

Name \_\_\_\_\_

## Measuring the Universe: The Distance to Stars and Galaxies

### Open-Ended Response Answer Key

1. Parallax is the apparent shift in the position of an object when viewed from two different perspectives. Astronomers use parallax to measure the distance to nearby stars by observing a star from two different positions in Earth's orbit approximately six months apart. By measuring the angle of this shift, they can calculate the star's distance using trigonometry.
2. Cepheid variable stars are significant in astronomy because their brightness varies in a regular and predictable pattern. Astronomers use the period of pulsation of Cepheid variable stars to determine their intrinsic brightness. By comparing their intrinsic brightness to their observed brightness from Earth, astronomers can calculate their distance.
3. Supernovae are crucial as "standard candles" because they have a consistent and well-known brightness when they explode. This consistency allows astronomers to determine their distance accurately, even in distant galaxies. It helps us map the vast universe and study its expansion.
4. Redshift is the stretching of light from galaxies as they move away from us due to the expansion of the universe. Hubble's Law establishes a direct relationship between a galaxy's velocity and its distance from us. By measuring the redshift of light from galaxies, astronomers can calculate their distances and, in turn, study the rate of the universe's expansion. This connection provides insights into the structure and evolution of the universe.

