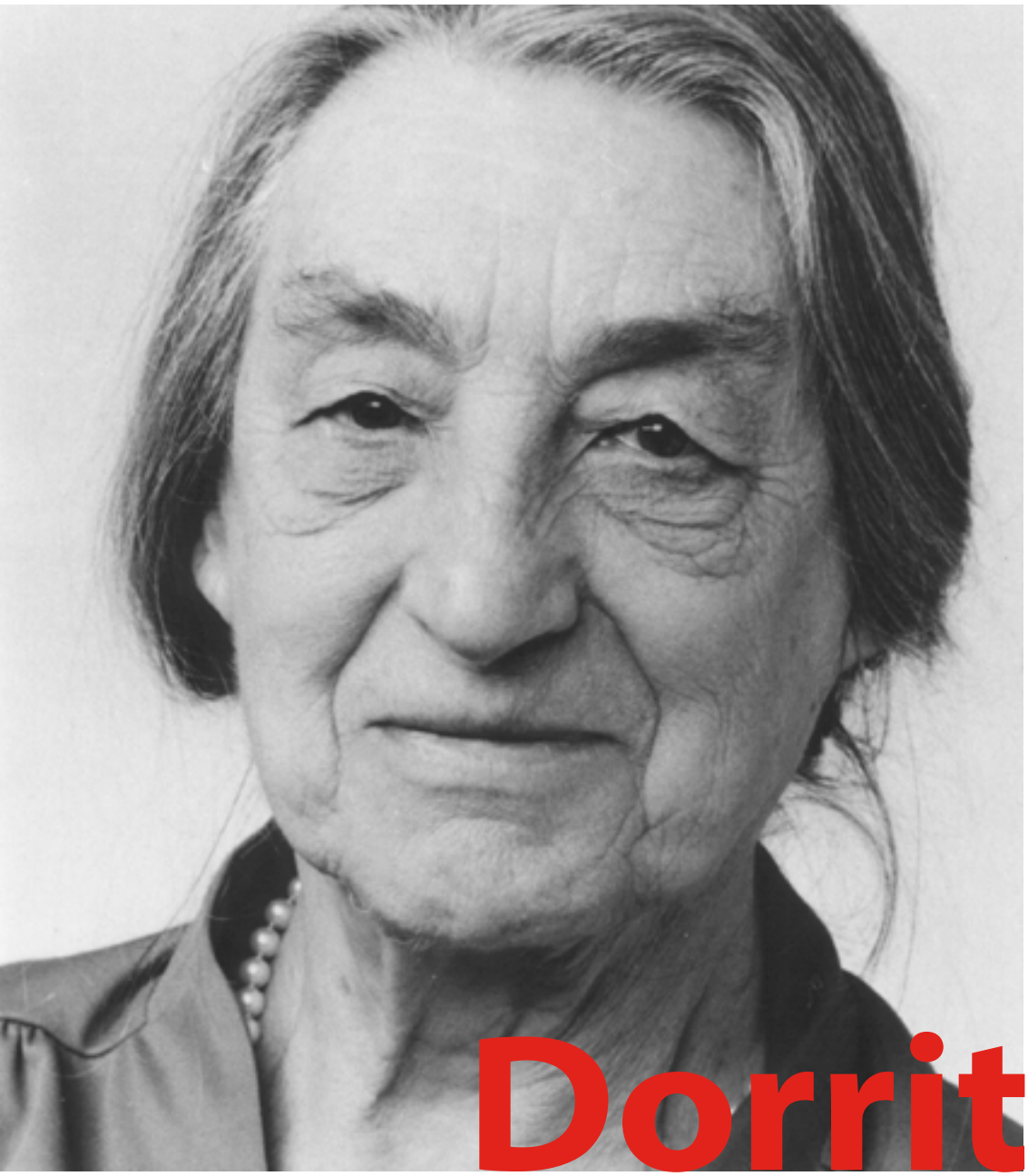
CONNECTICUT WOMEN'S HALL OF FAME
25TH ANNIVERSARY

STEMfems JR.

Vol. 1



Connecticut Women's Hall of Fame *presents*

Inspirational Women *in* STEM

Dorrit Hoffleit

NGSS Aligned

Grade 5

Earth & Space Science Unit

CONNECTICUT WOMEN'S HALL OF FAME
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- Christine Broadbridge, Ph. D., Southern Connecticut State University
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- Sandra Inga, Ph.D., Hartford Public Schools
- Ashley Pereira, MS Ed., Career In STEM

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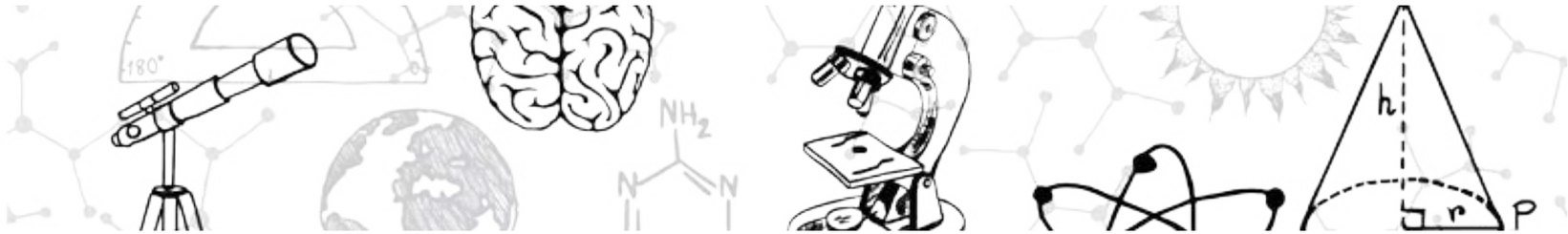


Reading *Passages*

Description Introduce students to Dorrit Hoffleit, a world-reknowned astronomer who studied the absolute brightness of stars. The story highlights both relevant science content and the challenges she overcame as a woman in science.

Standard By the end of the year, read and comprehend informational texts, including history, social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently. (CCSS.ELA-LITERACY.RI.5.10)

Close *Reading*

Description Use Hoffleit's story to develop your students' close reading skills. Review methods for close reading, including highlighting and annotating. Be sure to practice looking back in the text for evidence to support an answer.

Standards Quote accurately from a text when drawing inferences from the text. CCSS.ELA-LITERACY.RI.5.1

Explain how an author uses evidence to support particular points in a text, identifying which evidence supports which point(s). CCSS.ELA-LITERACY.RI.5.8

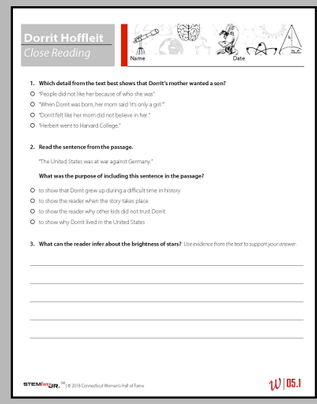
Differentiation

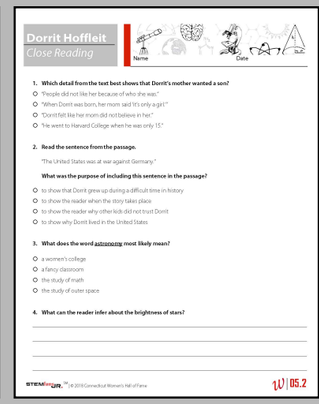
Provide students with the reading passage that aligns with their guided reading level.

