

# ASTRONOMY 100, Section 1, Fall 2001

## First Hour Exam; September 19, 2001

### Form A

1. "Light year" is a unit of  
(A) time      (B) brightness      (C) mass      (D) *length*      (E) energy
2. Our solar system is in  
(A) the Great Andromeda galaxy in the Local Group.  
(B) the Large Magellanic Cloud galaxy in the Milky Way.  
(C) the Milky Way of the Great Andromeda galaxy.  
(D) *the Milky Way in the Local Group.*  
(E) the Local Group of the Milky Way.
3. The "magnitude" of a star is a measurement of its  
(A) *brightness.*      (B) size.      (C) temperature.      (D) age.      (E) distance.
4. Which of the following is in the correct order?  
(A) pc > AU > m > cm > inch  
(B) *kpc > AU > mile > km > cm*  
(C) AU > km > mile > inch > cm  
(D) kpc > AU > km > mm > inch  
(E) AU > kpc > km > inch > cm
5. Which of the following gives clue to the shape of the earth?  
(A) the shape of a crescent moon      (B) the shape of a crescent Venus  
(C) *the shape of a lunar eclipse*      (D) the shape of a solar eclipse  
(E) all of the above
6. The Earth's spin (or rotation) is responsible for  
(A) the seasons.      (B) *the sunrise and sunset.*  
(C) the phases of the Moon.      (D) the solar eclipses.  
(E) the retrograde motion of superior planets.
7. Where on Earth do you see the least circumpolar stars?  
(A) Greenwich      (B) *the equator*      (C) the north or south pole  
(D) the same everywhere      (E) Champaign-Urbana
8. The ecliptic is defined by  
(A) the equatorial plane of the Earth.      (B) the plane of the observer's horizon.  
(C) *the orbital plane of the Earth.*      (D) the plane of the celestial equator.  
(E) the plane of the Moon's orbit.

9. When can we see the Sun at zenith from Champaign-Urbana?  
(A) vernal equinox                      (B) summer solstice                      (C) autumnal equinox  
(D) winter solstice                      (E) *none of the above*
10. Where do we see Polaris from Champaign-Urbana (at latitude  $40^\circ$  N)?  
(A) at zenith                                      (B) at horizon toward the north.  
(C) at  $40^\circ$  from the zenith.                      (D) *at  $40^\circ$  above the horizon.*  
(E) depends on the time of the night.
11. The coldest day in a year at Champaign-Urbana is most likely to occur  
(A) between autumnal equinox and winter solstice.                      (B) at winter solstice.  
(C) *between winter solstice and vernal equinox.*                      (D) when the Earth is at perihelion.  
(E) when the Earth is at aphelion.
12. The precession of the Earth's spin axis  
(A) has a period of 26,000 yr.  
(B) is caused by the Sun's and Moon's gravitational pull on the Earth's equatorial bulge.  
(C) causes the horoscopic dates of the sun signs to differ from astronomical dates.  
(D) causes the Sun's position at vernal equinox to shift by one constellation every 2,000 yr.  
(E) *all of the above.*
13. Which of the following can not be seen from Earth?  
(A) crescent Mars.                      (B) crescent Jupiter.                      (C) crescent Saturn.  
(D) crescent Pluto.                      (E) *all of the above*
14. If the axis of the Earth's spin is parallel to the axis of the Earth's orbit around the Sun,  
(A) there will be no sunrises and sunsets.                      (B) there will be no circumpolar stars.  
(C) Foucault pendulums will not rotate.                      (D) *there will be no seasons on Earth.*  
(E) solar eclipses would occur more frequently.
15. An astronaut standing on a full Moon looking toward the Earth sees  
(A) *a new Earth.*                      (B) a quarter Earth.                      (C) a gibbous Earth.                      (D) a full Earth.
16. The far side of the Moon is often erroneously called "dark side". It never faces  
(A) the Sun.                      (B) *the Earth.*                      (C) Venus.                      (D) Mars.                      (E) none of the above.
17. An annular lunar eclipse tells us that  
(A) the Moon is full                                      (B) the Moon is at perigee.  
(C) the Earth is round.                                      (D) the Earth is at aphelion.  
(E) *this question is wrong.*
18. Solar eclipses occur when the Sun, Earth, and Moon are aligned like  
(A) Sun - Earth - Moon.                      (B) *Earth - Moon - Sun.*                      (C) Earth - Sun - Moon.
19. Which of the following is a modern constellation?  
(A) Orion.                      (B) Illini.                      (C) *Telescopium.*                      (D) Refrigeratorium.                      (E) Big Dipper.

