

Good Vibrations

Fill in the circle to complete the sentence. Then answer questions 3, 4, and 5.

1. A rocket launching is an example of a _____.
 (A) loud sound that damages hearing
 (B) hearing range
 (C) hearing loss
 2. Sound vibrations cause _____.
 (A) a wide hearing range
 (B) the cochlea to fill with fluid
 (C) the eardrum to vibrate
 3. What question do paragraphs 2 and 3 answer?
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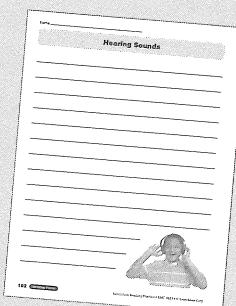
4. Give your own example of an occasion when hearing is especially important.
-
-

5. Does this text explain how hearing can be regained if it is lost? Why do you think that is?
-
-

Write About the Topic

Use the Writing Form to write about what you read.

Make a list of five sounds that you think might damage your hearing. Tell what you can do about each of them.



Annie Jump Cannon, Astronomer

Level 1 ■

Words to Know list, Reading Selection, and Reading Comprehension questions

Name _____

Counting the Stars

Fill in the circle to complete the sentence.

Counting the Stars

Living things have a life cycle. They are born, grow, and die. Even though stars are not living things, they may have a life cycle. A star is born in a blue hot glow. It is yellow. It cools and becomes red over time. Finally, the star explodes. The star is then called an supernova.

Annie Jump Cannon was born in 1863. She never taught her about the constellations when she was a girl. Annie was interested in stars when she was a young girl. But not many women studied stars back then. It was hard for Annie to find anyone to help her. Also, Annie had an illness that caused her to lose most of her hearing. But these things didn't stop Annie from becoming an astronomer.

Annie was hired to work at the Harvard College Observatory. Astronomers there took telescopes and took photographs of the sky. It was an exciting new job.

The Harvard Observatory soon needed a person in the telescope room. That person was Annie. She had to separate the stars in the telescope room. She separated them by color. Annie studied the colors of each kind of star. She could not see the colors. She usually saw only different dark lines. She had to learn to classify stars from younger stars to older and older stars.

Annie Jump Cannon classified more than 300,000 stars. Her catalog will be used by astronomers all over the world. In 1934, an award was given to Annie. Annie became an Astronomer of the Year. It is given to a woman astronomer from around the world every year.

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Words to Know

Counting the Stars

life cycle
middle-aged
explodes
astronomers
classified
constellations
college
degrees
observatory
telescopes
photographs
prism
separated
catalog

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Level 2 ■■

Words to Know list, Reading Selection, and Reading Comprehension questions

Name _____

Star Catalog

Fill in the circle to complete the sentence.

Star Catalog

Living things have a life cycle. They are born, grow, and die. Stars are not living things, but they do have a life cycle. A star is born in a cloud of dust and gas. It grows longer as it grows older. A young star is blue hot. As it grows older, it uses up its energy. It becomes older and bigger. Finally, the star explodes. It is then called a supernova.

Annie Jump Cannon was an American astronomer who classified stars by their temperature. Annie Jump Cannon was an American astronomer who classified stars by their temperature. Annie Jump Cannon was an American astronomer who classified stars by their temperature.

Annie Jump Cannon was born in 1863. Her mother taught her about the constellations when she was a girl. As a young woman, Annie studied stars. She studied stars because not many women went to college in those days. Also, Annie had an illness that caused her to lose most of her hearing. But these things didn't stop her from earning two college degrees.

Annie was hired to work at the Harvard College Observatory. Astronomers there took telescopes and took photographs of the sky. It was an exciting new job.

The light from each star passed through a prism in the telescope. The prism separated the light into a rainbow of colors, called a spectrum. Photos were black and white in those days. But Cannon took color photos in each spectrum and placed them side-by-side. She classified stars from younger stars to older ones.

During her career, Annie Jump Cannon classified more than 300,000 stars. In 1925, Annie Jump Cannon became the first woman to receive an Oxford University degree. She was given a degree with the title "D.Sc."

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Words to Know

Star Catalog

life cycle
energy
explodes
white dwarf
supernova
astronomers
classified
temperature
constellations
college
degrees
observatory
telescopes
photographs
existing
prism
catalog

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Level 3 ■■■

Words to Know list, Reading Selection, and Reading Comprehension questions

Name _____

Classifying the Stars

Fill in the circle to complete the sentence.

Classifying the Stars

Living things have a life cycle. They are born, grow, and die. Stars are not living things, but they do have a life cycle. A star is born in a cloud of dust and gas. It grows longer as it grows older. A young star is blue hot. As it grows older, it uses up its energy. It becomes older and bigger. Finally, the star explodes. It is then called a supernova.

Annie Jump Cannon was born in 1863. She became interested in astronomy when her mother taught her about the constellations. Sometime in her youth, Annie had an illness that caused her to lose most of her hearing. It didn't stop her from learning new technologies. She also learned to take photographs.

