

Directed Reading

Section: Characteristics of Stars

1. What is a star?

2. How does the color of stars seen from Earth differ from their actual color?

ANALYZING STARLIGHT

3. How do astronomers learn about stars?

- a. by analyzing the sounds that stars absorb
 - b. by analyzing the light that stars emit
 - c. by analyzing the sounds that stars emit
 - d. by analyzing the light that stars absorb
4. What are spectrographs?

- a. devices that separate light into different colors
 - b. devices that separate light into different gases
 - c. graphs that separate light into different spectra
 - d. devices that gather light into different spectra
5. What are the three types of spectra?

- a. remission, bright-line, and contiguous
 - b. emission, absorption, and composite
 - c. emission, absorption, and continuous
 - d. transmission, abduction, and continuous
6. What does a star's dark-line spectrum reveal?

- a. the star's distance and size
 - b. the star's composition and magnitude
 - c. the star's texture and temperature
 - d. the star's composition and temperature
7. What is true of the layers of a star?

- a. the inner layers are very cool, the outer layers are somewhat cool
 - b. the outer layers are very hot, the inner layers are somewhat cooler
 - c. the inner layers are very hot, the outer layers are somewhat cooler
 - d. the outer layers are very hot, the inner layers are somewhat hot

- _____ 8. Elements in the outer layers of a star absorb
- a. some of the light radiating from within the star.
 - b. some of the light radiating from outside the star.
 - c. none of the light radiating from outside the star.
 - d. none of the light radiating from inside the star.

THE COMPOSITIONS OF STARS

9. What do the colors and lines in the spectrum of a star indicate?
- _____
- _____

10. What is the most common element in stars? What is the second most common element?
- _____
- _____

THE TEMPERATURES OF STARS

In the space provided, write the letter of the color that best matches the surface temperature of a star.

- _____ 11. less than 3,500°C a. orange
- _____ 12. 10,000–30,000°C b. red
- _____ 13. 3,500–5,000°C c. yellow
- _____ 14. 5,000–6,000°C d. blue-white
- _____ 15. 7,500–10,000°C e. white

16. What is indicated by a star's color?
- _____
- _____

17. What color are the coolest stars?
- _____
- _____

THE SIZES AND MASSES OF STARS

- _____ 18. What is the diameter of the sun?
- a. 1,390,000 km
 - b. 11,390,000 km
 - c. 1,390,000 miles
 - d. 390,000 km

Directed Reading continued

- _____ 19. Stars that are very dense may have
- greater temperature than the sun and still be much larger.
 - less mass than the sun and still be much smaller than the sun.
 - more mass than the sun and still be much smaller than the sun.
 - lower temperature than the sun and still be much larger.

STELLAR MOTION

- _____ 20. What two kinds of motion are associated with stars?
- inferred motion and actual motion
 - actual motion and apparent motion
 - actual motion and imagined motion
 - inferred motion and apparent motion
- _____ 21. What causes the apparent motion of the stars, which we can see with the unaided eye?
- the actual movement of the stars
 - the movement of the skies
 - the movement of the sun
 - the movement of the Earth
- _____ 22. What causes the circular trails of light seen in long-exposure photographs of the stars?
- the revolution of the stars around the North Pole
 - the rotation of Earth on its axis
 - the revolution of Earth around the sun
 - the rotation of the stars on their axes
- _____ 23. In the Northern Hemisphere, the movement of stars called circumpolar stars makes them appear
- to be extremely distant.
 - to circle the sun.
 - to circle Polaris, the North Star.
 - to circle Mars and Venus.
- _____ 24. What is true of all visible stars at the North Pole?
- They are visible at the South Pole.
 - They are circumpolar.
 - They are perpendicular.
 - They are brighter than the sun.

Directed Reading continued

25. What is the Doppler effect?

26. What does the fact that most distant galaxies have red-shifted spectra indicate?

DISTANCES TO STARS

_____ 27. What is a light-year?

- a. the distance that light travels in one year
- b. the same as the speed of light
- c. the amount of time it takes light to travel one mile
- d. the distance that light travels in one second

_____ 28. How many kilometers does light travel in one year?

- a. 300,000 km
- b. 9.46 billion km
- c. 700 trillion km
- d. 9.46 trillion km

_____ 29. When we witness an event on the sun, when did it actually take place?

- a. about 8 minutes before we saw it
- b. about 80 years ago
- c. about 8 light-years before we saw it
- d. about 8 years before we saw it

_____ 30. Except for the sun, what star is nearest to Earth?

- a. Polaris
- b. Proxima Centauri
- c. Alpha Centauri
- d. Jupiter

_____ 31. How many stars can be seen without a telescope on Earth?

- a. about 6,000
- b. more than 3 billion
- c. less than 1,000
- d. more than 3 trillion