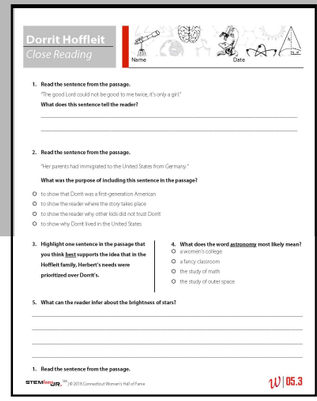
04.1 Levels J, K, L
04.2 Levels M, N
04.3 Levels O, P, Q
04.4 Levels R, S, T
04.5 Levels U, V, W
04.6 Levels X, Y, Z

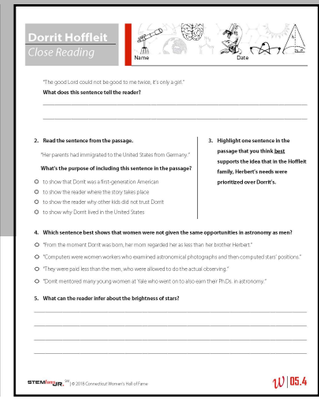
Navigation

Click directly on the image of any worksheet to access the printable version, then use the bookmarks icon to return to this page.









Differentiation

Provide students with the close reading printable that aligns with the passage read.

Levels J, K, L **05.1**
Levels M - Q **05.2**
Levels R, S, T **05.3**
Levels U - Z **05.4**

Navigation

The page numbers for each student activity match the numbers in the teacher's guide for easy alignment.

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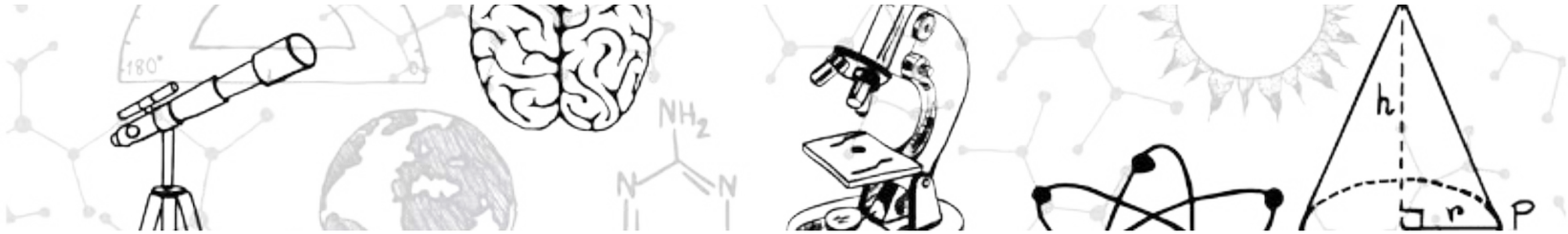
Inductee

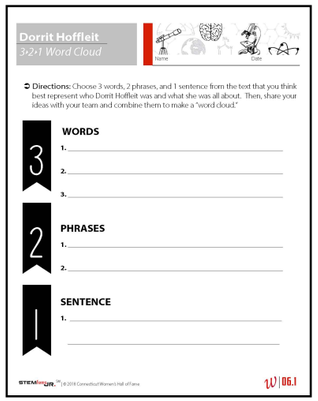
In-depth



3-2-1 Word Cloud - Discussion Protocol

Directions Engage your students in structured dialogue about Dorrit Hoffleit by providing the opportunity for them to collaboratively create a word cloud based on the text. After students create their word clouds, challenge them to articulate new ideas that they developed as a team.-

Standard Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others. CCSS.ELA-LITERACY.SL.5.1.C



Dorrit Hoffleit
3•2•1 Word Cloud

Name Date

➲ **Directions:** Choose 3 words, 2 phrases, and 1 sentence from the text that you think best represent who Dorrit Hoffleit was and what she was all about. Then, share your ideas with your team and combine them to make a "word cloud."

3 **WORDS**
1. _____
2. _____
3. _____

2 **PHRASES**
1. _____
2. _____

1 **SENTENCE**
1. _____

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w | 06.1

A Career in Astronomy

Students who are inspired by Dorrit Hoffleit may want to consider a career in astronomy. Though for many years women in astronomy were relegated to support roles as "computers," examining astronomical photographs and then computing the stars' positions, women are now breaking into this fascinating field. Interested students can watch videos, engage in simulations, and read more about careers in astronomy by visiting www.careerinstem.com/astronomer.

www.careerinstem.com

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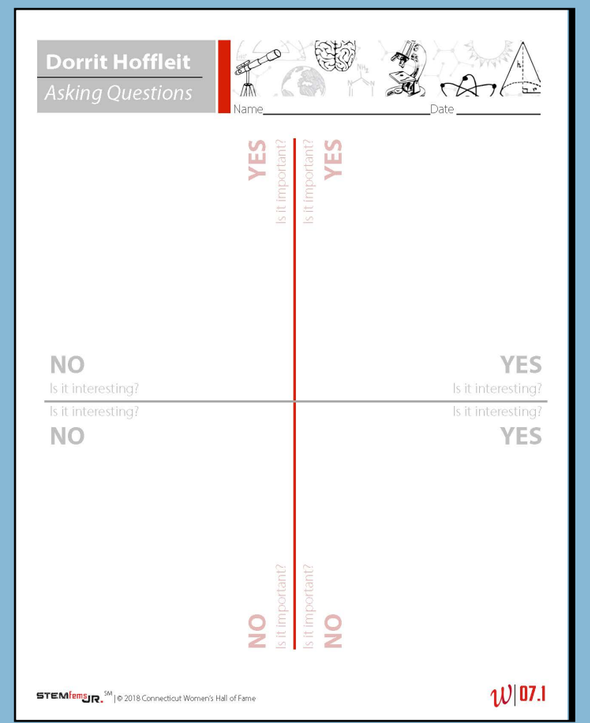
Science and Engineering Practices Activity

Asking Questions

Question Sort

Engage students in the inquiry process by providing students time to ask their own questions about astronomy. Divide students into small groups to allow them to sort and classify their questions. Instruct each student to write their questions on individual sticky notes and bring them to their group. As a team, students evaluate whether each question is important enough to warrant ongoing whole-class study, and whether or not it is interesting enough to sustain their peers' attention. Discuss each team's best questions with the whole class.



Dorrit Hoffleit
Asking Questions

Name_____ Date_____

YES Is it important? | YES Is it important?

NO Is it interesting? | YES Is it interesting?

NO Is it interesting? | YES Is it interesting?

NO Is it important? | NO Is it important?

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w | 07.1

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Disciplinary *Core Ideas*

Discipline: Earth and Space Science

Core Idea ESS1.A: The Universe and its Stars

Guiding Question

What is the universe, and what goes on in stars?

Description

The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from earth.

Performance Expectation

Students who demonstrate an understanding can support an argument that the apparent brightness of the sun and stars is due to their relative distances from the earth. (5.ESS1.1)

Overview

Stars are defined as "natural bodies that give off their own light." Astronomers have long compared stars based on their varying degrees of brightness.

There are a number of factors that affect how bright a star appears to us here on earth. One of the major factors is distance. The sun appears brighter than other stars because it is the closest to the Earth. Stars that are very far away appear smaller and dimmer because the light has to travel larger distances to reach us.

Even though these distant stars appear small and dull, many of them are actually very bright. This is because the ***apparent brightness*** of the star is affected by our location. Astronomers are more interested in a star's ***absolute brightness*** than how it appears to us on earth. Absolute brightness is a measure of how bright the star is compared to other stars while controlling for distance. Scientists measure absolute brightness by determining how bright the star would appear if it was 32.6 light-years from Earth. They also measure ***luminosity*** by measuring the amount of energy emitted from the star. Both of these methods provide ways of describing how bright stars are compared to one another. Factors such as the star's size and temperature impact its absolute brightness or luminosity.

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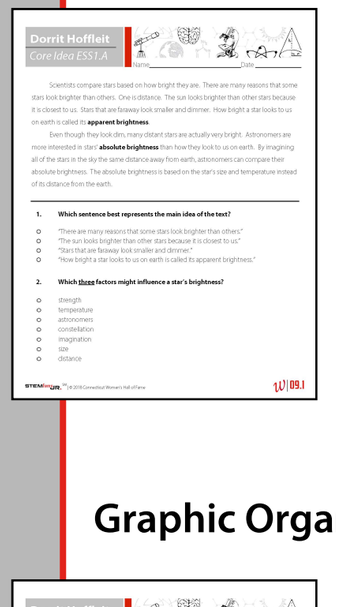
Student *Worksheets*


Dorrit Hoffleit
Core Idea ESS1.A

Name _____ Date _____

Scientists compare stars based on how bright they are. There are many reasons that some stars look brighter than others. One is distance. The sun looks brighter than other stars because it is closest to us. Stars that are faraway look smaller and dimmer. How bright a star looks to us on earth is called its **apparent brightness**.