Cannon was hired to work at the Harvard College Observatory. Astronomers there took telescopes and photographs to collect information about individual stars. It was an exciting new science.

Cannon created a system for classifying stars. She took photographs with a prism. Light from stars shone through a prism in the telescope. The prism separated the light into a band of colors, called a spectrum. Photos were black and white in those days. But Cannon took color photos in each spectrum and placed them side-by-side. She classified stars from younger stars to older ones.

During her career, Annie Jump Cannon classified more than 300,000 stars. In 1925, Annie Jump Cannon became the first woman to receive an Oxford University degree. She was given a degree with the title "D.Sc."

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Words to Know

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spectrum

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Assemble the Unit

Reproduce and distribute one copy for each student:

- Visual Literacy page: Annie Jump Cannon Timeline, page 111
- Level 1, 2, or 3 Reading Selection and Reading Comprehension page and the corresponding Words to Know list
- Graphic Organizer of your choosing, provided on pages 180–186
- Writing Form: The Work of Annie Jump Cannon, page 112

Introduce the Topic

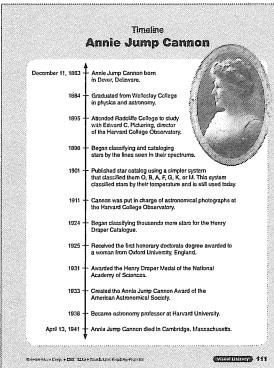
Review the timeline with students. Explain that in Annie Jump Cannon's time, astronomers used a new technology—photography—to study the stars. Her huge volume of work is still used by astronomers today.

Read and Respond

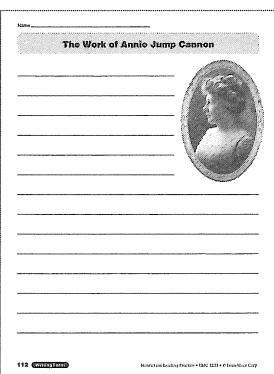
Form leveled groups and review the Words to Know lists with each group of students. Instruct each group to read their selection individually, in pairs, or as a group. Have students complete the Reading Comprehension page for their selection.

Write About the Topic

Read aloud the leveled writing prompt for each group. Tell students to use the Graphic Organizer to plan their writing. Direct students to use their Writing Form to respond to their prompt.



Timeline
Annie Jump Cannon



Writing Form

Timeline

Annie Jump Cannon

- December 11, 1863 — Annie Jump Cannon born in Dover, Delaware.
- 1884 — Graduated from Wellesley College in physics and astronomy.
- 1895 — Attended Radcliffe College to study with Edward C. Pickering, director of the Harvard College Observatory.
- 1896 — Began classifying and cataloging stars by the lines seen in their spectrums.
- 1901 — Published star catalog using a simpler system that classified them O, B, A, F, G, K, or M. This system classified stars by their temperature and is still used today.
- 1911 — Cannon was put in charge of astronomical photographs at the Harvard College Observatory.
- 1924 — Began classifying thousands more stars for the Henry Draper Catalogue.
- 1925 — Received the first honorary doctorate degree awarded to a woman from Oxford University, England.
- 1931 — Awarded the Henry Draper Medal of the National Academy of Sciences.
- 1933 — Created the Annie Jump Cannon Award of the American Astronomical Society.
- 1938 — Became astronomy professor at Harvard University.
- April 13, 1941 — Annie Jump Cannon died in Cambridge, Massachusetts.



Name _____

The Work of Annie Jump Cannon



Words to Know

Counting the Stars

life cycle
middle-aged
explodes
astronomers
classified
constellations
college
degrees
observatory
telescopes
photographs
prism
separated
catalog

Annie Jump Cannon,
Astronomer ■■



Words to Know

Star Catalog

life cycle
energy
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Annie Jump Cannon,
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Words to Know

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Annie Jump Cannon,
Astronomer ■■■■

Counting the Stars

Living things have a life cycle. They are born, grow, and die. Even though stars are not living things, they do have a life cycle. A star is born in a cloud of dust and gas. A young star is blue and very hot. A middle-aged star is yellow. It cools and becomes a red giant. Finally, the star explodes. The light of a star tells astronomers many things about the star. Annie Jump Cannon was an American astronomer who carefully classified stars by looking at their light.

Annie Jump Cannon was born in 1863. Her mother taught her about the constellations when she was a girl. Annie was interested in studying the stars when she grew up. But not many women went to college in those days. Also, Annie had an illness that caused her to lose most of her hearing. But these things didn't stop Annie from earning two college degrees.

Cannon was hired to work at the Harvard College Observatory. Astronomers there used telescopes and took photographs of the sky. It was an exciting new science.

The light from each star passed through a prism in the telescope. A prism is a piece of cut glass. Light passing through a prism is separated into a rainbow. Cannon studied the photos of each band of colors. Early photos were black and white. She could not see the colors. She could only see different dark lines. She used the lines to classify stars from younger and very hot to older and cooler.

Annie Jump Cannon classified more than 300,000 stars! Her star catalog is still used by astronomers all over the world. During her lifetime, Cannon received many honors. In 1934, an award was named for her. The Annie J. Cannon Award in Astronomy is given every year. It is given to a woman astronomer from North America.