_____ 32. What is the Hubble Space Telescope?

- a. a sun-orbiting telescope
- b. an Earth-orbiting telescope
- c. a land-based telescope
- d. a telescope on a rocket

33. What is a star's apparent magnitude?

34. What is a star's absolute magnitude?

Directed Reading

Section: Star Groups

CONSTELLATIONS

- _____ 1. Although the stars that make up a pattern appear to be close together,
- a. they are not all the same distance from Earth.
 - b. they are not all stars.
 - c. they are all the same distance from Earth.
 - d. they are not all visible from Earth
- _____ 2. If you look at the same region of the sky for several nights, the positions of the stars
- a. appear to change in relation to one another.
 - b. appear to change some in relation to the sun.
 - c. do not appear to change in relation to one another.
 - d. appear to change in relation to the universe.
- _____ 3. Why do the stars appear to be fixed in their patterns?
- a. because Earth revolves around the stars
 - b. because they are actually not moving
 - c. because of the small distance from which the stars are viewed
 - d. because of the tremendous distance from which the stars are viewed
- _____ 4. What are the patterns of stars and the region of space around them?
- a. consternations
 - b. consultations
 - c. constellations
 - d. galaxies
- _____ 5. Why are constellations useful?

Directed Reading *continued*

MULTIPLE-STAR SYSTEMS

- _____ 6. What are binary stars?
- a. pairs of stars that revolve around each other and are held together by gravity
 - b. multiple-star systems that revolve around each other and are held together by gravity
 - c. pairs of stars that do not revolve around each other but are held together by gravity
 - d. pairs of stars that revolve around each other and are held together by magnetism
- _____ 7. What is a barycenter?
- a. the center of pressure in a star
 - b. the center of mass in systems of stars
 - c. the place where a star is hottest
 - d. the place toward which stars travel
- _____ 8. Where is the barycenter located when binary stars have similar masses?
- a. in one of the stars
 - b. outside both stars
 - c. in the center of each star
 - d. somewhere between the stars
9. How many observed stars do astronomers estimate are part of multiple star systems?

STAR CLUSTERS

10. What are clusters?
- _____
- _____
- _____
- _____
- _____
- _____
- _____
11. Name and describe two kinds of clusters.
- _____
- _____
- _____
- _____
- _____

GALAXIES

- _____ 12. What is a galaxy?
a. a large-scale group of planets, stars, and moons bound together by gravity
b. a large-scale group of stars, gas, and dust bound together by gravity
c. a large-scale group of stars, rocks, and dirt bound together by gravity
d. a large-scale group of gas, elements, and atoms bound together by gravity
- _____ 13. What is the diameter of the Milky Way?
a. about 100,000 years
b. about 200 billion miles
c. about 200 billion light-years
d. about 100,000 light-years
- _____ 14. What are Cepheid variables?
a. small stars that fade in a regular pattern
b. giant stars that brighten and fade in an irregular pattern
c. giant stars that brighten and fade in a regular pattern
d. dwarf stars that brighten and fade in a regular pattern

In the space provided, write the letter of the definition that best matches the term or phrase.

- _____ 15. elliptical galaxy
a. varies from almost spherical to a stretched out football in shape and has a bright center
- _____ 16. barred spiral galaxy
b. has a nucleus of bright stars and flattened arms that circle around the nucleus
- _____ 17. irregular galaxy
c. has no particular shape and may have a low total mass
- _____ 18. spiral galaxy
d. has a straight bar of stars that runs through the center

Name _____

Class _____

Date _____

Skills Worksheet

Directed Reading

Section: Stellar Evolution

- _____ 1. Why are astronomers not able to observe the entire life of any star?
- a. because of the movement of stars
 - b. because a star typically exists for billions of years
 - c. because the light of stars reaches Earth millions of years later
 - d. because a star typically does not exist long enough to be observed

CLASSIFYING STARS

2. What is luminosity?
- _____
- _____

3. What is the Hertzsprung-Russell diagram?
- _____
- _____
- _____

4. What is plotted on the horizontal axis and the vertical axis of the H-R diagram?
- _____
- _____

5. What is the main sequence?
- _____
- _____
- _____

STAR FORMATION

- _____ 6. What is a nebula?
- a. a cloud of gas and dust where a star begins
 - b. an explosion where dust collects
 - c. a false image of a star
 - d. a group of planets where a star begins

Directed Reading *continued*

- _____ 7. What is Newton's law of universal gravitation?
- a. None of the objects in the universe attract each other through gravitational force.
 - b. All objects in the universe attract each other through magnetic force.
 - c. None of the objects in the universe attract each other through magnetic force.
 - d. All objects in the universe attract each other through gravitational force.
- _____ 8. Gravitational force increases as the mass of an object
- a. decreases or as the distance between two objects decreases.
 - b. increases or as the distance between two objects increases.
 - c. increases or as the distance between two objects decreases.
 - d. decreases or as the distance between two objects increases.
9. What is a proto star?

