Name _____

Ecosystem Balance

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. According to the diagram, _____.
   - Ⓐ giraffes have no predators
   - Ⓑ lions feed on their own species
   - Ⓒ cheetahs and rhinoceroses compete with each other
   - Ⓓ giraffes and elephants compete with each other

2. The last paragraph of the text provides questions that _____.
   - Ⓐ the author and readers should know the exact answers to
   - Ⓑ encourage thinking about an organism's role in its ecosystem
   - Ⓒ are related to a situation that is absolutely impossible
   - Ⓓ are meant to make the reader think mainly about parasitism

3. Explain why predation and competition are not considered symbiosis.

_____

_____

4. What would happen if only one species at the top of the food chain were to disappear?

_____

_____

5. According to the diagram, which animals are in competition with each other?

_____

_____

Write About the Topic

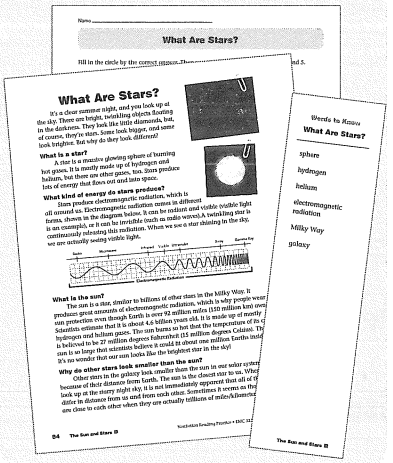
Use the Writing Form to write about what you read.

Write about why the balance of different species in an ecosystem is important. Use details and examples.

The Sun and Stars

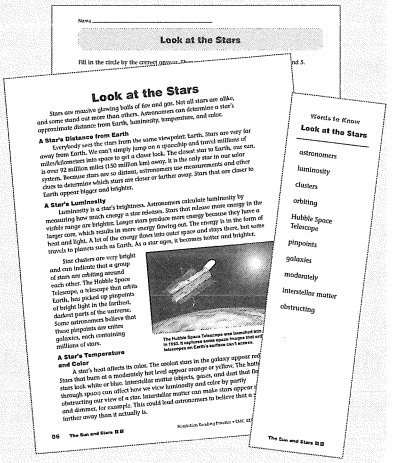
Level 1 ■

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



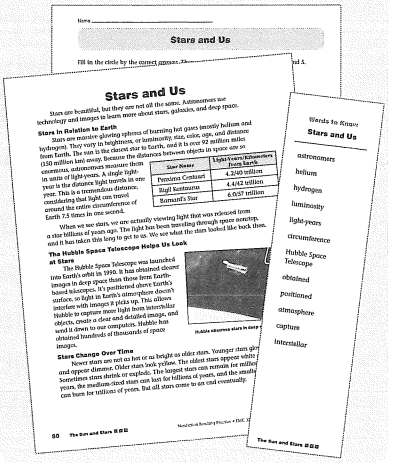
Level 2 ■■

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



Level 3 ■■■

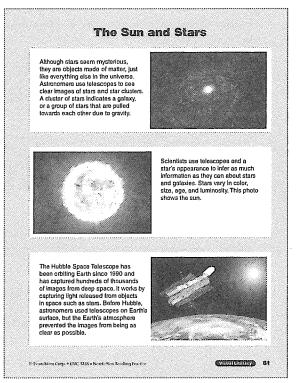
Words to Know list, Reading Selection, and Reading Comprehension questions



Assemble the Unit

Reproduce and distribute one copy for each student:

- Visual Literacy page: The Sun and Stars, page 81
- 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 Sun and Stars, page 82



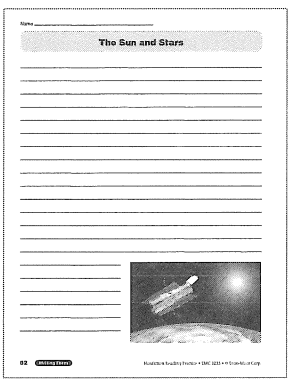
Visual Literacy

Introduce the Topic

Read aloud and discuss the text and photographs of the stars, the sun, and the Hubble Space Telescope. Explain that stars vary in their heat, size, age, brightness, color, and distance from Earth. Point out that the sun is the only star in our solar system. Ask students if the sun is the biggest, brightest star they have ever seen in the sky.

