



THE STAR★WITNESS

Supplemental Educational Support Materials for Special Feature: "Hubble's Picture Book of the Universe"

Discussion questions

Q1. What evidence in the story supports the idea that the Hubble Space Telescope is like a time machine?

Answer:

The telescope can look deep into space to examine galaxies that existed billions of years ago. The light from these distant galaxies must travel for a long time before arriving at Earth. It takes billions of years for that light to arrive, so we are seeing the galaxies as they appeared when the light left them billions of years ago, long before the Sun and Earth were born.

Q2. The story says that the Hubble Space Telescope does not always work alone. What does that mean?

Answer:

Sometimes astronomers must use several telescopes to look at a celestial object in order to get a more complete picture of it. Hubble sees in visible, ultraviolet, and near-infrared light. Other telescopes, both ground- and space-based, see in different wavelengths of light, such as X-rays or infrared. Hubble routinely works with other telescopes so that astronomers can piece together a better picture of an object's true appearance. Combining the images from Hubble and other telescopes gives astronomers a more accurate picture of what a celestial object really looks like.

Q3. If you could become an astronomer, what question(s) about space would you want the Hubble Space Telescope to investigate?

Answer:

Possible topics you might want Hubble to investigate:

- How can Hubble see planets in another solar system?
- If black holes are invisible, how can telescopes like Hubble see them?
- How often do comets crash into planets?
- Have any comets ever crashed into Earth?
- How is our star, the Sun, similar to and different from other stars in the Milky Way galaxy?
- How many galaxies are in the universe? Are all galaxies the same?

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Q4. Which of Hubble’s “top ten” scientific achievements is your favorite and why?

Answer: Your answers will vary.

Q5. What else would you like to know about your favorite Hubble scientific achievement?

Answer: Your answers will vary.

Vocabulary words

Astronomer

A scientist who studies the universe and the celestial bodies residing in it, including their composition, history, location, and motion. Many of the scientists at the Space Telescope Science Institute are astronomers. Astronomers from all over the world use the Hubble Space Telescope.

Visible light

The part of the electromagnetic spectrum that human eyes can detect; also known as the visible spectrum. The colors of visible light are red, orange, yellow, green, blue, and violet, along with various combinations and shades of these colors. Within the visible part of the spectrum, red light has a longer wavelength than blue light.

Ultraviolet light

A region of the electromagnetic spectrum that has slightly shorter wavelengths and higher frequencies than visible light, but is not visible to the human eye. This region of light is comparable to the range of sounds that are too high for the human ear to hear. Too much ultraviolet light causes sunburns.

Infrared light

A region of the electromagnetic spectrum not visible to the human eye. This region of light that cannot be seen is similar to the range of sounds that are too low for the human ear to hear. Infrared light can be detected as the heat from a fire or a light bulb.

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Primary mirror

A large mirror in a reflecting telescope that captures light from celestial objects and focuses it toward a smaller secondary mirror. The primary mirror in the Hubble Space Telescope measures 94.5 inches (2.4 meters) in diameter.

Celestial object

An object in the sky – examples include the Moon, the Sun, planets, comets, asteroids, stars, and galaxies.

Atmosphere

The layer of gases surrounding the surface of a planet, moon, or star.

Observation

In science, an observation is a fact or occurrence that is noted and recorded. The Hubble Space Telescope is a tool astronomers use to make observations of celestial objects.