Even though they look dim, many distant stars are actually very bright. Astronomers are more interested in stars' **absolute brightness** than how they look to us on earth. By imagining all of the stars in the sky the same distance away from earth, astronomers can compare their absolute brightness. The absolute brightness is based on the star's size and temperature instead of its distance from the earth.

1. **Which sentence best represents the main idea of the text?**
   - "There are many reasons that some stars look brighter than others."
   - "The sun looks brighter than other stars because it is closest to us."
   - "Stars that are faraway look smaller and dimmer."
   - "How bright a star looks to us on earth is called its apparent brightness."
2. **Which <u>three</u> factors might influence a star's brightness?**
   - strength
   - temperature
   - astronomers
   - constellation
   - imagination
   - size
   - distance

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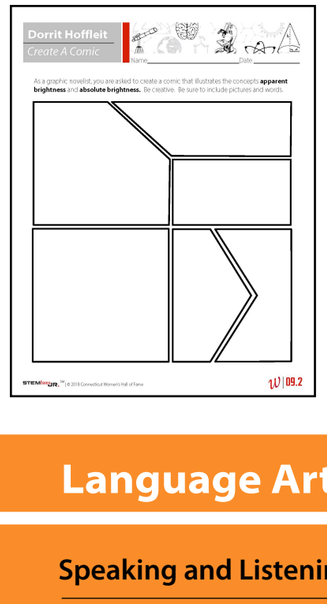
w | 09.1

Directions Introduce students to the terms apparent brightness and absolute brightness by assigning this brief reading passage and close reading questions.

Standard Determine two or more main ideas of a text. CCSS.ELA-LITERACY.RI.5.2


Dorrit Hoffleit
Create A Comic

Name _____ Date _____

As a graphic novelist, you are asked to create a comic that illustrates the concepts **apparent brightness** and **absolute brightness.** Be creative. Be sure to include pictures and words.

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w | 09.2

Directions Reinforce ideas about apparent and absolute brightness, while checking for understanding, by having students create their own comic.

Standard Determine the meaning of domain-specific words and phrases. CCSS.ELA-LITERACY.RI.5.4

Graphic Organizer


Dorrit Hoffleit
Research Notes

Name _____ Date _____

Title _____

Core Ideas & Cross-Cutting Concepts	Notes

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w | 09.3

Directions As students continue their research, they can take notes on this printable, using the column on the left to pull out the crosscutting concepts.

Standard Integrate information from several texts on the same topic. CCSS.ELA-LITERACY.RI.5.9

Language Arts: *Connections*

Speaking and Listening

Click the links for related videos.

- **Brainpop Jr.** | "Sun"
- **Brainpop** | "Life Cycle of Stars"
- **Crash Course for Kids** | "Glow On"

Reading Informational Text

Click the links for related reading passages.

- **NewsELA** | "How do stars form and evolve?"
- **CommonLit** | "When Stars Explode"

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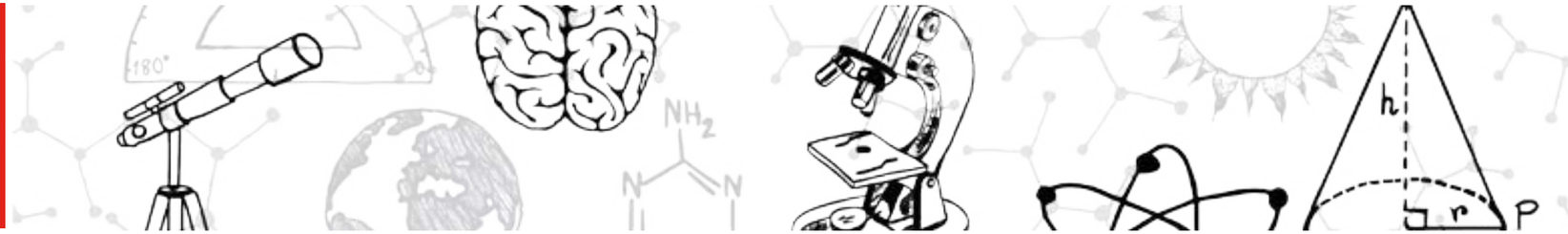
Crosscutting *Concepts*



Scale, Proportion, and Quantity	Students consider the effect of ***distance*** on the brightness of stars.
Cause and Effect	Students consider what other factors ***cause*** a star to appear bright or dim.
Energy and Matter	Students consider the ways that ***energy*** emitted from a star impacts its brightness.

Discussion Questions

Why is the sun the brightest star in our sky?

What impact does a star's size have on its absolute brightness?

What are the different phases in the life cycle of a star? What impact does each phase have on stars' absolute brightness?

How is the brightness of a star related to the energy it emits?

Activity: *Gallery Walk*

Directions Create anchor charts for each of the three cross-cutting concepts. On sticky notes, students write down how each concept relates to what they have learned about astronomy. After students place their sticky notes on the charts, provide time for them to read one another's thinking and respond directly on the chart with markers.

Standards Explain the relationships or interactions between two or more concepts or ideas in a scientific text based on specific information in the text. CCSS.ELA-LITERACY.RI.5.3

Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. CCSS.ELA-LITERACY.RI.5.9

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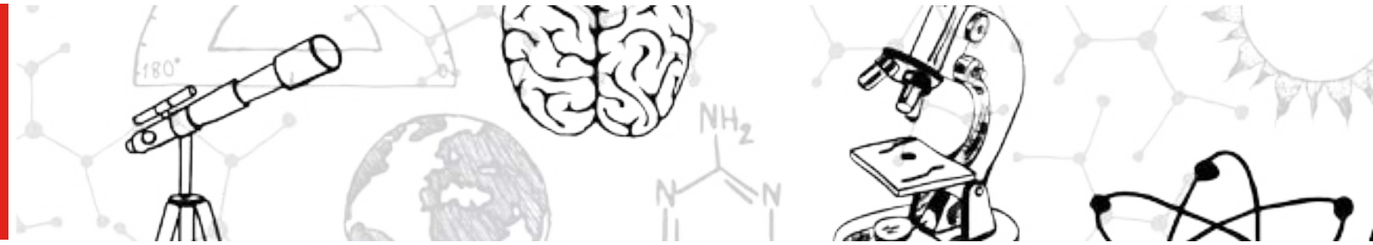
Science & Engineering

Practices

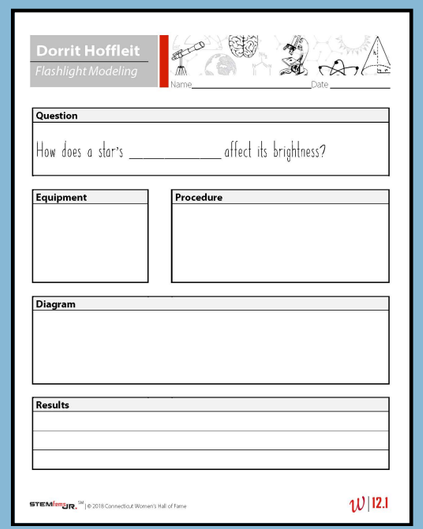


Developing and Using Models

Flashlight Modeling Activity

Provide students with flashlights, aluminum foil, wax paper, plastic film of various colors, and flashlight bulbs of various brightnesses. Have students design models that show how a star's distance from earth, size, temperature, and/or other factors affect their apparent brightness.

