**Technology in Astronomy**

**What scientific device did Galileo use to discover Jupiter’s moons?** He used a telescope.

**How would you describe the available technology used to explore space before the 20th century?** The technology was limited to different telescopes, and scientists were not able to send people or objects into outer space.

**How might astronomers gather more data about Jupiter’s moons besides using photos?** The astronomers could send a probe to one of Jupiter’s moons and have the probe send desired data back to Earth.

**Why are manned missions into space fewer in number than the number of probes sent into space?** It is very difficult to send humans into space because of all of the equipment needed to keep us alive. Reaching other planets takes a long time, and it is dangerous for humans to be in space that long with our current technology.

**How did the invention and launch of the Hubble Space Telescope enhance astronomers’ understanding of space**? The Hubble allowed scientists to take pictures of very distant objects, such as other galaxies, stars, nebulae, and planets, which they were not previously able to see and study.

**Attributes of the Stars**

**Which objects are smaller in the night sky?** The stars that are far away look smaller in the night sky.

**Why are some stars brighter than others?** The brightness of a star depends on how far away it is and its size.

**How is a star’s brightness related to its distance from Earth?** Stars that are closer to Earth are brighter than stars that are farther away.

**What is the relationship between a star’s size and distance from Earth?** The relationship between size and distance from Earth determine how bright and how large a star will appear. A bigger star that is really far away may look smaller than a closer, smaller star.

**What do the stars look like? When do you think they are in the sky?** Although stars are easier to see at night, remind students they’re still there during the day. The Sun’s light makes stars difficult to see during the day.

**Comparing Stars and Planets**

**What is a star?** A star is a sphere of gas that holds its shape because of gravity. Stars are formed when clouds of gas and dust accumulate into a large enough amount that the gravitational pull forms it into a mass. When the mass becomes large enough, it begins to heat up from the core.

**What do all planets revolve around?** All planets revolve around the Sun.

**How would you compare the movement of stars to the movement of planets?** Planets and stars both seem to move across the sky. The planets seem to move past the stars in the sky over time.

**How would you compare the size of stars to the size of planets?** Planets are much smaller than stars. Very large planets can be close to the size of some smaller stars.

**Investigate a constellation’s movement across the night sky. How does it change throughout the year?** Stars are very distant objects in the sky. As Earth spins on its axis, we spin past this background of distant stars. These stars appear to move across the night sky from east to west for the same reason that the Sun appears to “rise” in the east and “set” in the west. The star that lies almost perfectly above Earth’s rotational axis, however, appears to remain stationary in the sky. That star is known as the North Star, or Polaris. The North Star moves very, very little. Throughout the year, constellations gradually shift from east to west. This is caused by Earth’s orbit around our Sun. In the summer, viewers are looking in a different direction in space at night than they are during the winter.

**List the similarities and differences between stars and planets.** Stars twinkle while planets shine steadily. Stars appear to maintain a constant position in the night sky, whereas a planet seems to be at different locations at different times of the year. Stars are much farther away than planets. Planets orbit around a star.

**What conclusions can be made about planets and why they can be seen at different locations at different times?** Earth is constantly on the move as it rotates around the Sun. The other planets also orbit the Sun, but at different speeds. As a result, the planets appear in different places in the sky at different times when viewed from Earth. The stars are also on the move constantly as they race around the center of the galaxy. However, they are much farther away from us, and the journey around the center of the galaxy takes so long that it may be thousands of years before we can see any significant change in the location of the stars. Therefore, we treat the stars as fixed.

**How is modeling a planet’s orbital path helpful?** We can see that the planets are not lined up and moving at the same pace. Planets are in different positions around the Sun.

**Why can we see planets if they don’t produce light?** We are able to see these planets because they reflect the light from the Sun.

**Planets in the Solar System**

**How many planets are in our solar system?** There are eight planets in our solar system.

**What are the names of the planets in our solar system?** Mercury, Venus, Mars, Earth, Saturn, Uranus, Jupiter, and Neptune

**What is the closest planet to the Sun?** Mercury is the closest planet to the Sun.

**What is the planet farthest from the Sun?** Neptune is the farthest planet from the Sun.

**What two planets are closest to Earth?** Venus and Mars are the two planets closest to Earth.

**What is the nickname for Mercury, Venus, Earth, and Mars?** Mercury, Venus, Earth, and Mars are called the rocky planets because they are all made of rock.

**What is the nickname for Jupiter, Saturn, Uranus, and Neptune?** Jupiter, Saturn, Uranus, and Neptune are called gas giants because they are all very large and made of gases.

**Which planet is about the same size as Earth?** Venus is about the same size as Earth.

**Which planet is about the same size as Uranus?** Neptune is about the same size as Uranus.

**What is one limitation of your picture model of the solar system?** The pictures did not show what the planet was made of.

**How would you compare different models of the solar system?** You would compare them by looking at the planets’ size, appearance, composition, order, and distance from the Sun.

**Do you think a model can be created that has no limitations?** Answers will vary. Possible answer: No, because the Sun is so large, and some of the planets are very small. The model would be either too large to create or too small to see.

**Suppose you could create a model that accurately represents each planet’s composition. How would you go about doing that?** You would have to find a way to fill something with the different types of gases for the gas giants and with different types of rocks in the proper sizes to accurately show the rocky planets.