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.



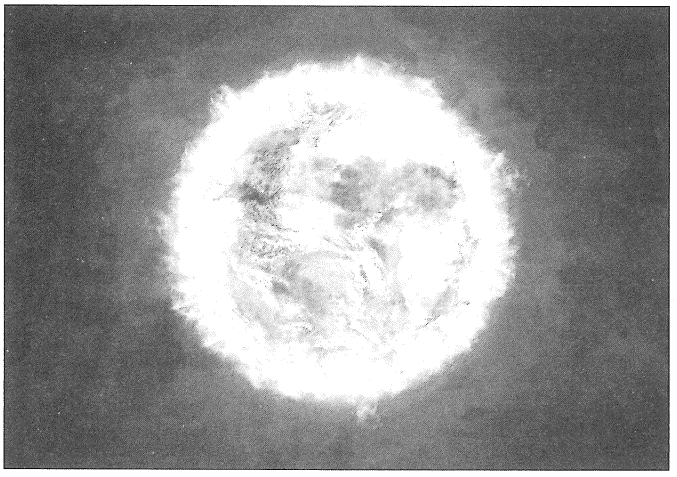
Writing Form

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.

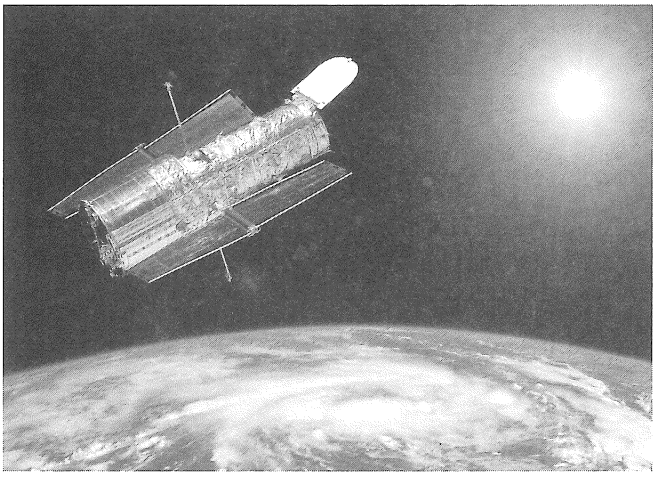
The Sun and Stars

Although stars seem mysterious, they are objects made of matter, just like everything else in the universe. Astronomers use telescopes to see clear images of stars and star clusters. A cluster of stars indicates a galaxy, or a group of stars that are pulled towards each other due to gravity.



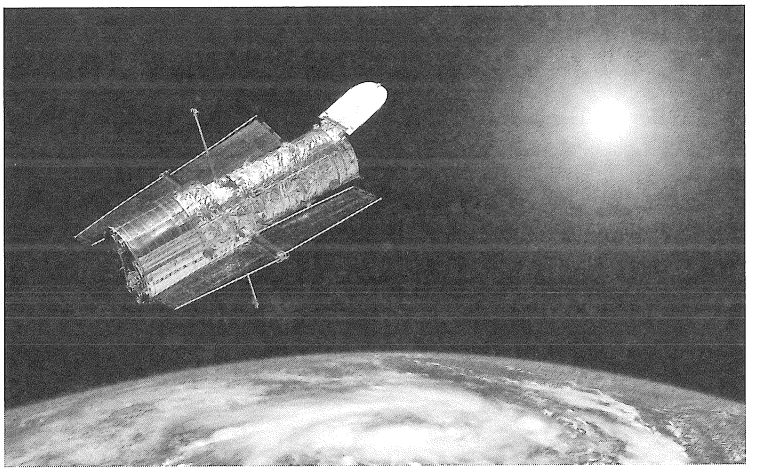
Scientists use telescopes and a star's appearance to infer as much information as they can about stars and galaxies. Stars vary in color, size, age, and luminosity. This photo shows the sun.