Encourage students to get creative with the materials available and consider how they might model each of the circumstances that they wish to test. For example, to model how a star's distance from earth impact's its apparent brightness, students may set up two flashlights with identical bulbs, each a different distance from the wall. When they turn on the flashlights, they can observe how the distance impacts the light we see. Similarly, if students want to model how a star's size might impact its apparent brightness, they can use one regular flashlight, and another that is covered with tin foil with only a small hole made for the light to pass through.



Dorrit Hoffleit

Flashlight Modeling

Name_____ Date_____

Question

How does a star's _____ affect its brightness?

Equipment

Procedure

Diagram

Results

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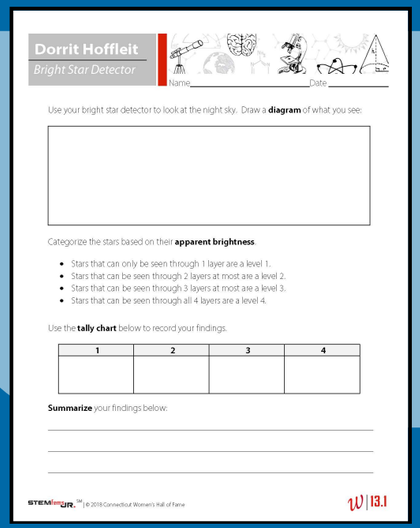

Dorrit Hoffleit

Bright Star Detector

Name_____ Date_____

Use your bright star detector to look at the night sky. Draw a **diagram** of what you see:

Categorize the stars based on their **apparent brightness**.

- Stars that can only be seen through 1 layer are a level 1.
- Stars that can be seen through 2 layers at most are a level 2.
- Stars that can be seen through 3 layers at most are a level 3.
- Stars that can be seen through all 4 layers are a level 4.

Use the **tally chart** below to record your findings.

1	2	3	4

Summarize your findings below:

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Planning & Carrying Out Investigations

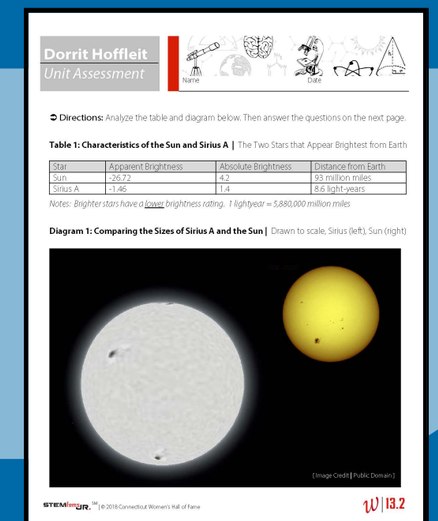
Make a Star Brightness Detector

Directions Invite students to investigate the apparent brightness of stars in the night sky by making a star brightness detector using simple materials and the directions provided by the editors of Publications International, LTD. at www.howstuffworks.com. Students can then record theif findings on the worksheet.

Engaging in Argument from Evidence

NGSS-Aligned Unit Assessment

Directions Students analyze data about the two stars that appear brightest from earth - the sun and Sirius A. Students then develop and support claims regarding the impact of distance on a star's apparent brightness. Questions are formatted in alignment with Connecticut's released NGSS Assessment items.



Dorrit Hoffleit

Unit Assessment

Name Date

➲ **Directions:** Analyze the table and diagram below. Then answer the questions on the next page.

Table 1: Characteristics of the Sun and Sirius A | The Two Stars that Appear Brightest from Earth

Star	Apparent Brightness	Absolute Brightness	Distance from Earth
Sun	-26.72	4.2	93 million miles
Sirius A	-1.46	1.4	8.6 light-years

Notes: Brighter stars have a lower brightness rating. 1 lightyear = 5,880,000 million miles

Diagram 1: Comparing the Sizes of Sirius A and the Sun | Drawn to scale, Sirius (left), Sun (right)

[Image Credit | Public Domain]

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Additional *Resources*

Interdisciplinary *Connections*

Nonfiction Writing

Create a Constellation Anthology

Directions Invite students to choose a constellation to research. Students might research the individual stars within the constellation, as well as the stories told about the constellation by different groups throughout history. Then, have students synthesize their findings with their knowledge of nonfiction writing in order to write about their chosen constellation. Students should include text features, such as diagrams, in their writing. As a class, compile each student's writing into a constellation anthology.

Visual Arts

Study Van Gogh's "Starry Night"

Directions Collaborate with the visual arts teacher at your school in order to create a truly interdisciplinary experience. Your art teacher may want to engage students in a study of Van Gogh's "Starry Night," analyzing his use of line to create a sense of movement throughout the piece. Students may then create their own images of starry skies, emulating Van Gogh's style, using oil pastels.

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Women *in Astronomy Today*

Sandra Faber

University Professor of Astronomy and Astrophysics

Faber discovered a connection between the brightness of galaxies and the movements of the stars inside of those galaxies. She was recently named one of the "50 Top Women in STEM." Click here to learn more about her accomplishments.

Aomawa Shields

University Professor of Physics and Astronomy

Shields explores whether or not other small planets are habitable. In 2016, she discovered that the planet Kepler 62f could have liquid water on its surace, and could possibly support life. Read more about Shields or use her TED-Ed lesson in your classroom.

Anjana Telidevara

Astrophysics Student, 2018 Hoffleit Research Fellow

Telidevara was selected by the Yale Department of Astronomy as a 2018 winner of the Hoffleit Research Fellowship, which is named in honor of none other than Dorrit Hoffleit. Telidevara's current research is on White Dwarf Stars. Click here to read more about her.

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References

Images & Resources

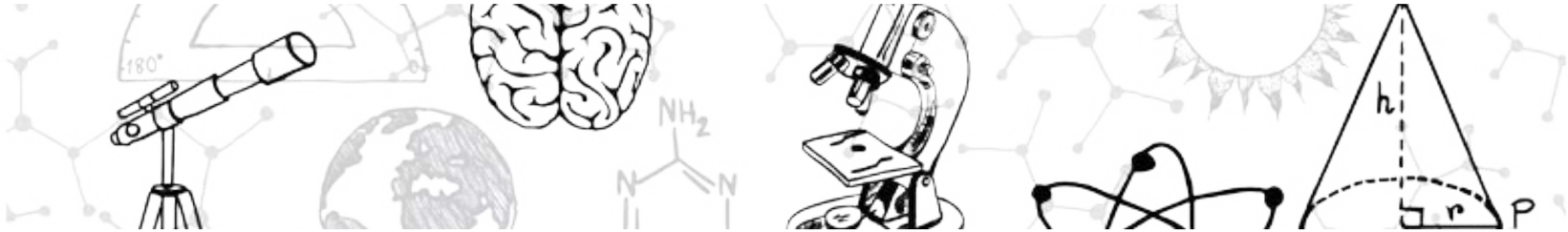

Image Credits

A Gallery Walk. 2016. Photograph. New York, NY. Parents Community Service Network.

Dorrit Hoffleit at the Mitchell Observatory. n.d. Photograph. Nantucket, Massachusetts. Nantucket Maria Mitchell Association.

Dorrit Hoffleit. 1973. Photograph. Stamford, Connecticut. American Association of Variable Star Observers.

Herbert and Dorrit. 1911. Photograph. Newcastle, Pennsylvania. American Association of Variable Star Observers.

Embedded Resources

Articles

"How Do Stars Form and Evolve?" 2017. *Newsela | Math & Science*. March 28.

Croswell, Ken. 2016. "When Stars Explode." *CommonLit.* CommonLit.

Videos

"Glow On: Crash Course Kids #20.2." 2015. *Crash Course Kids.* YouTube. August 3.

"Life Cycle of Stars." 2018. *BrainPOP.* BrainPOP.

"Sun." 2018. *BrainPOP Jr.* BrainPOP Jr.

Shields, Aomawa. "Should we be looking for life elsewhere in the universe?" Animated by Rémi Cans. Lessons Worth Sharing | TED-Ed, TED-Ed.

Resources

"Astronomer" n.d. CareerInSTEM. CareerInSTEM.

