

For each question, select the best answer from the four alternatives.

- Which of the following lists units for measuring distances between celestial objects from smallest to largest? (9.1) **K/U**
 - km, ly, AU
 - ly, AU, km
 - AU, km, ly
 - km, AU, ly
- Sirius, the brightest star in the night sky, has a luminosity of 22. This means that Sirius
 - has an apparent magnitude 22 times greater than the Sun's
 - gives off 22 times more energy than the Sun
 - developed 22 years before the Sun
 - is 22 times farther from Earth than the Sun (9.2) **K/U**
- A lenticular galaxy
 - has a central bulge but no spiral arms
 - does not have a regular shape
 - varies in shape from spherical to flattened oval
 - includes a central bulge and spiral arms (9.6) **K/U**
- Which of the following best describes a protostar? (9.4) **K/U**
 - a cloud of gas and dust that forms during the birth and death of a star
 - the hottest, most luminous type of star in the Universe
 - a stellar explosion that occurs at the end of a star's life
 - a dense concentration of gas and dust that eventually forms a star

Indicate whether each of the statements is TRUE or FALSE. If you think the statement is false, rewrite it to make it true.

- The astronomical unit (AU) is the most convenient unit for expressing distances to celestial objects outside our solar system. (9.1) **K/U**

- Apparent magnitude is a measure of the brightness of stars in the night sky as they appear from Earth. (9.2) **K/U**
- Dark matter is difficult to observe because it neither emits nor absorbs light. (9.7) **K/U**

Copy each of the following statements into your notebook. Fill in the blanks with a word or phrase that correctly completes the sentence.

- Astronomers use _____ to determine the distances to celestial objects based on the apparent change in their positions as seen from two different locations. (9.1) **K/U**
- The brightness of a star depends on both its _____ and its distance from the observer. (9.2) **K/U**
- Some _____ are called pulsars because they emit high frequency radio waves as they spin. (9.4) **K/U**

Match each term on the left with the most appropriate description on the right.

- | | |
|------------------------|---|
| 11. (a) luminosity | (i) the brightness of a star as if it were located 33 ly from Earth |
| (b) colour | (ii) indicates a star's surface temperature |
| (c) absolute magnitude | (iii) determines the length and stages of a star's life cycle |
| (d) mass | (iv) the total amount of energy produced by a star (9.2) K/U |

Write a short answer to each of these questions.

- What is the difference between the Solar Nebula theory and the Big Bang theory? (9.5, 9.7) **K/U**
- What was Greek astronomer Hipparchus's contribution to the understanding of the characteristics of celestial objects? (9.2) **K/U**

14. A misnomer is a misleading or inaccurate term applied to a person or object. Explain why the term “black hole” is a misnomer. (9.4) **T/I**
15. Your class is discussing the difference between scientific theories and personal beliefs. Write a brief paragraph explaining why the Big Bang concept is considered a theory rather than a belief or an opinion. (9.7) **T/I C**
16. If Polaris is 400 ly from Earth, what is its distance from Earth in kilometers? (9.1) **T/I**
17. Create a concept map showing the organization of objects of the Universe. Use the following terms in your concept map: star, star cluster, galaxy, and galaxy cluster. (9.4, 9.6) **K/U C**
18. Describe two celestial bodies that may form in the final stages of the life cycle of a star that is more massive than the Sun. (9.2) **K/U**
19. Write a paragraph describing the relationships among our solar system, the Milky Way, the Local Group, and the Virgo Supercluster. (9.6) **K/U C**
20. (a) Quasars are some of the most distant objects in the Universe. In which direction do the light waves from quasars most likely shift?
(b) A scientist observing a quasar in 2009 is actually seeing the quasar as it existed in the early Universe. Explain why this is so. (9.6, 9.7) **A**
21. An astronomer observes several stars and records their respective colours, as shown in Table 1 below. Using this data, order the stars by temperature from warmest to coolest. (9.4) **A**
22. (a) Name some words that contain the prefix “pro” or “proto.”
(b) Explain how someone who did not know the meaning of the word “protostar” could derive its meaning by looking at the word itself. (9.4) **C**
23. Which unit would be most appropriate for measuring each of the following distances? Choose between kilometers, AU, and light years. (9.1) **T/I**
(a) the distance from the Milky Way to the Canis Major Dwarf Galaxy
(b) the distance from the Sun to Charon, one of Pluto’s moons
(c) the distance from Earth’s surface to the International Space Station
24. (a) How does the phenomenon of red shift provide evidence of an expanding universe?
(b) A scientist observes blue shift in the edge of a rotating galaxy. What can you conclude about the galaxy’s movement? (9.7) **T/I**
25. Create a list of characteristics used to describe stars. Beside each characteristic, describe how the Sun compares with other stars. (9.2) **K/U T/I**
26. Refer to Table 2 on page 372. Describe how you think conditions on Earth would be different from conditions today if the Sun were
(a) as hot as a bluish star
(b) as cool as a reddish star (9.2) **K/U A**

Table 1

Star	Colour
10 Lacertra	bluish
Antares	reddish
Aldebaran	orange-ish
Canopus	bluish white