Chp 12-Review Questions. Predicting the Violent End of the Largest Stars

1. What are the important thermonuclear reactions leading up to the formation of iron?
2. Describe the steps leading up to a core-collapse supernova.
3. How do neutron stars form?
4. What are the differences between degenerate-electron pressure and degenerate-neutron pressure?
5. How is a neutron star similar to a coastal lighthouse?
6. What determines if a core-collapse supernova will form a neutron star or a black hole?
7. What is the difference between a black hole's event horizon and its Schwarzschild radius?
8. When we say that the Moon has a radius of 1080 miles (1737 km), we mean that this is the smallest radius that encloses all of the Moon's material. In this sense, is it correct to think of the Schwarzschild radius as the radius of a black hole? Why or why not?
9. Astronomers cannot actually see the black hole candidates in close binary systems. How, then, do they know that these candidates are not white dwarfs or neutron stars?
10. What are the differences between a Type Ia and a Type II supernova?
11. What are the similarities between a nova and a Type Ia supernova? What are the differences?
12. What is the similarity between a nova and an X-ray burster? How are they different?

Chp 12-Discussion Questions. Predicting the Violent End of the Largest Stars

1. Imagine that our Sun was somehow replaced by a 1-$M_\odot$ white-dwarf star and that Earth continued in an orbit of semimajor axis 1 AU around this star. Discuss what effects this would have on our planet. What would the white dwarf look like as seen from Earth? Could you look at it safely with the unaided eye? Would Earth's surface temperature remain the same as it is now?
2. The similar names white dwarf, red dwarf, and brown dwarf describe three very different kinds of objects. Suggest better names for these three kinds of objects, and describe how your names more accurately describe the objects' properties.
3. Describe the kinds of observations you might make in order to locate and identify black holes.

Chp 12-Collaborative Group Exercises. Predicting the Violent End of the Largest Stars

1. Imagine that a supernova originating from a close binary star system, both of whose stars have less than 4 solar masses, began (as seen from Earth) on the most recent birthday of the youngest person in your group. Using the light curves in Figure 12-18, what would its new luminosity be today and how bright would it appear in the sky (apparent magnitude) if it were located 32.6 light-years away? How would your answers change if you were to discover that the supernova actually originated from an isolated star with a mass 15 times greater than our Sun?
2. Consider the graph showing a recording of a pulsar in Figure 12-9. Sketch and label similar graphs that your group estimates for: (1) a rapidly spinning, professional ice skater holding a flashlight; (2) an emergency signal on an ambulance; and (3) a rotating beacon at an airport.
3. As stars go, pulsars are tiny, only about 12 miles (20 km) across. Name three specific things or places that have a size or a separation of about 12 miles.