

Name \_\_\_\_\_

## The Cosmic Puzzle

### Open-Ended Response Answer Key

1. To create a cosmic map, I would start by collecting observational data from telescopes and large-scale surveys. I would use tools like spectrographs to measure the redshift of galaxies, determining their distances and speeds. Next, I'd analyze the data and plot the positions of galaxies on a three-dimensional map. This map would reveal the cosmic web's structure and help me study large-scale patterns in the universe.
2. The study of the universe is like assembling a cosmic mosaic because it involves gathering pieces of information from various sources and techniques. Cosmic maps, redshift measurements, and cosmic background radiation provide key pieces. Supercomputer simulations allow us to test our understanding and fill in gaps. Large-scale surveys help us identify more pieces of the puzzle. The mosaic comes together as we combine these insights to understand the universe's structure and evolution.
3. Challenges in studying the large-scale structure include the vastness of the universe, limited observational data, and the elusive nature of dark energy. Future discoveries may involve more precise measurements of dark energy's effects, advanced telescopes, and improved simulations. Observations of supernovae, gravitational lensing, and cosmic microwave background could provide further insights into dark energy's behavior.
4. In a supercomputer simulation, I would aim to explore the formation and evolution of galaxies, galaxy clusters, and large-scale structures. I hope to gain insights into how these cosmic structures emerge, interact, and evolve over billions of years. Understanding their dynamics and behaviors would contribute to our comprehension of the universe's large-scale structure and cosmic evolution.

