



THE STAR★WITNESS

Supplemental Educational Support Materials for Special Feature: “Hubble: A Lunar Prospecting Machine”

Discussion questions

Q1.

How is the story of the search for resources on the Moon similar to and different from the story of the pioneers who settled the American west?

Answer:

The search for resources is similar in that the resources — water and food on Earth and oxygen on the Moon — are needed for survival. The search is different in that the American settlers looked for resources once they arrived at their destination. Scientists, on the other hand, used light to look for oxygen-containing minerals on the Moon, years before pioneering astronauts will attempt to journey there.

Q2.

What role did the Apollo missions play in the exploration of the Moon?

Answer:

The Apollo astronauts returned Moon rocks to Earth. Over the past 30 years, scientists have studied these rocks to learn about the Moon. Some of these rocks contain titanium oxides. These oxides can be used to produce oxygen gas. Scientists used the Hubble Space Telescope to study the ultraviolet (UV) light reflected from minerals at the Apollo landing sites where these rocks were found. Scientists compared the UV light from the Apollo landing sites with the UV light from other areas of the Moon. If the light from all of these areas is the same, then the same minerals are most likely present in each region.

Q3.

Why did scientists use the Hubble Space Telescope to observe the Moon?

Answer:

Our planet’s atmosphere absorbs most of the ultraviolet light that reaches it, preventing that light from reaching the ground. The Hubble Space Telescope is orbiting Earth high above our atmosphere. The ultraviolet light reflected off the Moon was captured by the telescope before it reached Earth’s atmosphere, where it would have been absorbed.

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Q4.

In what ways was the use of the Hubble Space Telescope unusual?

Answer:

This is the first time that scientists have used Hubble to support human space exploration. Hubble does not usually take images of the Moon because the Moon moves across the sky very quickly, making it difficult for Hubble to follow its path. The Moon also is very dim in ultraviolet light, so Hubble had to look at the Moon for a long time to capture the light reflected from the minerals.

Q5.

Do you think it is important for astronauts to return to the Moon? Why or why not?

Answer:

Students' answers will vary. Some students might think it is important to return to the Moon because we can learn more about the Moon or how to live in space. This experience would prepare us for a mission to Mars. Other students might think it is not important for astronauts to return to the Moon because it is very expensive. We could use the money on Earth to help solve important social problems like homelessness and hunger.

Vocabulary words

Atmosphere

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

Impact Crater

A large depression on a moon or a planet. An impact crater is created when an asteroid, a comet, or a meteorite strikes the moon or the planet with great force.

Minerals

The building blocks of rocks. They are naturally occurring substances formed through geological processes, and often have a crystalline form. They can be single elements (such as gold or silver) or compounds (such as quartz, marble, or turquoise).

Titanium Oxides

Minerals composed of oxygen and the metal titanium. Titanium oxides frequently contain other metals. One such titanium oxide is the mineral ilmenite, which contains titanium, oxygen, and iron. Ilmenite is found in both lunar rock and Earth rocks.

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Rille

A long, narrow depression on the Moon's surface. A rille can be straight, have a sweeping arc, or meander, with many curves going in random directions.

Ultraviolet (UV) 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.