The Hubble Space Telescope has been orbiting Earth since 1990 and has captured hundreds of thousands of images from deep space. It works by capturing light released from objects in space such as stars. Before Hubble, astronomers used telescopes on Earth's surface, but the Earth's atmosphere prevented the images from being as clear as possible.



Name _____

The Sun and Stars



Words to Know

What Are Stars?

sphere

hydrogen

helium

electromagnetic radiation

Milky Way

galaxy

The Sun and Stars ■

Words to Know

Look at the Stars

astronomers

luminosity

clusters

orbiting

Hubble Space Telescope

pinpoints

galaxies

moderately

interstellar matter

obstructing

The Sun and Stars ■■

Words to Know

Stars and Us

astronomers

helium

hydrogen

luminosity

light-years

circumference

Hubble Space Telescope

obtained

positioned

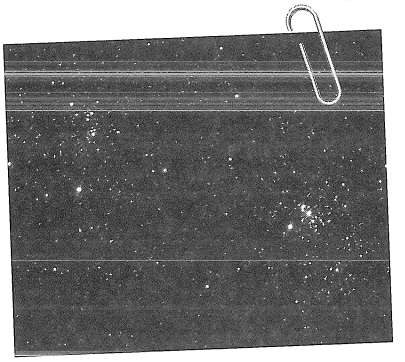
atmosphere

capture

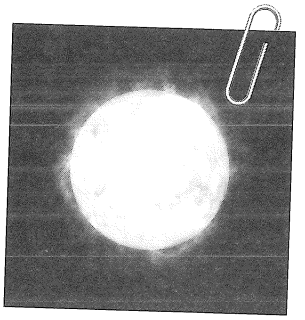
interstellar

The Sun and Stars ■■■

What Are Stars?



It's a clear summer night, and you look up at the sky. There are bright, twinkling objects floating in the darkness. They look like little diamonds, but, of course, they're stars. Some look bigger, and some look brighter. But why do they look different?

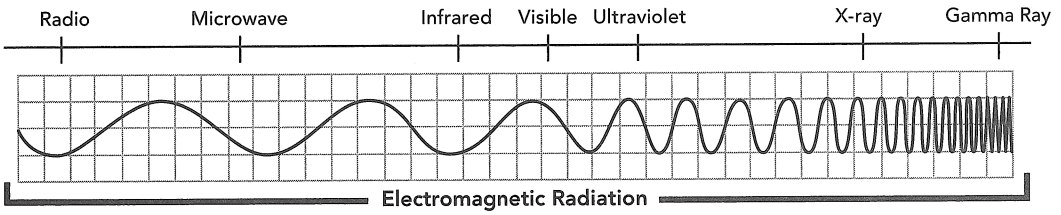


What is a star?

A star is a massive glowing sphere of burning hot gases. It is mostly made up of hydrogen and helium, but there are other gases, too. Stars produce lots of energy that flows out and into space.

What kind of energy do stars produce?

Stars produce electromagnetic radiation, which is all around us. Electromagnetic radiation comes in different forms, shown in the diagram below. It can be radiant and visible (visible light is an example), or it can be invisible (such as radio waves). A twinkling star is continuously releasing this radiation. When we see a star shining in the sky, we are actually seeing visible light.



What is the sun?

The sun is a star, similar to billions of other stars in the Milky Way. It produces great amounts of electromagnetic radiation, which is why people wear sun protection even though Earth is over 92 million miles (150 million km) away. Scientists estimate that it is about 4.6 billion years old. It is made up of mostly hydrogen and helium gases. The sun burns so hot that the temperature of its core is believed to be 27 million degrees Fahrenheit (15 million degrees Celsius). The sun is so large that scientists believe it could fit about one million Earths inside it. It's no wonder that our sun looks like the brightest star in the sky!

Why do other stars look smaller than the sun?

Other stars in the galaxy look smaller than the sun in our solar system because of their distance from Earth. The sun is the closest star to us. When we look up at the starry night sky, it is not immediately apparent that all of the stars differ in distance from us and from each other. Sometimes it seems as though stars are close to each other when they are actually trillions of miles/kilometers apart.

