The following icons indicate the Achievement Chart category addressed by each question.

K/U Knowledge/Understanding | T/I Thinking/Investigation | C Communication | A Application

What Do You Remember?

1. What is a nebula? (9.4, 9.5) K/U
2. Define the term "red shift." (9.7) K/U
3. What are the four types of galaxies, based on their shape? (9.6) K/U
4. What are the two factors that affect how bright stars look in the night sky (i.e., apparent magnitude)? (9.2, 9.3) K/U
5. Describe the process that allows stars to create their own energy. (9.4) K/U
6. Define the term "dark matter." (9.7) K/U
7. Where in our galaxy might you find a globular cluster? (9.6) K/U
8. What is a quasar, and where does the name come from? (9.6) K/U
9. What is the purpose of the Hertzsprung–Russell diagram? (9.4) K/U
10. What does the term "parallax" mean? (9.1) K/U

What Do You Understand?

11. What is the difference between a globular cluster and an open star cluster? (9.6) K/U
12. Place the following in the order that represents the life cycle of a star: supernova, neutron star, nuclear fusion, nebula, protostar. (9.5) K/U
13. Explain the difference between a galaxy cluster and a galaxy supercluster, with reference to the Milky Way. (9.6) K/U
14. If an astronomer finds a star that is 623 ly away, how far away is it in kilometres? (9.1) T/I
15. Describe how you could use the method of parallax to find the distance to a star. (9.1) T/I
16. Name two satellites orbiting Earth discussed in this chapter that have made important observations of distant stars and galaxies. What contributions have each one made? (9.1, 9.4, 9.6, 9.7) A
17. List as many physical properties as you can that describe a red supergiant star. (9.4) K/U
18. Describe the relationship between star colour and temperature. Use the following words in your answer: blue, red, yellow, orange, hottest, medium, cool, coolest. (9.2, 9.4) K/U C
19. What are two pieces of evidence that support the Big Bang theory, and which technologies have been used to collect this data? (9.7) K/U

Solve a Problem

20. Compare and contrast a neutron star with a black hole. (9.4) K/U
21. Arrange the following stars in order from coolest to hottest: blue supergiant, white dwarf, red giant, yellow main sequence star, orange main sequence star. (9.4) T/I
22. The oldest galaxies ever observed have been found 11.4 billion ly from the Milky Way. How far is this distance in kilometres? (9.1) T/I
23. What was the cause of the static interference that Arno Penzias and Robert Wilson detected in 1965? (9.7) K/U
24. Based on the H–R diagram in Section 9.4, determine the temperature of a main sequence star with absolute magnitude –2.2. (9.4) T/I
25. Based on the H–R diagram in Section 9.4, determine the absolute magnitude of a star with a temperature of 4500 °C. (9.4) T/I
26. Arrange the following objects in order from largest to smallest: white dwarf, nebula, neutron star, spiral galaxy, Virgo supercluster, red supergiant. (9.4, 9.5, 9.6) K/U T/I
27. What type of galaxy is shown in Figure 1? (9.6) K/U

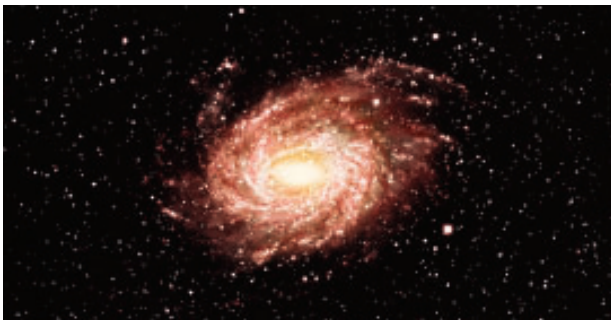

Figure 1

Create and Evaluate

28. Consider the terms astronomers use to describe stars and planets forming in nebulas. Then suggest what term should be used to describe stars coming together to form a new galaxy. Explain your choice. (9.4, 9.5) T/I C A

29. Imagine that you need to explain the structure of the Milky Way galaxy to a Grade 4 class. Describe how you might construct a three-dimensional model of the Milky Way detailing its structure so it is easy to understand. Be sure to describe the position of our solar system. (9.6) K/U C

30. The Hubble Space Telescope has cost $6 billion. Many people think that this money could have been better spent elsewhere. Do you think that the money was well spent? Support your opinion with information from this section and your own personal experience. (9.4, 9.7) A C

31. Copy Table 1 into your notebook. Then fill in the second column with the correct units used to describe the measurements of celestial objects from this chapter. (9.1) T/I

Table 1

Measurement	Unit
diameter of the Milky Way galaxy	
distance from Earth to the Sun	
distance to the star Vega	
distance to a quasar	
diameter of a neutron star	
distance to the MOST satellite	
distance to the star Betelgeuse	

32. When we observe the light coming from the Andromeda galaxy, we see "blue shift" in that light. Based on what you know about galaxies that show red shift, what can you conclude about the motion of the Andromeda galaxy with respect to the Milky Way? (9.6, 9.7) T/I A

33. Imagine that a new star is discovered only 128 ly away. How could you tell that this star has just been created? What kinds of physical properties could you gather about this star? How would you go about collecting your data? Write a report to the Canadian Space Agency explaining the properties of this star and why it is important to perform research on distant stars. (9.1, 9.2, 9.4, 9.5) K/U T/I C

Reflect on Your Learning

34. Find a partner. Find a page in your respective notebooks where you both took notes on the same topic on the same day.
    (a) Make a list of the ways in which your notes are similar and different.
    (b) What can you conclude from this about your different learning styles?
    (c) Why is it important to keep good notes?

Web Connections

35. Many of the images in this chapter come from the Hubble Space Telescope. List three of your favourite images from this chapter and write down one sentence describing each. T/I C

36. Astronomers need your help! In the last few decades, billions of stars have been found in galaxies all over the Universe. Many of these stars have planets orbiting them, and perhaps some of them could support a form of life. Join the Search for Extra-Terrestrial Intelligence (SETI) project by helping search through data collected from distant stars for evidence of intelligent life. After completing your research, present your findings in a format of your choice. T/I C

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