Annie Jump Cannon at work, classifying stars

© NASA

Counting the Stars

Fill in the circle to complete the sentence. Then answer questions 3, 4, and 5.

1. In an observatory, you would find _____.
Ⓐ astronauts at work
Ⓑ astronomers at work
Ⓒ red giants at work
2. A prism can _____.
Ⓐ separate light into colors
Ⓑ take a photograph
Ⓒ cut through glass
3. What talents do you think Cannon possessed in order to do her job?

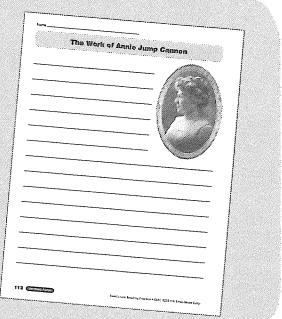
4. How do you know Cannon's work was important? Give two reasons.

5. If you could interview Annie Jump Cannon, what would you ask her?

Write About the Topic

Use the Writing Form to write about what you read.

Annie J. Cannon received many awards for her work.
If you gave her an award, what would your speech say?



Star Catalog

Living things have a life cycle. They are born, grow, and die. Stars are not living things, but they do have a life cycle. A star is born in a cloud of dust and gas. A star grows larger as it grows older. A young star is very hot. It cools as it uses up its energy. It becomes a red giant. Finally, the star explodes. It may become a white dwarf, a supernova, or even a black hole. The light of a star can tell astronomers many things about the star. Annie Jump Cannon was an American astronomer who classified stars by their temperature.

Annie Jump Cannon was born in 1863. Her mother taught her about the constellations when she was a girl. As a young woman, she was interested in studying the stars. Not many women went to college in those days. Also, Annie had an illness that caused her to lose most of her hearing. But these things didn't stop her from earning two college degrees.

Cannon was hired to work at the Harvard College Observatory. Astronomers there collected information about the light of individual stars. They used telescopes and took photographs of the sky. It was an exciting new science.

The light from each star passed through a prism in the telescope. A prism is a piece of cut glass. Light passing through a prism is split up into a rainbow of colors. Cannon carefully studied the photos of each star's band of colors. Because early photos were black and white, she could not see the colors. She could only see different lines. Using the lines, she could classify stars from younger and very hot to older and cooler. Her system gave each star a letter: O, B, A, F, G, K, or M. During her career, Annie Jump Cannon classified more than 300,000 stars. Her star catalog is still used by astronomers all over the world.



© NASA

Annie Jump Cannon working at her desk in the Harvard College Observatory

Star Catalog

Fill in the circle to complete the sentence. Then answer questions 3, 4, and 5.

1. Annie Jump Cannon's system used letters to _____.
Ⓐ name the constellations
Ⓑ name the stars in the photographs
Ⓒ classify stars by their temperature
2. As a star gets older, it _____.
Ⓐ gets hotter
Ⓑ cools
Ⓒ grows smaller
3. What traits do you think Cannon possessed in order to do her job?

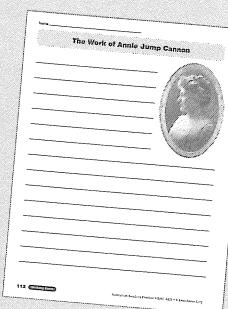
4. What are some of the things an astronomer might do? Give three examples.

5. Which idea from the text would you like to read a book about?

Write About the Topic

Use the Writing Form to write about what you read.

Write a list of the tools you think were useful to Annie Jump Cannon in her work.



Classifying the Stars

Living things have a life cycle. They are born, grow, and die. Stars are not living things, but they do have a life cycle. A star is born in a cloud of dust and gas, and grows larger as it grows older. A young blue star is very hot. It cools as it uses up its energy, becoming a red giant. Finally, the star explodes. It may become a white dwarf, a supernova, or even a black hole. Astronomers study a star's light to learn about the star. Annie Jump Cannon was an American astronomer whose system of classifying the stars is still used today.

Annie Jump Cannon was born in 1863. She became interested in astronomy as a young girl, when her mother taught her about the constellations. Sometime in her youth, Annie Cannon had an illness that caused her to lose most of her hearing. It didn't stop her from earning two college degrees. She also learned to take photographs, which was a new technology at the time.

Cannon was hired to work at the Harvard College Observatory. Astronomers there were using telescopes and photographs to collect information about individual stars. It was an exciting new science.

Cannon created a system for classifying stars by their temperatures. The light from each star passed through a prism in the telescope. The prism separated the light into a band of colors (like a rainbow), called a spectrum. Photos were black and white in those days. But Cannon studied the number and placement of lines in each spectrum photo. She classified stars from younger and very hot to older and cooler.

During her career, Cannon classified more than 300,000 stars! In 1925, Annie Jump Cannon became the first woman to receive a special honor from Oxford University. She was given a degree with the title "Doctor."



Annie Jump Cannon received an honorary degree from Oxford University, England, in 1925.