Name _____

What Are Stars?

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. According to the text, stars _____.
   - Ⓐ range in size and in distance from Earth
   - Ⓑ are all the same distance from Earth
   - Ⓒ are all the same size and temperature
   - Ⓓ can be seen only with a telescope

2. The diagram shows that electromagnetic radiation _____.
   - Ⓐ is everywhere we go
   - Ⓑ is always visible
   - Ⓒ moves in a straight line
   - Ⓓ moves in waves

3. Explain what the sun is composed of.

   _____

   _____

4. What effect does the distance from Earth have on how stars appear to us?

   _____

   _____

5. Explain which forms of electromagnetic radiation you are familiar with and how.

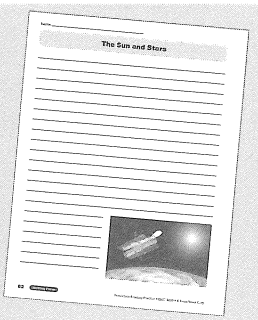
   _____

   _____

Write About the Topic

Use the Writing Form to write about what you read.

Compare and contrast the sun in our solar system to the other stars in the galaxy. Use details and examples from the text.



Look at the Stars

Stars are massive glowing balls of fire and gas. Not all stars are alike, and some stand out more than others. Astronomers can determine a star's approximate distance from Earth, luminosity, temperature, and color.

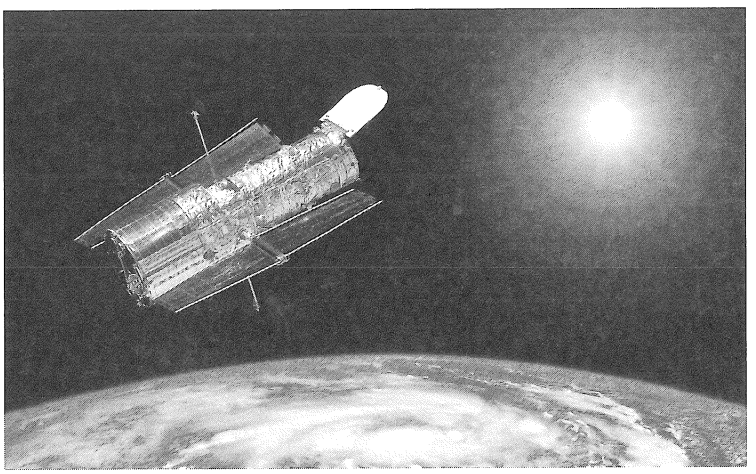
A Star's Distance from Earth

Everybody sees the stars from the same viewpoint: Earth. Stars are very far away from Earth. We can't simply jump on a spaceship and travel millions of miles/kilometers into space to get a closer look. The closest star to Earth, our sun, is over 92 million miles (150 million km) away. It is the only star in our solar system. Because stars are so distant, astronomers use measurements and other clues to determine which stars are closer or farther away. Stars that are closer to Earth appear bigger and brighter.

A Star's Luminosity

Luminosity is a star's brightness. Astronomers calculate luminosity by measuring how much energy a star releases. Stars that release more energy in the visible range are brighter. Larger stars produce more energy because they have a larger core, which results in more energy flowing out. The energy is in the form of heat and light. A lot of the energy flows into outer space and stays there, but some travels to planets such as Earth. As a star ages, it becomes hotter and brighter.

Star clusters are very bright and can indicate that a group of stars are orbiting around each other. The Hubble Space Telescope, a telescope that orbits Earth, has picked up pinpoints of bright light in the farthest, darkest parts of the universe. Some astronomers believe that these pinpoints are entire galaxies, each containing millions of stars.



The Hubble Space Telescope was launched into space in 1990. It captures some space images that ordinary telescopes on Earth's surface can't access.

