1. A planetary nebula is a

- **a.** shell of gases ejected from the surface of red giant star.
- **b.** spherical, rapidly expanding cloud of gas produced by a supernova explosion.
- **c.** cloud of gas surrounding a very young star in which planets are expected to form.
- **d.** gas cloud surrounding a planet after its formation.

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2. In what manner does an isolated white dwarf generate energy?

- **a.** An isolated white dwarf does not generate energy.
- **b.** gravitational contraction
- **c.** hydrogen fusion
- **d.** helium fusion

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3. What is a pulsar?

- **a.** Cepheid variable star with a period of a few days
- **b.** pulsating white dwarf star, fluctuating rapidly in brightness
- **c.** rapidly rotating neutron star, producing beams of radio energy and occasionally of X rays and visible light
- **d.** very hot material orbiting a black hole

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4. According to general relativity, why does Earth orbit the Sun?

- **a.** The Sun exerts a gravitational force on Earth across empty space.
- **b.** Matter contains quarks, and Earth and the Sun attract each other with the “color force” between their quarks.
- **c.** Space around the Sun is curved, and Earth follows a geodesic in this curved space.
- **d.** Earth and the Sun are continually exchanging photons of light in a way that holds Earth in orbit.

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5. What is the event horizon of a black hole?

- **a.** "surface" at which all events happen
- **b.** "surface" at which any object passing through it will leave with greater energy than it entered
- **c.** "surface" from inside of which nothing can escape
- **d.** infinitesimally small volume at the center of the black hole that contains all of the black hole's mass

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6. In the context of black holes, what is a wormhole?

- **a.** "tunnel" of undistorted space through an event horizon allowing objects to enter and leave a black hole without being torn apart
- **b.** small, black hole through a solid object such as a planet
- **c.** direct connection from any black hole to another part of spacetime
- **d.** direct connection from a rotating black hole to another part of spacetime

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7. Cepheid variable stars are useful to astronomers as indicators of

- **a.** white dwarf star behavior.
- **b.** stars with very high-speed motion.
- **c.** distance, particularly to nearby galaxies.
- **d.** the existence of black holes.

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8. Harlow Shapley first located the center of the Milky Way Galaxy in 1917 by

- **a.** measuring redshifts of stars in the galactic plane and disk.
- **b.** observing the distribution of globular clusters in the galactic halo.
- **c.** observing the distribution of hydrogen gas, measured by 21-cm radio emission.
- **d.** measuring the positions of supernova explosions throughout the Galaxy.