"Science Projects for Kids: The Incredible Universe." 2007. *Editors of Publications International, Ltd.* HowStuffWorks. November 17.

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References

"2018 Winners of Prestigious Hoffleit Research Fellowship Announced." *Department of Astronomy*, Yale University, 29 May 2018.

***A Framework for K-12 Science Education Practices, Crosscutting Concepts, and Core Ideas*. 2012. Washington, DC: NAP, National Acad. Pr.**

Barham, James. "50 Top Women in STEM." *The Best Schools*, TheBestSchools.org.

Deady, Kathleen W. 2013. "Ellen Dorrit Hoffleit: Astronomer." Essay. In *Women of the Constitution State,* 97–101. Amherst, NH: Apprentice Shop Books, LLC.

"Dr. Dorrit Hoffleit (1907-2007): World Renowned Astronomer and Bright Star Expert." Essay. In *STEMfems: Women Transforming Our World*, 52–55. New Haven, CT: Connecticut Women's Hall of Fame.

Howell, Elizabeth. 2017. "Brightest Stars: Luminosity & Magnitude." *Space.com*. Space.com. November 2. https://www.space.com/21640-star-luminosity-and-magnitude.html.

National Governors Association Center for Best Practices, Council of Chief State School Officers. *Common Core State Standards: English Language Arts*. 2010. Washington DC.: National Governors Association Center for Best Practices, Council of Chief State School Officers.

NGSS Lead States. 2013. *Next Generation Science Standards: For States, By States*. Washington, DC: The National Academies Press.

Opalko, Jane. 1994. "When Women Were 'Computers'" *Odyssey* 3, no. 3: 10. Primary Search, EBSCOhost. Accessed June 21, 2018.

Sallas, Jennifer. 2018. "What Affects the Brightness of Stars." Accessed June 21. https://betterlesson.com/lesson/639839/what-affects-the-brightness-of-stars#.

Sokol, Joshua. "Why the Universe Needs More Black and Latino Astronomers." *Smithsonian.com*, Smithsonian Institution, 23 Aug. 2016.

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Dorrit Hoffleit

Reading Passages

Name Date

Dorrit Hoffleit was born in 1907. She experienced **discrimination.** People did not like her because of who she was.

When Dorrit was born, her mom said "it's only a girl." She wanted a boy.

As Dorrit grew older, kids did not like her. Her family was German. The United States was at war against Germany. Kids did not trust Dorrit. They said she was the enemy.

Dorrit loved her older brother Herbert. Herbert was very smart. Dorrit was always compared to him. Herbert called her dumb.

When she was ten, Dorrit and her mom went for a walk. They ran into her teacher. The teacher said, "Dorrit isn't nearly as bright as her brother, is she?" Her mom said, "What can you expect? She's only a girl!" Dorrit felt like her mom did not believe in her.

Herbert went to Harvard College. He was only 15. Dorrit's mother did not want people to make fun of him for having a dumb sister. She let Dorrit go to Radcliffe College.

At Radcliffe, Dorrit studied math. She took two classes in **astronomy**. There, she learned about stars.

After graduation, Dorrit worked with **telescopes**. She became an expert at figuring out the **absolute brightness** of stars. She could figure out how bright stars really were, even if they were far away.

Dorrit became an expert **astronomer**. She showed that she could be smart, too.

Dorrit Hoffleit

Reading Passages

Name Date

Dorrit Hoffleit was born in 1907. Growing up, she experienced **discrimination.** People did not like her because of who she was.

When Dorrit was born, her mom complained "it's only a girl." She wanted to have a boy and was disappointed.

As Dorrit grew older, kids did not like her. Her family was German, and the United States was at war against Germany. Kids did not trust Dorrit. They often played war games and made her be the enemy. She felt left out.

Dorrit felt closest to her older brother Herbert. However, Herbert was considered very smart, and Dorrit was always compared to him. Even Herbert often teased her, calling her dumb.

When she was ten, Dorrit and her mom went for a walk. When they ran into her teacher, the teacher said, "Dorrit isn't nearly as bright as her brother, is she?" Dorrit did not mind. She loved her brother and agreed that he was special. It was her mom who hurt her feelings. Her mom said, "What can you expect? She's only a girl!" Dorrit felt like her mom did not believe in her.

Herbert's achievements did not make things easier for Dorrit. He went to Harvard College when he was only 15. Dorrit's mother did not want people to make fun of him for having a dumb sister, so she let Dorrit go to Radcliffe College.

At Radcliffe, Dorrit studied math. However, remembering a time when she observed **meteors** as a child, she took two classes in **astronomy**. There, she developed a love for the stars.

After graduation, Dorrit worked in the Harvard College **Observatory**. She became an expert at figuring out the **absolute brightness** of stars. This means she could figure out how bright stars really were, even if they were far away.

When she moved to a new job at Yale University in New Haven, Connecticut, she put this expertise to good use. Her major project was a revision of *The Bright Star Catalogue*. This book lists all the stars visible to the naked eye from earth. Dorrit became an expert **astronomer**. She continued researching until she died in 2007. She was 100 years old.

Dorrit Hoffleit

Reading Passages

Name Date

Dorrit Hoffleit was born in 1907. Growing up, she experienced **discrimination.** People did not like her because of who she was.

When Dorrit was born, her mom complained "it's only a girl." She wanted a boy and was disappointed.

As Dorrit grew older, kids did not like her. Her family was German, and the United States was at war against Germany. Kids did not trust Dorrit. They often played war games and made her be the enemy. She felt left out.

Dorrit felt closest to her older brother Herbert. However, Herbert was considered very smart, and Dorrit was always compared to him. Even Herbert often teased her, calling her dumb.

When she was ten, Dorrit and her mom went for a walk. When they ran into her teacher, the teacher said, "Dorrit isn't nearly as bright as her brother, is she?" Dorrit did not mind. She loved her brother and agreed that he was special. It was her mom who hurt her feelings. Her mom said, "What can you expect? She's only a girl!" Dorrit felt like her mom did not believe in her.

Herbert's achievements did not make things easier for Dorrit. He went to Harvard College when he was only 15. Dorrit's mother did not want people to make fun of him for having a dumb sister, so she let Dorrit go to Radcliffe College.

At Radcliffe, Dorrit studied math. However, remembering a time when she observed **meteors** as a child, she took two classes in **astronomy**. There, she developed a love for the stars.

After graduation, Dorrit worked at the Harvard College **Observatory**. She spent the weekends doing extra research on meteors. She earned both a Master's degree in astronomy and a Ph.D. from Radcliffe.

She became an expert at figuring out the **absolute brightness** of stars. This means she could figure out how bright stars really were, even if they were far away. When she moved to a new job at Yale University in New Haven, Connecticut, she put this expertise to good use. Her major project was a revision of *The Bright Star Catalogue*. This book lists all the stars visible to the naked eye from earth.

Dorrit became a world-class **astronomer**, proving that she was just as intelligent as her brother. She continued researching until her death in 2007 at the age of 100.

Dorrit Hoffleit

Reading Passages

Name Date

Dorrit Hoffleit was born in 1907. Growing up, she experienced **discrimination** based on her gender and ethnicity. Her parents had immigrated to the United States from Germany. Growing up during World War I, other kids were suspicious of her. They played war games and forced her to play the part of the enemy.

Things were not any better at home. From the moment Dorrit was born, her mom regarded her as less than her brother Herbert. Dorrit describes her birth as "a great disappointment to mother who said, 'The good Lord could not be good to me twice, it's only a girl.'"

Despite the constant comparisons, Dorrit loved Herbert. She thought that he was brilliant, and didn't mind when he teased her, calling her dumb. It was her mother's perspective that stung. When Dorrit was ten, she and her mom went for a walk. When they ran into her teacher, the teacher said, "Dorrit isn't nearly as bright as her brother, is she?" Dorrit did not mind; she agreed that he was special. However, when her mother replied, "What can you expect? She's only a girl," Dorrit was truly hurt.

