

Name _____

Exploring the Mysteries of Our Galaxy: Are There Black Holes in Our Milky Way?

Open-Ended Response Answer Key

1. Discovering black holes in the Milky Way is significant because it allows us to study these mysterious objects up close. It contributes to our understanding of how massive stars evolve and end their lives. Moreover, it provides insights into the role of black holes in shaping the dynamics of galaxies and the structure of the universe.
2. Black hole research has seen remarkable progress in recent years, with the direct imaging of a black hole's event horizon being a significant breakthrough. However, many questions remain, such as the nature of dark matter and the behavior of matter under extreme conditions. The concept of black holes challenges our understanding of the fundamental laws of physics, making this field of study both exciting and full of opportunities for future exploration.
3. The event horizon of a black hole is a boundary beyond which nothing can escape, not even light. It plays a crucial role in defining black holes as objects with an "point of no return." Understanding the event horizon helps us grasp the unique and extreme properties of black holes and is fundamental to our definition and study of these objects.
4. If a supermassive black hole were to suddenly disappear from the center of a galaxy, the consequences would be profound. The stars orbiting around it would no longer experience its gravitational pull, leading to erratic and unpredictable trajectories. This disruption could potentially eject stars from the galaxy or alter its overall structure. Additionally, the absence of a supermassive black hole might affect the galaxy's activity and star formation processes, with significant implications for its long-term evolution.