A Star's Temperature and Color

A star's heat affects its color. The coolest stars in the galaxy appear red. Stars that burn at a moderately hot level appear orange or yellow. The hottest stars look white or blue. Interstellar matter (objects, gases, and dust that float through space) can affect how we view luminosity and color by partly obstructing our view of a star. Interstellar matter can make stars appear redder and dimmer, for example. This could lead astronomers to believe that a star is farther away than it actually is.

Name _____

Look at the Stars

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. The brightness of a star can indicate _____.
   - Ⓐ an entire galaxy
   - Ⓑ a star's age
   - Ⓒ which telescope is required
   - Ⓓ a star's name

2. The sun appears bigger and brighter than other stars partly because it's _____.
   - Ⓐ farthest from Earth
   - Ⓑ near our solar system
   - Ⓒ yellow
   - Ⓓ closest to Earth

3. Why do you think it's important for astronomers to study stars?

   _____

   _____

4. What inferences could you make about a small red star in the sky? Explain why.

   _____

   _____

5. Did the photo help you understand the text better? Explain why or why not.

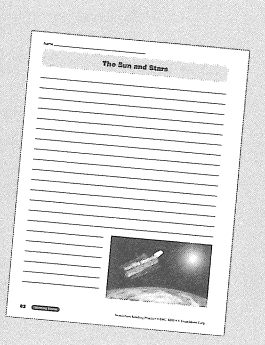
   _____

   _____

Write About the Topic

Use the Writing Form to write about what you read.

Explain how a scientist could use a star's appearance to learn more about stars and galaxies. Use details and examples.



Stars and Us

Stars are beautiful, but they are not all the same. Astronomers use technology and images to learn more about stars, galaxies, and deep space.

Stars in Relation to Earth

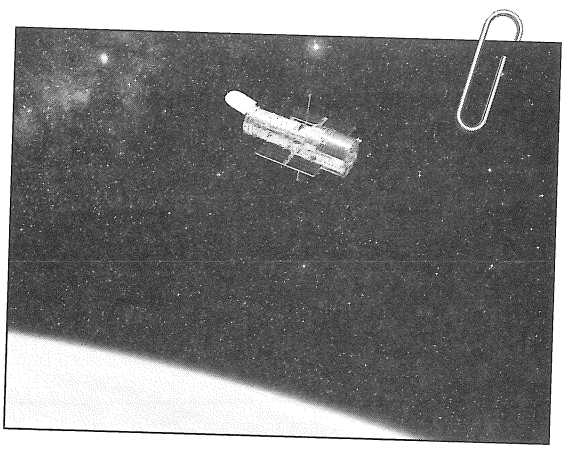
Stars are massive glowing spheres of burning hot gases (mostly helium and hydrogen). They vary in brightness, or luminosity, size, color, age, and distance from Earth. The sun is the closest star to Earth, and it is over 92 million miles (150 million km) away. Because the distances between objects in space are so enormous, astronomers measure them in units of light-years. A single light-year is the distance light travels in one year. This is a tremendous distance, considering that light can travel around the entire circumference of Earth 7.5 times in one second.

Star Name	Light-Years/Kilometers from Earth
Proxima Centauri	4.2/40 trillion
Rigil Kentaurus	4.4/42 trillion
Barnard's Star	6.0/57 trillion

When we see stars, we are actually viewing light that was released from a star billions of years ago. The light has been traveling through space nonstop, and it has taken this long to get to us. We see what the stars looked like back then.

The Hubble Space Telescope Helps Us Look at Stars

The Hubble Space Telescope was launched into Earth's orbit in 1990. It has obtained clearer images in deep space than those from Earth-based telescopes. It's positioned above Earth's surface, so light in Earth's atmosphere doesn't interfere with images it picks up. This allows Hubble to capture more light from interstellar objects, create a clear and detailed image, and send it down to our computers. Hubble has obtained hundreds of thousands of space images.



Hubble observes stars in deep space.

Stars Change Over Time

Newer stars are not as hot or as bright as older stars. Younger stars glow red and appear dimmer. Older stars look yellow. The oldest stars appear white or blue. Sometimes stars shrink or explode. The largest stars can remain for millions of years, the medium-sized stars can last for billions of years, and the smallest stars can burn for trillions of years. But all stars come to an end eventually.