10. What happens as more matter is pulled into a proto star?

11. What is important about the onset of fusion?

12. What happens as gravity increases the pressure on the matter within a star?

13. What does the equilibrium between the outward pressures of radiation and the force of gravity do?

14. How long does a main sequence star maintain a stable size?
-
-
-

THE MAIN-SEQUENCE STAGE

- _____ 15. What is the second and longest stage in the life of a star?
- a. the fusion stage
 - b. the stellar equilibrium stage
 - c. the main-sequence stage
 - d. the nebula stage
- _____ 16. A star that has the same mass as the sun's mass
- a. stays on the main sequence for about 10 million years.
 - b. stays on the main sequence for about 10 billion years.
 - c. stays on the main sequence for about 14 billion years.
 - d. stays on the main sequence for about 100 billion years.

LEAVING THE MAIN SEQUENCE

17. When does a star enter its third stage?
- _____
- _____

18. What does increased temperature from contraction in the core cause the helium core to do?
- _____
- _____

19. Describe the stars known as giants and their place on the H-R diagram.
- _____
- _____

20. What are super giants?
- _____
- _____

THE FINAL STAGES OF A SUNLIKE STAR

- _____ 21. What is a planetary nebula?
- a. a cloud of gas that forms around a sun like star that is dying
 - b. a cloud of gas that forms as a star is born
 - c. a cloud of energy that is hard to identify
 - d. a cloud of helium that forms around a star that is starting to fuse

Directed Reading continued**THE MILKY WAY**

19. What does the Milky Way look like in the night sky?

- a. a cloudlike band that stretches across the sky
- b. a cloudy mass in the center of the sky
- c. a cloudlike elliptical mass
- d. a cloudy mass with spiral arms

20. How is the sun related to the Milky Way?

21. How long does it take the sun to orbit around the Milky Way?

22. What are the closest neighbors to the Milky Way?

23. How far from Earth are the Milky Way's closest neighbors?

QUASARS

24. When were quasars first discovered?

- a. 1663
- b. 1963
- c. 1863
- d. 1763

25. What does a quasar look like when viewed through an optical telescope?

- a. It appears as a point of light, almost like a small, faint star.
- b. It appears as a mass of light, almost like a large, faint star
- c. It appears as a point of light, almost like a small, bright star
- d. It appears as a mass of light, almost like a large, bright star

26. The word quasar is a shortened term for

- a. quasi-singular radioactive source.
- b. quasi-stellar radio star.
- c. quarter-stellar radio star.
- d. quasi-stellar radio source.

_____ 28. After the supergiant stage, massive stars contract with a gravitational force that is

- a. a much less than that of small-mass stars.
- b. much greater than that of large-mass stars.
- c. much less than that of white dwarf stars.
- d. much greater than that of small mass stars.

29. What happens when the core uses up its fuel?

30. What is a neutron star?

31. What is a pulsar?

32. Describe how a black hole forms.

33. Why is locating black holes difficult?

Directed Reading continued

- _____ 22. What is a white dwarf?
- a. a cool, extremely scattered core of matter leftover from an old star
 - b. a hot, extremely scattered core of matter leftover from a red giant
 - c. a hot, extremely dense core of matter leftover from an old star
 - d. a cool, extremely dense core of matter leftover from a red giant
- _____ 23. What is a black dwarf?
- a. a white dwarf that no longer gives off light
 - b. a white dwarf that starts to give off more light
 - c. a black star that becomes a white dwarf
 - d. a star that is dying
- _____ 24. An explosion on a white dwarf caused by a pressure build-up is a
- a. red giant.
 - b. black dwarf.
 - c. super giant.
 - d. nova.
- _____ 25. What effect may a nova have on a star?
- a. It may cause it to become many thousands of times brighter.
 - b. It may destroy the star.
 - c. It may cause it to turn into a giant.
 - d. It may cause it to become many thousands of times dimmer.
26. Describe a supernova and how it differs from a nova.

THE FINAL STAGES OF MASSIVE STARS

- _____ 27. Stars that have masses of more than 8 times the sun's mass produce supernovas
- a. with the help of a secondary star.
 - b. rarely.
 - c. without needing a secondary star to fuel them.
 - d. on a regular basis.