

Name \_\_\_\_\_

## Refracting vs. Reflecting Telescopes: Unveiling the Key Differences

### Open-Ended Response Answer Key

1. I would choose a reflecting telescope for observing distant galaxies and nebulae. Reflecting telescopes are ideal for deep-sky observations because they can gather more light, allowing me to see faint objects more clearly. Their minimized chromatic aberration also ensures that the colors of these celestial objects are accurately represented. The compact design of reflecting telescopes is convenient for transporting to observation sites.
2. Maintenance and alignment differ between refracting and reflecting telescopes. Refracting telescopes with lenses may require periodic cleaning and alignment to ensure that the lenses are properly aligned. Reflecting telescopes, on the other hand, may require occasional realignment of the mirrors. Reflecting telescopes might be more convenient for amateur astronomers in terms of maintenance because they often have fewer optical elements and are more forgiving in terms of alignment.
3. Refracting telescopes, like the one Galileo used, played a pivotal role in the history of astronomy. Galileo's observations with refracting telescopes revolutionized astronomy by providing direct evidence for heliocentrism, the idea that the Earth orbits the Sun. He discovered features on the Moon, observed the phases of Venus, and identified the four largest moons of Jupiter, which became known as the Galilean moons. These observations challenged the geocentric model of the universe and provided strong support for the heliocentric model, changing our understanding of the solar system.
4. Chromatic aberration in refracting telescopes can distort the colors of observed objects and reduce image quality. Modern refractors have addressed this issue through the use of multiple lenses or specially designed lens coatings that reduce chromatic aberration. Apochromatic refractors, in particular, use extra-low dispersion (ED) glass elements to minimize color fringing, resulting in higher-quality images. These advancements have significantly improved the performance of refracting telescopes and made them more suitable for various astronomical observations.

