

OpenStax Astronomy, Ch.26: WS Problems (Apr-2021)

Review Questions

1. Describe the main distinguishing features of spiral, elliptical, and irregular galaxies.
2. Why did it take so long for the existence of other galaxies to be established?
3. Explain what the mass-to-light ratio is and why it is smaller in spiral galaxies with regions of star formation than in elliptical galaxies.
4. If we now realize dwarf ellipticals are the most common type of galaxy, why did they escape our notice for so long?
5. What are the two best ways to measure the distance to a nearby spiral galaxy, and how would it be measured?
6. What are the two best ways to measure the distance to a distant, isolated spiral galaxy, and how would it be measured?
7. Why is Hubble's law considered one of the most important discoveries in the history of astronomy?
8. What does it mean to say that the universe is expanding? What is expanding? For example, is your astronomy classroom expanding? Is the solar system? Why or why not?
9. Was Hubble's original estimate of the distance to the Andromeda galaxy correct? Explain.
10. Does an elliptical galaxy rotate like a spiral galaxy? Explain.
11. Why does the disk of a spiral galaxy appear dark when viewed edge on?
12. What causes the largest mass-to-light ratio: gas and dust, dark matter, or stars that have burnt out?
13. What is the most useful standard bulb method for determining distances to galaxies?
14. When comparing two isolated spiral galaxies that have the same apparent brightness, but rotate at different rates, what can you say about their relative luminosity?
15. If all distant galaxies are expanding away from us, does this mean we're at the center of the universe?
16. Is the Hubble constant actually constant?
17. Why can we not determine distances to galaxies by the same method used to measure the parallaxes of stars?
18. Which is redder—a spiral galaxy or an elliptical galaxy?
19. Suppose the stars in an elliptical galaxy all formed within a few million years shortly after the universe began. Suppose these stars have a range of masses, just as the stars in our own galaxy do. How would the color of the elliptical change over the next several billion years? How would its luminosity change? Why?
20. A cluster of galaxies is observed to have a recessional velocity of 60,000 km/s. Find the distance to the cluster. (Assume a Hubble constant of 22 km/s per million light-years.)

