history in their own way.

Sadie Bowman  
Co-founder, Managing Director  
Matheatre

# Who was Caroline Herschel?

## **CAROLINE HERSCHEL (1750-1848)**

took measurements and created books that catalog the position of stars, a resource that has been used by astronomers for centuries. Along with her brother William, she discovered the planet Uranus as well as other celestial objects including 8 comets and 14 nebulae. She was the first woman to be paid for her work as a scientist.

Her Cinderella-like trajectory from housekeeper to astronomer took her from Hanover, Germany to the countryside of England as a team with her brother, William.

A musical family, the Herschels were inspired into their life studying the skies by a book called *Harmonics, or the Philosophy of Musical Sounds*, which expounded on the mathematical properties of music. Caroline was an accomplished singer and harpsichordist, and her brother William composed symphonies, concertos and other musical works.

Caroline lived to the age of 98 and was a mentor to her nephew John Herschel, also a prominent astronomer and scientist.

## Key lesson concepts:



Light pollution



Math and music



Optics of telescopes



Sharing opportunities

*A painting of  
Caroline and William*



## Suggested discussion questions

- Caroline's favorite celestial object is a comet. What's yours?
- Caroline's brother was a key figure in her career. If you have siblings, how do you help each other learn? If you don't have a sibling, what would you want to teach them if you did?
- For Caroline, science and math are very connected to music. If you play an instrument, how does math help you? How do you experience math when you listen to music?

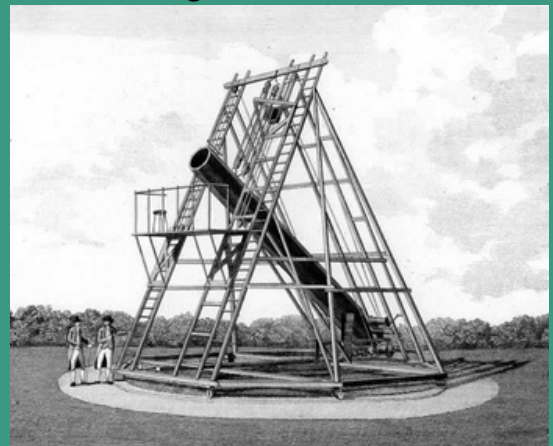


*Caroline's brother William*

## Suggested activities



- Caroline sings a German version of one song you might be familiar with—Twinkle Twinkle Little Star. Imagine you're in charge of making a music video to accompany this song and draw a storyboard—three to ten pictures that map out the way you would visually illustrate the lyrics.
- Caroline and William used a reflector telescope, which uses mirrors to collect light and magnify images. Take a small, handheld mirror and experiment with reflecting sunlight onto the wall. See if you can make it dance! (**note: never, ever look directly at the sun, or reflect sunlight into your eyes**). How does the light change with the angle of the mirror? Can you make the light more or less bright?



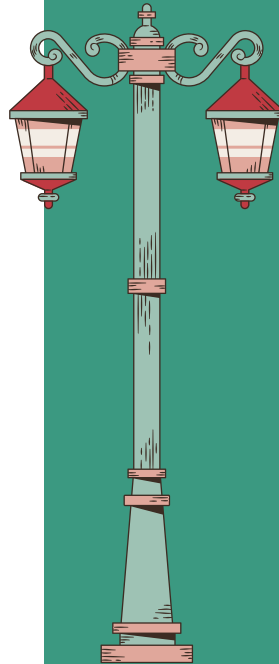
Caroline and William's 40-foot telescope

## Suggested discussion questions

- Caroline describes the big telescope she and William used in the 1780s—almost 250 years ago. Have you heard of any recent telescopes in the 2020s that are even more powerful? Hint: one launched at Christmastime, 2021!
- Scientists are still discovering planets outside of our solar system, so it's possible you could discover one yourself someday! What will you name it?
- Caroline really appreciates the ways her brother helped her find opportunities that were not always available to girls during their time. Why is it so important for people with privilege, like William, to speak up for people with less privilege?



## *Suggested activities*

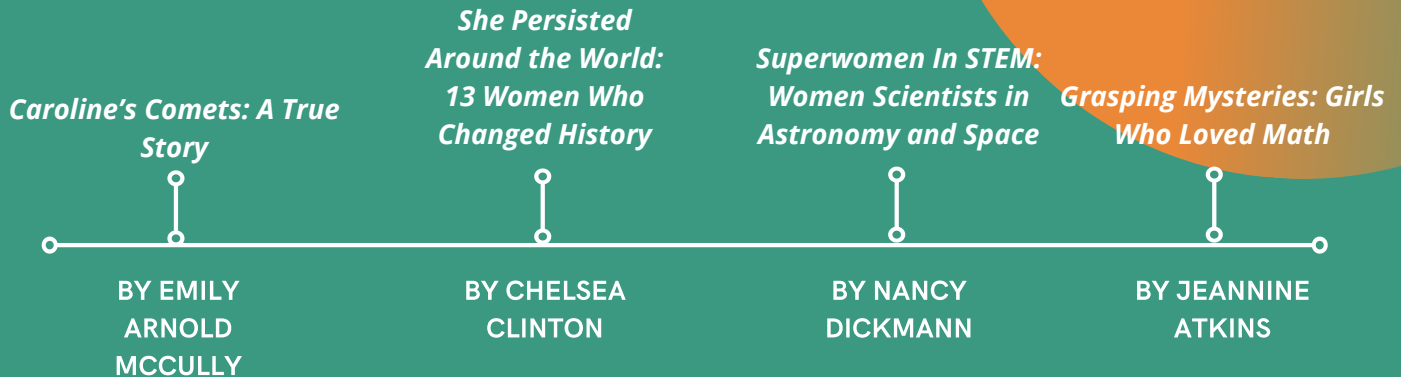


- Caroline talks about how different the night sky looked before light pollution. Not only does light pollution make it harder to see the stars, it also disrupts the migratory patterns of animals, which causes harm to ecosystems. Next time it's dark, take a look around and list what you see that generates artificial light. See if there are ways you can reduce light pollution from your own house (like turning off unnecessary lights, closing blinds, etc).
- If you're feeling ambitious, you can make your own reflector telescope with a few simple components. Instructions here: <https://www.unawe.org/activity/eu-unawe1314/> (external link, not affiliated with Matheatre)





## Suggested reading



## *Modern day Caroline Herschels!*

Technology has come a long way since Caroline and William peered at the stars in the 1700s. Scientists are able to see farther and farther into the universe thanks to powerful telescopes like Hubble and James Webb, which launched in late 2021.

We don't know what Caroline Herschel would be up to if she were around today, but many, many people are expanding on her work, not only by exploring the universe, but finding creative inspiration from math and physics.

Much like Caroline and William were inspired by the math of music, musicians like Ray, pictured here, use math every day. Ray even uses knowledge of math and physics to build his own instruments! Ray says "*being an engineer has allowed me to build the instrument of my dreams. Now I can make music on my terms!*"

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