

Introductory Astronomy

Homework 26: The Discovery of Galaxies Not to be handed in. Homework solutions are posted already.

1. “Let’s play *Jeopardy!* For \$100, the answer is: They are large, gravitationally-bound systems of stars that range from dwarf versions that are kiloparsec in size scale to the large ones that are tens of kiloparsecs in size scale.”

What are _____, Alex?

- a) binaries b) open clusters c) globular clusters d) galaxies e) universes

2. “Let’s play *Jeopardy!* For \$100, the answer is: In the celestial-sphere picture of the sky, this object is luminous band on celestial sphere that straddles a great circle that is at an angle of about 60° to the celestial equator.”

What is the _____, Alex?

- a) Zodiac b) celestial axis c) ecliptic d) Milky Way e) Andromeda Nebula

3. The center of the Milky Way is in:

- a) Orion. b) Sagittarius. c) Virgo. d) Cassiopeia. e) Norma.

4. Democritus (460?–360? BCE) hypothesized that the Milky Way was made of stars unresolvable to the unaided eye. Galileo and other observers of circa 1610 verified this hypothesis using the then recently invented:

- a) telescope. b) microscope. c) spectroscope. d) astrolabe. e) sundial.

5. “Let’s play *Jeopardy!* For \$100, the answer is: He/she attempted to map the Milky Way using star counts (or star gauges).”

Who is _____, Alex?

- a) Nicolaus Copernicus (1473–1543) b) Galileo Galilei (1564–1642) c) Isaac Newton (1642/3–1727)
d) William Herschel (1738–1822) e) Caroline Lucretia Herschel (1750–1848).

6. “Let’s play *Jeopardy!* For \$100, the answer is: He/she obtained the first roughly correct size estimate for Milky Way using Cepheid variable stars in globular clusters in the halo of the Milky Way.”

Who is _____, Alex?

- a) Henrietta Swan Leavitt (1868–1921). b) Heber Curtis (1872–1942). c) Harlow Shapley (1885–1972).
d) Edwin Hubble (1889–1953). e) Stephen Hawking (1942–).

7. Clouds in space or, historically, those objects regarded as cloud-like are called:

- a) shapleys. b) stars. c) galaxies. d) nebulae. e) curtises.

8. The spiral nature of some nebulae was discovered using visual astronomy and the largest telescope of its time: the 183-cm diameter Leviathan of Parsonstown located at Birr Castle, Parsonstown, Ireland. Because the spiral nebula are rather faint, it takes are large telescope to make out the spiral arms

visually. With long-exposure photography it is relatively easy to discover spirals. But visual astronomy beat the recently invented photography by some years in this case: the discovery was made in 1845 April by the builder of the Leviathan:

a) Henrietta Swan Leavitt (1868–1921). b) the Earl of Rosse (1800-1867). c) Edwin Hubble (1889–1953).
d) Harlow Shapley (1885–1972). e) Caroline Lucretia Herschel (1750–1848).

9. On 1920 April 26, a debate about the nature of the spiral nebulae was held at a meeting of the National Academy of Sciences in Washington, D.C. The debaters both made sound points in the printed presentations that they later made if not on the day of. This debate is called the Great Debate or the:

a) Einstein-de Sitter debate. b) Rosse-Hubble debate. c) Shapley-Hubble debate.
d) Shapley-Curtis debate. e) Kant-Einstein debate.

10. Edwin Hubble (1889–1953) was able to prove the extragalactic nature of the spiral nebulae because, among other things, he had available the world's:

a) largest telescope of our day. b) largest telescope of his day. c) smallest telescope of his day.
d) smallest telescope of our day. e) largest telescope of Newton's day.