

Galaxies.

1. Compared to the present day, the Milky Way 3 billion years ago would have had
 - a) More gas in the disk
 - b) More low mass stars in the halo
 - c) More metal rich stars
 - d) No solar system
2. What is the best way to determine the distance to the Andromeda galaxy?
 - a) Doppler shift of spectral lines
 - b) Period-luminosity relation of Cepheid variables in Andromeda
 - c) The Hubble law of recession of galaxies
 - d) Trigonometric parallax using the Earth's orbit
3. The nuclei of spiral galaxies appear redder than their spiral arms because of
 - a) Young blue stars in the arms and old red ones in the nucleus
 - b) Emission nebulae and dust in the nucleus
 - c) Receding nuclei and approaching spiral arms (Doppler shift)
 - d) Nuclear reactions
4. Compared to stars like the sun in the disk of the Milky Way, stars that populate the extended halo of the Galaxy were born
 - a) Earlier, so have had time to accumulate more heavy elements and so appear rich in metals
 - b) Later, so have used up their heavy elements
 - c) Earlier, from more primordial gas, so have fewer heavy elements
 - d) Later, so have accumulated more heavy elements from previous generations of stars
5. You could best map the structure of arms in a galaxy by studying
 - a) High velocity stars
 - b) Globular clusters
 - c) Evolved stars like planetary nebulae
 - d) Young open clusters