20. Astronauts in orbit about the Earth are weightless because  
(A) there is no gravity in outer space.  
(B) they are out of the Earth's gravitational field.  
(C) the Sun's gravity balances the Earth's gravity.  
(D) the Moon's gravity balances the Earth's gravity.  
(E) *they are falling toward the Earth with the same acceleration as the spacecraft.*
21. If the Moon's orbit around the Earth is exactly in the ecliptic plane, then  
(A) solar eclipse may occur at quarter Moon.  
(B) *solar eclipse will occur at every new Moon.*  
(C) lunar eclipse may occur at quarter Moon.  
(D) lunar eclipse will occur at every new Moon.  
(E) none of the above.
22. The spectrum of a blackbody depends only on its  
(A) magnetic field.      (B) mass.      (C) size.      (D) age.      (E) *temperature.*
23. The inverse-square law has the form  $F \propto \frac{1}{R^2}$ . ( $\propto$  means "is proportional to") Therefore, if R increases by a factor of 10, then  
(A) *F decreases by a factor of 100.*      (B) F decreases by a factor of 10.  
(C) F increases by a factor of 100.      (D) F increases by a factor of 10.  
(E) F goes to zero when R is zero.
24. Which of the following has less energetic photons than visible light?  
(A) gamma rays.      (B) X-ray.      (C) *infrared radiation.*  
(D) ultraviolet radiation.      (E) none of the above.
25. Human body emits in  
(A) X-rays.      (B) ultraviolet light.      (C) visible light.  
(D) *infrared light.*      (E) all of the above.
26. The inequality of season can be explained by  
(A) Kepler's harmonic law.      (B) *Kepler's equal areas law.*  
(C) Kepler's law of ellipses.      (D) Newton's law of action-reaction.  
(E) Newton's law of inertia.
27. The coming Saturday is September 22. It is the  
(A) vernal equinox.      (B) Summer solstice.      (C) *autumnal equinox.*  
(D) winter solstice      (E) time when terrorists burn in hell.
28. On September 22, in which direction will the Sun set?  
(A) northwest      (B) *due west*      (C) southwest

29. How many stars can we see with naked eyes in the night sky at a dark site?  
(A) 60–80. (B) 600–800. (C) 6,000–8,000 (D) 6–8 million. (E) 6–8 billion.
30. The brightest star in the night sky is  
(A) Vega. (B) Polaris. (C) Venus. (D) *Sirius*. (E) Betelgeuse.
31. If you see Venus at sunset, you must be looking toward  
(A) north. (B) east. (C) south. (D) *west*. (E) zenith.
32. If you see a Full Moon at sunset, you must be looking toward  
(A) north. (B) *east*. (C) south. (D) west. (E) zenith.
33. If the Moon is new on Sep 16, two weeks later the Moon will be  
(A) new. (B) crescent. (C) quarter. (D) gibbous. (E) *full*.
34. On Friday, Sep 14, students in this class used transmission gratings to look at the spectrum of  
(A) sodium. (B) helium. (C) *hydrogen*. (D) Mercury. (E) all of the above.
35. A planet orbiting around a star, the total energy (= gravitational energy + kinetic energy) of the planet is  
(A) *negative*. (B) zero. (C) positive. (D) imaginary. (E) variable.
36. Two atoms with the same numbers of protons belong to the same  
(A) isotope. (B) *element*. (C) family. (D) nucleus. (E) molecule.
37. Which of the photons travels at the fastest speed?  
(A) gamma ray (B) X-ray (C) visible light  
(D) radio wave (E) *they all travel at the same speed*.
38. Which of the following speed is the highest?  
(A) speed limit in Montana  
(B) Earth's rotational velocity at its equator  
(C) *Earth's orbital velocity around the Sun*
39. A 100-watt light bulb emits \_\_\_\_ photons in each second.  
(A)  $10^{-20}$  (B) 1 (C) 100 (D)  $10^{20}$
40. Which of the following describes the Earth's rotation and orbital motion around the Sun?  
(A) (B)  
  
(C) *use the right-hand rule* (D)