

Name:

Directions: Listed below are twenty (20) multiple-choice questions based on the material covered by the lectures this past week. Choose the correct response from those listed, **along with at least a one (1) sentence justification for your answer.** In the case of a question involving math, the calculation can serve as your justification. Each question is worth 5 points: 2 for the letter response and 3 for the justification. Collaboration with your peers is permitted, but all justifications must be in your own words. If you are unsure about a question, make an educated guess, and justify your guess (which can include why you can rule out certain choices from the list). If you get stuck, **please seek assistance from your peers, the TA, or the professor.** Note: It may be helpful to place your answers on a separate sheet of paper and staple it to this assignment sheet.

**WARNING:** Please **DO NOT** copy material word for word from sources such as textbooks, a peer's notes, online references (i.e. Google or Wikipedia), etc in any responses to homework, quiz, or exam questions. Ideas should be expressed in your own words. Not only does this protect you from illegal acts of plagiarism and/or accusations of cheating, but it also aids your future studying by having ideas expressed in a way that you, personally, can best understand. If for some reason you **MUST** quote text from a source in your answer, properly reference your quote.

- Over what range of declination will stars be circumpolar (i.e., always above the horizon) for an observer at  $30^\circ$  N latitude?
  - $60^\circ$  to  $90^\circ$  N and  $60^\circ$  to  $90^\circ$  S
  - $60^\circ$  to  $90^\circ$  N
  - $30^\circ$  to  $90^\circ$  N
  - $0^\circ$  to  $30^\circ$  N
- What is the angle, measured in degrees between two stars at  $RA = 4^h$ , declination =  $0^\circ$ , and  $RA = 8^h$ , declination =  $0^\circ$ ?
  - $4^\circ$
  - $0^\circ$ , since declinations are equal
  - $120^\circ$
  - $60^\circ$
- A star with  $RA = 4^h$  is in your meridian at a certain time. Which of the following star positions will be on your meridian 2.5 hours from now?
  - $RA = 6^h 30^m$
  - $RA = 4^h 2^m 30^s$
  - $RA = 1^h 30^m$
  - $RA = 4^h$ , since RA of a star does not change with time
- At what approximate value of declination was the Sun on March 21 this year?
  - $0^\circ$
  - $23.5^\circ$
  - $180^\circ$
  - no unique value

5. The two bright stars in the constellation Gemini, the Twins, are Castor (right ascension  $7^{\text{h}} 33^{\text{m}}$ , declination  $+31^{\circ} 56'$ ) and Pollux (right ascension  $7^{\text{h}} 44^{\text{m}}$ , declination  $+28^{\circ} 51'$ ). From these coordinates you can see that
- A) Pollux is slightly southeast of Castor.
  - B) Pollux is slightly northwest of Castor.
  - C) Pollux is slightly northeast of Castor.
  - D) Pollux is slightly southwest of Castor.
6. If we could observe background stars in daylight, how would the Sun appear to move against this background because of our motion on an orbiting Earth?
- A)  $1^{\circ}$  per day, from west to east
  - B)  $15^{\circ}$  per hour, from east to west
  - C)  $1^{\circ}$  per day, from east to west
  - D)  $15^{\circ}$  per hour, from west to east
7. The lowest amount of solar energy per square meter is incident on the surface of Earth in the northern hemisphere on or about
- A) March 21, the end of winter.
  - B) February 5, midwinter.
  - C) September 21, the beginning of autumn.
  - D) December 21, the beginning of winter.
8. The vernal equinox is that time of the year when the
- A) Sun crosses the equatorial plane, or celestial equator, moving north.
  - B) Sun crosses the equatorial plane or celestial equator, moving south.
  - C) Sun crosses the ecliptic plane.
  - D) Earth is at the closest point to the Sun in its elliptical orbit.
9. In what region of Earth would you have to be to have the Sun pass through your zenith at some time during the year?
- A) within the Arctic Circle
  - B) at any latitude
  - C) within  $\pm 23.5^{\circ}$  of the equator—the tropics
  - D) only on the equator, nowhere else
10. In its motion across our sky against the background stars in the course of a month, the Moon appears to move about
- A)  $0.5^{\circ}$  per day, its own diameter, from west to east.
  - B)  $1.0^{\circ}$  per day, twice its diameter, from west to east.
  - C)  $0.5^{\circ}$  per hour, its own diameter, from east to west.
  - D)  $0.5^{\circ}$  per hour, its own diameter, from west to east.
11. Precession of the Earth's axis of rotation is caused by
- A) changes in the rate of rotation (length of the day) of the Earth caused primarily by the gravitational pull of the Moon.
  - B) changes in the shape of the Earth's orbit due to the gravitational pull of the Moon.
  - C) the gravitational pull of the Moon and the Sun on the equatorial bulge of the Earth.
  - D) changes in the shape of the Earth's orbit due to the gravitational pull of the Sun.

12. If the polar axis of Earth precesses through a full circle (See Fig. 2-18, Freedman and Kaufmann, *Universe*, 7th ed.) in 26,000 years, how long will it take for the line between the axis and the center of the circle to move through  $1^\circ$ ?
- A) 720 years
  - B) 0.014 years
  - C) 7.2 years
  - D) 72 years
13. A given star in the sky will reach its highest point for a particular observer when it passes through the
- A) zodiac.
  - B) ecliptic plane.
  - C) meridian.
  - D) celestial equator.
14. On December 1 at 10 P.M., the bright star Procyon will just be rising on the eastern horizon. At approximately what time would you see this star rising on Christmas Day (24 days later)?
- A) 9:36 P.M.
  - B) 11:36 P.M.
  - C) 10 P.M.
  - D) 8:24 P.M.
15. At a particular time, the vernal equinox passes through the celestial meridian of an observer. What is the sidereal time at that site?
- A) 12 hours exactly
  - B) 0 hours exactly
  - C) variable, depending on the observer's latitude
  - D) variable, depending on the time of year
16. Suppose that on a given evening you notice that the sunlit portion of the Moon has a crescent shape. This simple observation tells you
- A) that at that particular time the Moon is closer to the Sun than you are.
  - B) that at that particular time the Moon is farther from the Sun than you are.
  - C) that the line from you to the Moon is exactly at right angles to the line from you to the Sun.
  - D) nothing at all about where the Moon is in space compared to you and the Sun.
17. The phase of the Moon when the Sun and Moon are separated by 6 hours of right ascension is always
- A) full moon.
  - B) new moon.
  - C) crescent.
  - D) either first or third quarter.
18. How much of the total surface of the Moon is illuminated by the Sun when it is at quarter phase?
- A) one quarter
  - B) very little
  - C) all of it

D) one half

19. Why is the period between two successive full moons not equal to the Moon's orbital period, or sidereal month?

- A) The Moon's orbit is elliptical, and the Moon therefore moves irregularly around the Earth.
- B) The Moon's orbit is inclined at about  $5^\circ$  to the Earth's orbital plane.
- C) Two time intervals are not related, since full-moon time depends on the Moon's rotation period about its own axis.
- D) The Earth-Moon system is also orbiting the Sun.

20. Which of the following is a necessary condition for lunar or solar eclipses?

- A) The Earth must be on the celestial equator.
- B) The Sun must be on the celestial equator.
- C) The Sun must be close to or crossing the ecliptic plane.
- D) The Moon must be close to or crossing the ecliptic plane.