Herbert's achievements did not make things easier for Dorrit. The family moved to Cambridge, Massachusetts so that he could attend Harvard College when he was only 15. Dorrit's mother was concerned that the other students would make fun of him for having a dumb sister, so after high school she let Dorrit go to Radcliffe College to spare Herbert the embarrassment.

At Radcliffe, Dorrit studied math. However, remembering a time when she observed **meteors** as a child, she took two classes in **astronomy,** which she enjoyed immensely. After graduation, Dorrit worked at the Harvard College **Observatory**. She spent the weekends doing extra research on meteors. She went on to earn both a Master's degree in astronomy and a Ph.D. from Radcliffe.

She became an expert at figuring out the **absolute brightness** of stars. This means she could figure out how bright stars really were, even if they appeared dim because they were far away. When she moved to a new job at Yale University in New Haven, Connecticut, she put this expertise to good use. Her major project was a revision of *The Bright Star Catalogue*. This book lists all the stars visible to the naked eye from earth.

Dorrit became a world-class **astronomer**. She won many awards and had an asteroid named after her as a present for her 80th birthday. She continued researching until her death in 2007 at age 100.

Dorrit Hoffleit

Reading Passages

Name Date

Dorrit Hoffleit was born in 1907. Growing up, she experienced **discrimination** based on her gender and ethnicity. Her parents had **immigrated** to the United States from Germany. Growing up during World War I, she found that other kids were often suspicious of her. They played war games and forced her to play the part of the enemy, leaving her isolated from her peers.

Things were not any better at home. From the moment Dorrit was born, her mom regarded her as less than her brother Herbert. Dorrit describes her birth as "a great disappointment to mother who said, 'The good Lord could not be good to me twice, it's only a girl.'"

Despite the constant comparisons throughout her childhood, Dorrit loved Herbert. She thought that he was brilliant, and didn't mind when he teased her, calling her dumb. It was her mother's perspective that stung. When Dorrit was ten, she and her mom went for a walk. When they ran into her teacher, the teacher said, "Dorrit isn't nearly as bright as her brother, is she?" Dorrit did not mind; she agreed that he was special. However, when her mother replied, "What can you expect? She's only a girl," Dorrit was hurt.

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At Radcliffe, Dorrit studied math. However, remembering a time when she observed **meteors** as a child, she took two classes in **astronomy**, which she enjoyed immensely.

After graduation, Dorrit was hired to work as a "computer" at the Harvard College **Observatory**. Computers were women workers who examined astronomical photographs and then computed the stars' positions. They were paid less than the men, who were allowed to do the actual observing. Despite this limited assignment, Hoffleit spent the weekends doing extra research on meteors. After impressing her superiors with her publication, she earned both a Master's degree in astronomy and a Ph.D. from Radcliffe.

Over time, she became an expert at determining the **absolute brightness** of stars. This means she could figure out how bright stars really were, even if they appeared dim because of their distance from the earth. When she moved to a new job at Yale University, in New Haven, Connecticut, she put this expertise to good use. Her major project was a revision of *The Bright Star Catalogue*. This book lists all 9,110 stars visible to the naked eye from earth.

Dorrit became a world-class **astronomer**, and mentored many young women at Yale who went on to also earn their Ph.Ds in astronomy. She was the recipient of many prestigious awards and even had an asteroid named after her as a present for her 80th birthday. She continued researching until her death in 2007 at the age of 100.

Dorrit Hoffleit

Reading Passages

Name Date

Dorrit Hoffleit was born in 1907. Growing up, she experienced **discrimination** based on her gender and ethnicity. She persevered, however, becoming one of the world's top astronomers and a mentor to many young scientists. Dr. Hoffleit specifically focused her efforts on encouraging young women to pursue their interest in math and science, helping to reverse some of the difficulties she had overcome.

As a young girl, Dorrit found that she was often isolated from her peers because of her ethnicity. Her parents had **immigrated** to the United States from Germany. When the United States entered into World War I against Germany, other kids were often suspicious of her, assuming she was an enemy spy. They played war games and forced her to play the part of the enemy,

Things were not any better at home. From the moment Dorrit was born, her mom regarded her as less than her brother Herbert. Dorrit describes her birth as "a great disappointment to mother who said, 'The good Lord could not be good to me twice, it's only a girl.'"

Despite the constant comparisons throughout her childhood, Dorrit loved Herbert. She thought that he was brilliant, and didn't mind when he teased her, calling her Lisien, a nickname that implied she was dumb. It was her mother's perspective that stung. When Dorrit was ten, she and her mom went for a walk. When they ran into her teacher, the teacher said, "Dorrit isn't nearly as bright as her brother, is she?" Dorrit did not mind; she agreed that Herbert was special. However, when her mother replied, "What can you expect? She's only a girl," Dorrit was truly hurt. It was only years later that Dorrit learned her mother intended to comment on the many barriers society places on girls' achievement, not on Dorrit's intelligence. All Dorrit heard was that her mother did not believe in her potential.

Herbert's achievements did not make things easier for Dorrit. The family moved to Cambridge, Massachusetts so that he could attend Harvard College when he was only 15. Dorrit's mother was concerned that the other students would make fun of him for having a dumb sister, so after high school she let Dorrit go to Radcliffe College to spare Herbert the embarrassment.

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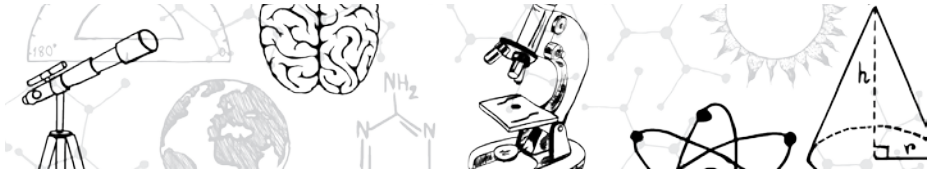
Over time, she became an expert at determining the **absolute brightness** of stars. This means she could figure out how bright stars really were, even if they appeared dim because of their distance from the earth. After working for the military for a time, calculating the trajectory of missiles, she eventually moved into a position at Yale University, in New Haven, Connecticut, where she put her expertise to good use. Her major project was a revision of *The Bright Star Catalogue*. This book lists all 9,110 stars visible to the naked eye from earth.

Dorrit became a world-class **astronomer** and mentored numerous young women at Yale who went on to also earn their Ph.Ds in astronomy. She was the recipient of many prestigious awards and even had an asteroid named after her as a present for her 80th birthday. She continued researching until her death in 2007 at age 100.

Dorrit Hoffleit

Close Reading



Name Date

1. Which detail from the text best shows that Dorrit's mother wanted a son?

- ○ "People did not like her because of who she was"
- ○ "When Dorrit was born, her mom said 'it's only a girl.'"
- ○ "Dorrit felt like her mom did not believe in her."
- ○ "Herbert went to Harvard College."

2. Read the sentence from the passage.

"The United States was at war against Germany."

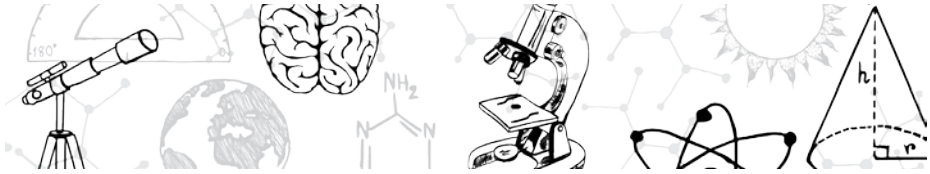
What was the purpose of including this sentence in the passage?

