Hubble's Story

Name _____

Directions: Read the information below and answer the questions on the next page.

Approximately 450 years ago, people thought Earth was the center of the universe. This was based on observations they were making with their own eyes, without the help of tools or instruments. However, this idea began to change in 1610, when Galileo invented the telescope. Scientists quickly learned about the other planets. Galileo realized that the Milky Way galaxy, which everyone thought was a cloud, actually contains stars, planets, and objects.

Telescopes have changed greatly since the simple one used by Galileo and his peers in the 17th century. They have grown in size and complexity. They have also been positioned on tops of mountains, away from city lights, resulting in better views of the night sky. One example is the 100-inch Hooker Telescope, located on Mt. Wilson near Los Angeles, CA, which Edwin Hubble peered through in 1924. At this time, astronomers thought the universe was only made up of the Milky Way galaxy, in which Earth is located. However, while looking through the Hooker Telescope, Hubble saw many other galaxies. He also noticed that the stars were moving away from each other, leading to the conclusion that the universe was expanding and changing.

Although there were many advances in telescopes, their view was still clouded by one thing – the atmosphere. The atmosphere is a thick mixture of gas and dust surrounding Earth. It diffracts light, blurring images. It also absorbs infrared and ultraviolet light, further limiting what astronomers can see. In 1923, a German scientist wrote an article that mentioned the possibility of a rocket propelling a telescope into Earth's orbit. Twenty years later, an American astronomer wrote a paper on the benefits of positioning a telescope above Earth's atmosphere. In 1969, NASA launched a program to design a Large Space Telescope. Its initial launch date was 1979, but because of budget issues and other delays, it took another 21 years to be ready for space. On April 24, 1990, the Space Shuttle Discovery propelled the Hubble Telescope into orbit around the Earth, enabling astronomers to see images never before seen.

The Hubble Telescope is made up of several large mirrors and cameras. It weighs 24,500 pounds and is 13.3 meters (43.5 feet) long – about the length of a school bus. It travels around Earth at 17,500 mph, taking pictures as it moves. It has already made more than 100,000 trips around Earth and has traveled more than 2.4 billion miles. In this time, it has taken almost 500,000 images. This data is initially stored on the telescope and then transferred to computers on Earth through a system of satellites.

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One of the main reasons the Hubble Telescope was launched was to help measure the rate at which the universe is expanding, the observation first made by Edwin Hubble 65 years earlier. It is because of this important observation that the telescope was named after Hubble. The Hubble has enabled us to learn that the universe is expanding rapidly. Images captured by Hubble have also helped scientists learn that black holes exist at the center of most galaxies.

One interesting fact about the Hubble Telescope is that it is the only telescope that is serviced by astronauts in space. Any repairs and advancements must be made during a service mission. Since 1990, four service missions have been conducted. The fifth and final service mission is scheduled for September 2008. Repairs done during this mission are expected to last until 2013, when the Hubble Telescope will be returned to Earth and replaced by the James Webb Space Telescope.

Questions:

1. What important discovery did Galileo make using the telescope?

2. What did Edwin Hubble discover in 1924?

3. Why does the atmosphere blur the images seen by telescopes on Earth?

4. When was the Hubble Telescope launched into Earth's orbit?

5. How do scientists on Earth see images taken by the Hubble Telescope?

6. Name an important discovery that has been made based on data gathered from the Hubble Telescope.