1. **The distances to the most remote galaxies can be determined using:**

   a) galactic parallax.
   b) spectroscopic parallax.
   c) proper motion.
   d) Cepheids.
   e) none of the above.

2. **Generally stars that have low metallicities are considered to be:**

   a) near the end of their lives.
   b) very young.
   c) very old.
   d) a, b, or c — it's impossible to say.

3. **The evidence for the small size of quasars comes from:**

   a) the amount of energy they release.
   b) their distance from us.
   c) the rapidity of their luminosity changes.
   d) comparison with Cepheid variables.
   e) the magnitude of their redshift.

4. A star whose temperature is increasing but whose luminosity is roughly constant moves in what direction on the H-R diagram?

   a) to the right.
   b) to the left.
   c) upwards.
   d) downwards.
   e) none of the above, the star doesn't move on the H-R diagram.

5. **Which type of galaxy is observed to contain mostly older stars?**

   a) spiral
   b) elliptical
   c) dwarf elliptical
   d) irregular
   e) none of the above

6. The Andromeda Galaxy (our nearest spiral neighbour) has spectral lines that show a blue shift. From this we may conclude that:

   a) the universe is no longer expanding.
   b) The particular galaxy is moving towards us.
   c) This galaxy has merged with the Milky Way and is now a part of it.
   d) This particular galaxy is moving away from us.
   e) This galaxy has an unusual number of very bright and blue (i.e. hot) stars in it.

7. Which of the following is the most common type of star?

   a) white dwarf
   b) red giant
   c) main sequence
   d) supergiants
   e) none of the above

**8. What does the Hubble constant measure?**

   a) The age of galaxies.
   b) How light gets fainter with increasing distance.
   c) The curvature of spacetime.
   d) The average density of the Universe.
   e) The rate of expansion of the Universe.

9. What is the single most important characteristic in determining the course of a star's evolution?

   a) luminosity
   b) distance
   c) surface temperature
   d) mass
   e) chemical composition

**10. Which of the following is NOT found in the Galaxy's disk?**

   a) young star clusters
   b) O and B stars
   c) globular clusters
   d) emission nebulae
   e) dust lanes

**11. Some regions of the Milky Way appear dark because:**

   a) there are no stars there.
   b) stars in that direction are obscured by interstellar gas.
   c) stars in that direction are obscured by interstellar dust.
   d) there are numerous black holes that capture all the star light behind them.
   e) the Milky Way is full of holes.

12. Nearly all the elements found in our environment were formed inside of stars. The major exceptions are:

   a) iron and nickel.
   b) oxygen and carbon.
   c) hydrogen and helium.
   d) silver and technetium.
   e) gold and platinum.

**13. What effect does dust have on visible light passing through it?**

   a) it completely blocks all visible light from passing through.

b)  it dims and reddens it.
c)  all light is turned bluish in colour.
d)  it makes the light coming from stars appear to twinkle.
e)  it has no effect.

## 14. What is a planetary nebula?

a)  a planet surrounded by a glowing shell of gas.
b)  the disc of gas and dust surrounding a young star that will soon form a solar system.
c)  the ejected envelope of a red giant star surrounding a stellar core remnant.
d)  a type of young, medium mass star.
e)  a planet surrounded by a cool shell of molecular gas.

15. How does comparing the H-R diagram of different open and globular clusters confirm astronomers' general ideas about stellar evolution?

a)  The diagrams for different clusters are all the same.
b)  The diagrams indicate that all stars have the same age.
c)  The diagrams show that the top end of the main sequence turns off at different points, indicating that more massive stars evolve faster.
d)  The diagrams show the observed path that stars take through space.

16. Basically, stars evolve because they:

a)  are made of hydrogen.
b)  are gases.
c)  lose energy via radiation.
d)  are larger then planets.
e)  get bored with the status quo.

17. O and B type stars (i.e. recently formed, massive stars) are most commonly found in:

a)  elliptical galaxies
b)  irregular galaxies.
c)  the arms of spiral galaxies.
d)  galaxies of all type.
e)  globular clusters.

18. H-R diagrams of very young clusters of stars:

a)  have all their stars on the main sequence.
b)  Have only their high mass stars on the main sequence while the low-mass protostars are still contracting (and hence are not on the main sequence yet).
c)  Have only their low mass stars on the main sequence while the high-mass protostars are still contracting (and hence are not on the main sequence yet).
d)  Have only giant stars and white dwarfs.

## 19. The basic property of the molecular cloud that causes it to collapse and form a star is:

a)  its own gravitational forces.
b)  the pressure from surrounding clouds.

c) nuclear forces that are as yet not understood.
d) gas pressure forces and turbulence that tend to make such clouds condense.

20. Which one of the following is the primary difference between the observed spectra of most stars?

a) the presence or absence of a continuous spectrum.
b) the differing strengths and patterns of absorption lines.
c) the differing strengths and patterns of emission lines.
d) spectra of all stars have approximately the same appearance.

**21. Cepheid variable stars are important to astronomy primarily because they allow us to determine stellar**

a) distance.
b) mass.
c) temperature.
d) pulsation period.

22. What are the two most important intrinsic properties used to classify stars?

a) luminosity and distance.
b) luminosity and surface temperature.
c) distance and surface temperature.
d) distance and colour.
e) colour and surface temperature.

23. A black hole is really

a) densely packed matter.
b) at the centre of most stars and provides the star's energy.
c) a black star of temperature 0 K.
d) strongly curved space.

**24. Which of the following is the Hubble Law?**

a) The more distant a galaxy is, the younger is appears.
b) Most galaxies belong to a cluster; most clusters are part of a super cluster.
c) On large scales, the Universe appears the same to all observers.
d) The greater the distance to a galaxy, the greater its recession velocity.
e) The greater the distance to a galaxy, the fainter it is.

25. A galaxy is at a distance of one billion light years. Which of the following is true?

a) We see the galaxy the way it will be in one billion years.
b) We see the galaxy the way it was one billion years ago.
c) We see the galaxy the way it was when the Universe was one billion years old.
d) We see what our galaxy will be like in one billion years.

26. The observed difference between stellar spectra are caused primarily by differences in

   a) luminosity.
   b) chemical composition.
   c) temperature.
   d) motions.
   e) locations in space.

27. **Because all of the distant galaxies are redshifted, we know that:**

   a) We are at the centre of the Universe.
   b) The Universe is expanding.
   c) The sky is dark at night.
   d) all of the above.
   e) none of the above.

28. **The redshift of galaxies in the Universe is correctly interpreted as:**

   a) A Doppler shift due to the motions of the galaxies through space.
   b) An "aging" of the light.
   c) Space itself is expanding with time; the wavelengths of photons are stretched while they travel through space.
   d) The difference in temperatures of distant and nearby galaxies.
   e) Photons shifting their frequency due to the presence of dark matter.

29. What characteristic of a star cluster is used to determine its age?

   a) the number of red giants.
   b) the faintest stars in the cluster.
   c) the main sequence turnoff.
   d) the cluster birth certificate.
   e) the total number of stars in the cluster.

30. **The rotation curve of the Galaxy:**

   a) is a plot of rotation velocity versus distance from the galactic centre.
   b) indicates that the Galaxy could be imbedded in a halo of dark matter.
   c) shows that at large distances from the galactic centre, i.e. beyond the Sun's distance, objects are orbiting faster than theory predicts.
   d) all of the above.
   e) a) and c) are correct.