

These questions are meant to be in the style of the iClicker questions in lecture, and the questions on the Final. Please act as though this is the Final (work individually, and do not use calculators).

Name: _____

1. Which of the following explains the expansion of the Universe?
 - (a) The Special Theory of Relativity.
 - (b) The Big Bang.
 - (c) The theory of Inflation.
 - (d) Both (b) and (c).
2. Astronomers use the fact that atoms have quantized energy levels to:
 - (a) Determine the elemental abundances of stars and other astrophysical bodies.
 - (b) Measure the mass of stars and other astrophysical bodies.
 - (c) Try to understand chemistry.
 - (d) Measure the relative speed of stars and other astrophysical bodies.
 - (e) Both (a) and (d).
3. Which of the following is evidence for Dark Matter in our Universe?
 - (a) The observed accelerating expansion of the Universe.
 - (b) The cosmological constant.
 - (c) The emission of Hawking Radiation.
 - (d) The observed rotation rate of the Milky Way
 - (e) The gravitational redshift of distant galaxies.
4. Which of the following is TRUE:
 - (a) The Sun and Solar System lie about 1,000 light years from the center of the Milky Way galaxy.
 - (b) The carbon, nitrogen, and oxygen present in the Sun and Earth were synthesized in nuclear fusion reactions in the Sun's core.
 - (c) Mature galaxies tend to look more straggly than infant galaxies.
 - (d) The subtle ripples in the density of the early Universe from which galaxies formed left imprints that are visible in the afterglow from the Big Bang.
5. The epoch of confinement is best described as:
 - (a) The period of time when quarks first became bound to produce protons and neutrons.
 - (b) The period of time when photons were first able to stream freely, without interacting with electrons and protons.
 - (c) A period of time just before Inflation began.
 - (d) The period of time when stable hydrogen atoms were first formed.
 - (e) Both (a) and (c).

6. The lifetime of a solar mass star is approximately 10 billion years. The lifetime of a .1 solar mass star is approximately:
 - (a) 1 billion years.
 - (b) 10 billion years.
 - (c) 100 billion years.
 - (d) 1 trillion years.
 - (e) It cannot be determined just from the star's mass.
7. Which of the following is true about the Universe's size?
 - (a) It has a radius of approximately 100,000 light years.
 - (b) It has a radius of approximately 14 billion light years.
 - (c) It has a radius of approximately 45 billion light years.
 - (d) We do not know its size.
8. You observe a lunar eclipse just before sunset. What is the phase of the Moon?
 - (a) New
 - (b) Full
 - (c) Gibbous
 - (d) Crescent
 - (e) A lunar eclipse can occur during any phase of the moon.
9. Which of the following statements is FALSE?
 - (a) The Cosmic Microwave Background Radiation is considered to be strong evidence in favor of the Big Bang theory.
 - (b) The Steady State theory is founded on the Cosmological Principle.
 - (c) Most astronomers believe that the Universe satisfies the Cosmological Principle but not the Perfect Cosmological Principle.
 - (d) The Steady State theory postulates that, as the Universe expands, matter in the form of galaxies is created out of the energy in the C-field ("Creation" field).
10. Which of the following statements about quasars are TRUE?
 - (a) The light emitting region of a typical quasar is roughly the size of our galaxy.
 - (b) They are rapidly rotating neutrons stars with powerful magnetic fields which act as "standard candles".
 - (c) The typical mass of a super-massive black hole that powers the nucleus of a quasar is about five million times the mass of our Sun.
 - (d) Quasars feature radio jets lit up by synchrotron radiation produced by charged particles moving along spiral paths in a magnetic field.
 - (e) Both (a) and (c).
11. When a photon interacts with an atom, what changes occur in the atom?
 - (a) The atomic number increases.
 - (b) The nucleus begins to glow.
 - (c) An electron changes its orbital energy.
 - (d) The photon becomes trapped, orbiting in the atom.

- (e) Both (a) and (b).
12. Which of the following statements about Inflation is FALSE?
- (a) The Universe expands faster than the speed of light during Inflation.
 - (b) The rapid expansion during Inflation naturally explains why spacetime appears to be “flat” in terms of its geometric properties.
 - (c) Inflation solves the CMB horizon problem.
 - (d) Inflation violates the principles of Einsteins General Theory of Relativity.
 - (e) The theory of Inflation predicted that there should be fluctuations at the level of 1 part in 105 in the CMB.
13. Which of the following spiral galaxies is most tightly wound?
- (a) SBc
 - (b) Sb
 - (c) Sa
 - (d) Sbc
 - (e) E6
14. If a photon A has a longer wavelength (redder) than another photon B, then photon A has _____ than photon B.
- (a) higher energy
 - (b) lower energy
 - (c) lower frequency
 - (d) higher frequency
 - (e) Both (b) and (c).
15. An exoplanet which orbits the star Polaris is said to be tidally locked because:
- (a) The same side of the planet is always facing the star.
 - (b) It is confined to orbit the star.
 - (c) It orbits the star with the same period as the other planets in the system.
 - (d) We always see the same side of the planet from Earth.
 - (e) It orbits without spinning (each face always sees the same set of stars).
16. The majority of the energy in the Universe is thought to be in which form?
- (a) Ordinary (baryonic) luminous matter.
 - (b) Light.
 - (c) Dark matter.
 - (d) Dark energy.
 - (e) Evenly split between (a) and (c).