

Chp 13-Review Questions. Exploring Our Galaxy

1. Why do the stars of the Galaxy appear to form a bright band that extends around the sky?
2. How did observations of globular clusters help astronomers determine our location in the Galaxy?
3. Why are infrared telescopes useful for exploring the structure of the Galaxy? Why is it important to make observations at both near- infrared and far-infrared wavelengths?
4. The galactic halo is dominated by Population II stars, whereas the galactic disk contains predominantly Population I stars. In which of these parts of the Galaxy has star formation taken place recently? Explain your answer.
5. Most interstellar hydrogen atoms emit only radio waves at a wavelength of 21 cm, but some hydrogen clouds emit profuse amounts of visible light (see, for example, Figure 11-1). What causes this difference?
6. The Milky Way map taken at radio wavelengths, shown back in Figure 2-26b, has a large gap on the side of the Galaxy opposite to ours. Why is this?
7. In a spiral galaxy, are stars in general concentrated in the spiral arms? Why are spiral arms so prominent in visible-light images of spiral galaxies?
8. How do astronomers determine how fast the Sun moves in its orbit around the Galaxy? How does this speed tell us about the amount of mass inside the Sun's orbit? Does this speed tell us about the amount of mass outside the Sun's orbit?
9. How do astronomers conclude that vast quantities of dark matter surround our Galaxy? How is this dark matter distributed in space?
10. Another student tells you that the Milky Way Galaxy is made up "mostly of stars." Is this statement accurate? Why or why not?
11. What proposals have been made to explain the nature of dark matter?
12. In our Galaxy, why are stars of spectral classes O and B only found in or near the spiral arms? Is the same true for stars of other spectral classes? Explain why or why not.
13. What is the evidence that there is a supermassive black hole at the center of our Galaxy?

Chp 13-Discussion Questions. Exploring Our Galaxy

1. From what you know about stellar evolution, the interstellar medium, and the density-wave theory, explain the appearance and structure of the spiral arms of grand-design spiral galaxies.
2. What observations would you make to determine the nature of the dark matter in our Galaxy's halo?
3. Describe how the appearance of the night sky might change if dark matter were visible to our eyes.
4. Discuss how a supermassive black hole could have formed at the center of our Galaxy.

Chp 13-Collaborative Group Exercises. Exploring Our Galaxy

1. Student book bags often contain a wide collection of odd-shaped objects. Each person in your group should rummage through her or his own book bag and find one object that is most similar to the Milky Way Galaxy in shape. List the items from each group member's belongings and describe what about the items is similar to the shape of our Galaxy and what about the items is not similar, then indicate which of the items is the closest match.
2. One strategy for identifying a central location is called triangulation. In triangulation, a central position can be pinpointed by knowing the distance from each of three different places. First, on a piece

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of paper, create a rough map showing where each person in your group lives. Second, create a circle around each person's home that has a radius equal to the distance that each home is from your classroom. Label the place where the circles intersect as your classroom. Why can you not identify the position of the classroom with only two people's circles?