- ○ to show that Dorrit grew up during a difficult time in history
- ○ to show the reader when the story takes place
- ○ to show the reader why other kids did not trust Dorrit
- ○ to show why Dorrit lived in the United States

3. What can the reader infer about the brightness of stars? *Use evidence from the text to support your answer.*

Dorrit Hoffleit

Close Reading



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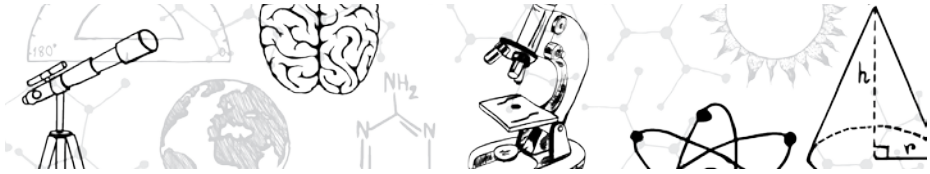
- ○ to show why Dorrit lived in the United States

3. What does the word <u>astronomy</u> most likely mean?

- ○ a women's college
- ○ a fancy classroom
- ○ the study of math
- ○ the study of outer space

4. What can the reader infer about the brightness of stars?

Dorrit Hoffleit
Close Reading



Name _____ Date _____

1. **Read the sentence from the passage.**

   "The good Lord could not be good to me twice, it's only a girl."

   What does this sentence tell the reader?

   _____

   _____

2. **Read the sentence from the passage.**

   "Her parents had immigrated to the United States from Germany."

   What was the purpose of including this sentence in the passage?

- ○ to show that Dorrit was a first-generation American
- ○ to show the reader where the story takes place
- ○ to show the reader why other kids did not trust Dorrit
- ○ to show why Dorrit lived in the United States

3. **Highlight one sentence in the passage that you think <u>best</u> supports the idea that in the Hoffleit family, Herbert's needs were prioritized over Dorrit's.**

4. **What does the word <u>astronomy</u> most likely mean?**
- ○ a women's college
- ○ a fancy classroom
- ○ the study of math
- ○ the study of outer space

5. **What can the reader infer about the brightness of stars?**

_____

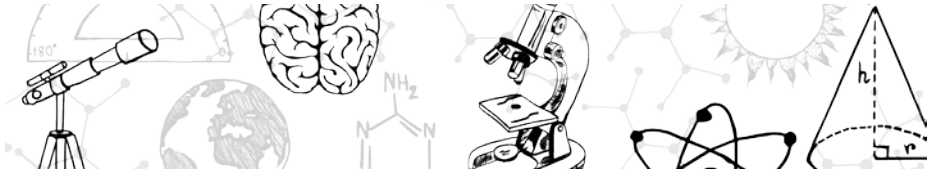
_____

_____

_____

1. **Read the sentence from the passage.**

Dorrit Hoffleit
Close Reading



Name _____ Date _____

"The good Lord could not be good to me twice, it's only a girl."

What does this sentence tell the reader?

_____

_____

2. Read the sentence from the passage.

"Her parents had immigrated to the United States from Germany."

What's the purpose of including this sentence in the passage?

- ○ to show that Dorrit was a first-generation American
- ○ to show the reader where the story takes place
- ○ to show the reader why other kids did not trust Dorrit
- ○ to show why Dorrit lived in the United States

3. Highlight one sentence in the passage that you think <u>best</u> supports the idea that in the Hoffleit family, Herbert's needs were prioritized over Dorrit's.

4. Which sentence best shows that women were not given the same opportunities in astronomy as men?

- ○ "From the moment Dorrit was born, her mom regarded her as less than her brother Herbert."
- ○ "Computers were women workers who examined astronomical photographs and then computed stars' positions."
- ○ "They were paid less than the men, who were allowed to do the actual observing."
- ○ "Dorrit mentored many young women at Yale who went on to also earn their Ph.Ds. in astronomy."

5. What can the reader infer about the brightness of stars?

_____

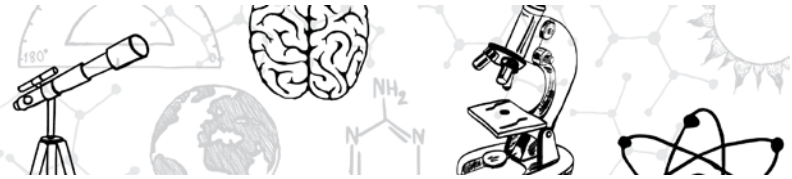
_____

_____

_____

Dorrit Hoffleit

3›2›1 Word Cloud



Name _____ Date _____

➲ **Directions:** Choose 3 words, 2 phrases, and 1 sentence from the text that you think best represent who Dorrit Hoffleit was and what she was all about. Then, share your ideas with your team and combine them to make a "word cloud."

3

WORDS

1. _____
2. _____
3. _____

2

PHRASES

1. _____
2. _____

1

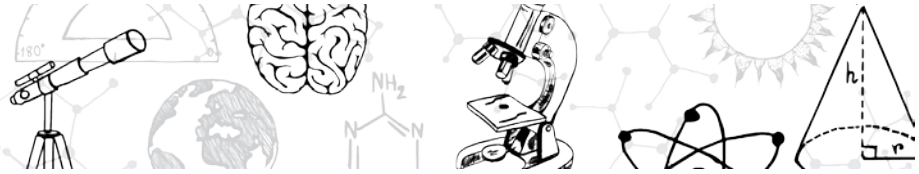
SENTENCE

1. _____

_____

Dorrit Hoffleit

Asking Questions



Name_____ Date _____

YES
Is it important?

YES
Is it important?

NO
Is it interesting?

YES
Is it interesting?

NO
Is it interesting?

YES
Is it interesting?

NO
Is it important?

NO
Is it important?

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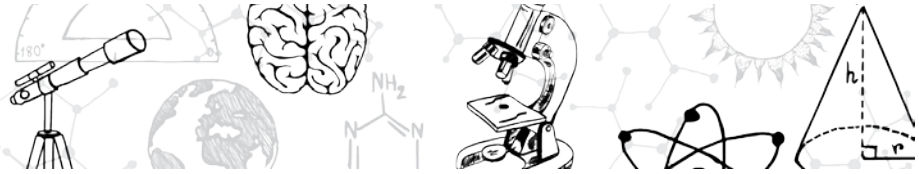
Dorrit Hoffleit

Core Idea ESS1.A



Name_____Date _____

Scientists compare stars based on how bright they are. There are many reasons that some stars look brighter than others. One is distance. The sun looks brighter than other stars because it is closest to us. Stars that are faraway look smaller and dimmer. How bright a star looks to us on earth is called its **apparent brightness**.

Even though they look dim, many distant stars are actually very bright. Astronomers are more interested in stars' **absolute brightness** than how they look to us on earth. By imagining all of the stars in the sky the same distance away from earth, astronomers can compare their absolute brightness. The absolute brightness is based on the star's size and temperature instead of its distance from the earth.

---

1. Which sentence best represents the main idea of the text?

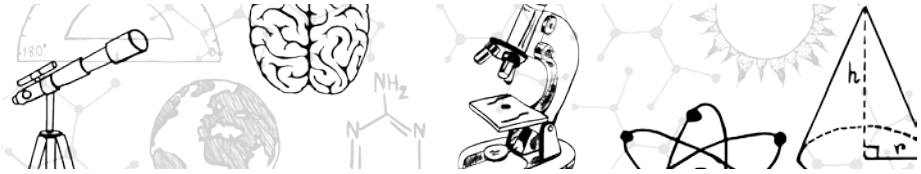
- O "There are many reasons that some stars look brighter than others."
- O "The sun looks brighter than other stars because it is closest to us."
- O "Stars that are faraway look smaller and dimmer."
- O "How bright a star looks to us on earth is called its apparent brightness."

2. Which <u>three</u> factors might influence a star's brightness?

- O strength
- O temperature
- O astronomers
- O constellation
- O imagination
- O size
- O distance

Dorrit Hoffleit

Create A Comic

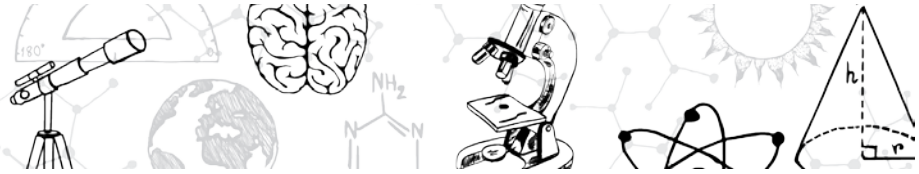


Name_____Date _____

As a graphic novelist, you are asked to create a comic that illustrates the concepts **apparent brightness** and **absolute brightness.** Be creative. Be sure to include pictures and words.

