

Name: _____ Date: _____
Homework covering Chapter 24: Galaxies

1. The observational fact about a Cepheid variable star that leads to a measurement of its distance from Earth is that its period of variation is directly related to its
 - A) absolute magnitude or luminosity.
 - B) apparent magnitude.
 - C) speed away from us, using the relativistic effect upon pulsation period.
 - D) surface temperature.
2. Why does the central bulge of a spiral galaxy appear red when compared to the color of the spiral arms?
 - A) UV light from the very hot stars in the bulge has excited hydrogen gas, which is emitting the red Balmer H_α light as a consequence.
 - B) There is no star formation there, and the star population is dominated by old, long-lived, low-mass red stars.
 - C) The light from the stars in this region is not Doppler-shifted by galactic rotation, in contrast to that from spiral-arm stars.
 - D) Dust surrounding the bulge has preferentially scattered the blue light from the bulge stars.
3. Which of the following galaxy types contain little or no interstellar dust or gas?
 - A) ellipticals
 - B) barred spirals
 - C) spirals
 - D) irregular galaxies
4. Which of the following types of galaxies contains primarily population II, low-mass, long-lived stars?
 - A) ellipticals
 - B) irregular galaxies
 - C) lenticular galaxies
 - D) spirals

5. The Tully-Fisher Relationship relies upon broadening of the 21-cm radio line in distant spiral galaxies. What causes this broadening?
 - A) thermal motion of the gases in the galaxy
 - B) random motions of the stars in the galaxy
 - C) the rotation of the galaxy
 - D) the general expansion of the universe (Hubble flow)
6. The Hubble relation links which two characteristics of distant objects in the universe?
 - A) distance and velocity of recession
 - B) the state of organization of stars in clusters and the age of the clusters
 - C) stellar mass and luminosity
 - D) luminosity and surface temperature
7. What method is used to determine the distances of very remote galaxies?
 - A) use of their spectral redshifts and the Hubble law
 - B) measurement of the angular size of the galaxy and an assumption about the actual physical size of the galaxy
 - C) measurement of the apparent brightness and period of Cepheid variable stars within the galaxies
 - D) comparison of their apparent and absolute magnitudes
8. The expansion of the universe takes place
 - A) between all objects, even between the atoms in our bodies, although the expansion of a person is too small to be measured reliably.
 - B) only between objects separated by a vacuum; as a result, our bodies do not expand but the Earth-Moon system does.
 - C) only over distances about the size of a galaxy or larger; consequently, our galaxy expands but the solar system does not.
 - D) primarily in the huge voids between clusters of galaxies: “small” objects like galaxies or Earth do not expand.
9. An astronomer studying the spectrum of a distant galaxy finds that its recessional velocity is 14,000 km/s. What is the distance to the galaxy? Take Hubble's constant to be 73 km/s/Mpc.
 - A) 96 Mpc
 - B) 959,000 Mpc
 - C) 1,918 Mpc
 - D) 192 Mpc

10. What is the Local Group?
- A) a group of about 100 stars within 100 light years of the Sun, which appear to have been formed in a star cluster at about the same time from similar material
 - B) the planets Mars, Earth, and Venus, which are similar in physical properties and in orbital positions around the Sun
 - C) a group of galaxies clustered around the Andromeda Galaxy M31, apparently gravitationally bound to it but separate from the Milky Way
 - D) a cluster of about 40 galaxies of which the Milky Way is a member
11. What is the galaxy content of a rich, regular cluster of galaxies, like the Coma cluster?
- A) mostly ellipticals and S0 galaxies, with relatively few spirals and irregulars
 - B) entirely elliptical galaxies
 - C) mostly spirals and irregulars, and very few ellipticals and S0 galaxies
 - D) more-or-less even distribution of spirals, ellipticals, irregulars, and S0 galaxies
12. What is the galaxy content of a rich, irregular cluster of galaxies, like the Hercules cluster?
- A) entirely elliptical galaxies
 - B) more-or-less equal numbers of spirals and ellipticals
 - C) many more ellipticals than spirals
 - D) many more spirals than ellipticals
13. The overall distribution of galaxies through space is now found to be
- A) galaxies clustered together in several high-density centers, with very little matter between them
 - B) galaxies concentrated on the surfaces of huge open spaces or voids, like soap bubbles.
 - C) galaxies concentrated around one position in space, presumably the original site of the Big Bang.
 - D) galaxies distributed uniformly throughout space, out to the furthest distances.
14. What is the dominant radiation that we see from the intergalactic matter in rich clusters of galaxies?
- A) X-rays from very hot gas
 - B) infrared radiation from dust
 - C) 21-cm radio radiation from cool, neutral hydrogen gas
 - D) ultraviolet light from electrons spiraling in magnetic fields

15. What is the likely fate of our Milky Way within about the next 6–8 billion years?
- A) It will collide with the Andromeda Galaxy, triggering new star birth in gas and dust clouds.
 - B) It will continue to move away from its near neighbor galaxy, M31 in Andromeda, allowing its spiral arms to straighten to form a central bar.
 - C) Its rate of rotation will slow and its spiral arms will dissipate into intergalactic space as the galaxy becomes an elliptical galaxy.
 - D) It will slowly condense under the action of the central supermassive black hole, causing its spin rate to increase.
16. What is believed to be the origin of starburst galaxies?
- A) The galaxies are slower-rotators than other galaxies, and the slower-speed collisions between interstellar clouds produce more star formation.
 - B) A recent collision with another galaxy has triggered a wave of star formation.
 - C) A recent series of supernovae has compressed the interstellar medium and started a new wave of star formation.
 - D) The galaxies are newly formed and are undergoing their initial, rapid star formation
17. In order for gravitational lensing of a distant quasar to occur, the galaxy producing the lensing must
- A) be rotating rapidly in order to produce the requisite curvature of space to bend the light beam.
 - B) be almost perfectly placed on a line between Earth and the quasar.
 - C) contain a supermassive black hole at its center.
 - D) be a dwarf galaxy, otherwise the quasar's light cannot pass through it and reach Earth.
18. Recent evidence suggests that galaxies formed
- A) from the collapse of immense clouds of gas and dust.
 - B) from the mergers of hundreds of smaller objects.
 - C) when clouds of dark matter coalesced.
 - D) as direct, immediate products of the Big Bang.