Dorrit Hoffleit

Research Notes



Name_____Date _____

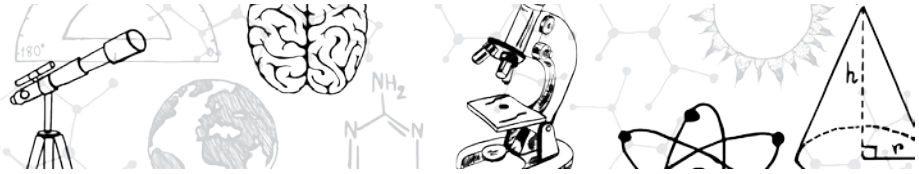
Title

Core Ideas & Cross-Cutting Concepts

Notes

Dorrit Hoffleit

Flashlight Modeling



Name_____Date _____

Question

How does a star's _____ affect its brightness?

Equipment

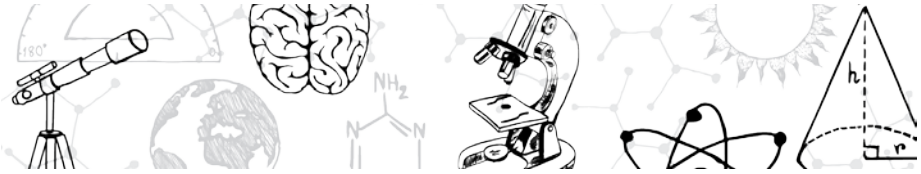
Procedure

Diagram

Results

Dorrit Hoffleit

Bright Star Detector



Name_____Date _____

Use your bright star detector to look at the night sky. Draw a **diagram** of what you see:

Categorize the stars based on their **apparent brightness**.

- Stars that can only be seen through 1 layer are a level 1.
- Stars that can be seen through 2 layers at most are a level 2.
- Stars that can be seen through 3 layers at most are a level 3.
- Stars that can be seen through all 4 layers are a level 4.

Use the **tally chart** below to record your findings.

1	2	3	4

Summarize your findings below:

_____

_____

_____

Dorrit Hoffleit

Unit Assessment

Name Date

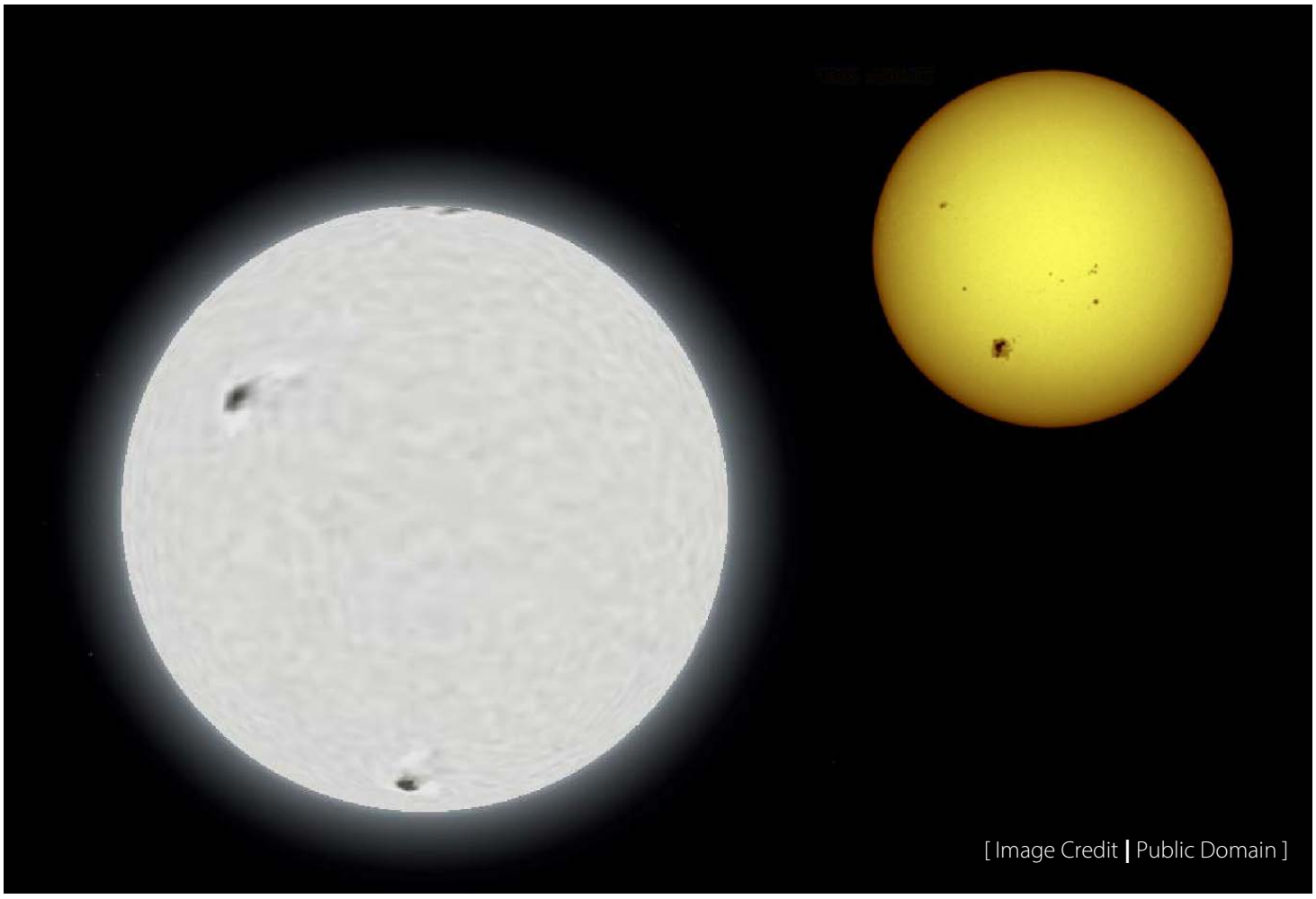
➲ **Directions:** Analyze the table and diagram below. Then answer the questions on the next page.

Table 1: Characteristics of the Sun and Sirius A | The Two Stars that Appear Brightest from Earth

Star	Apparent Brightness	Absolute Brightness	Distance from Earth
Sun	-26.72	4.2	93 million miles
Sirius A	-1.46	1.4	8.6 light-years

Notes: Brighter stars have a lower brightness rating. 1 lightyear = 5,880,000 million miles

Diagram 1: Comparing the Sizes of Sirius A and the Sun | Drawn to scale, Sirius (left), Sun (right)



[Image Credit | Public Domain]

➲ **Part A:** Using the information provided in the table and the diagram, what is the most likely reason that the sun is the brightest star in our sky?

- ○ The sun is the largest star in the sky.
- ○ The sun gives off more energy than any other star in the sky.
- ○ The sun is the closest star in the sky.
- ○ The sun is the newest star in the sky.

➲ **Part B:** Read the sentence frames below. Choose the words and phrases that best fill in each blank to form a true statement about the sun.

The sun ___○ is / ○ appears to be___ ___○ brighter / ○ dimmer___ than the stars in the night sky because ___○ of its relative distance from the earth / ○ of its absolute brightness___.

➲ **Part C:** Check the boxes to identify whether or not each statement provides evidence to support your claim in Part B.

Evidence	Supports Claim	Does Not Support Claim
The sun has a lower apparent brightness rating.	☐	☐
The sun has a higher absolute brightness rating.	☐	☐
The sun is closer to the earth.	☐	☐
The sun is smaller than Sirius A.	☐	☐