ASTRO 120 -- FALL 2018

EXAM 1 Sample - September 29, 2018

Name: _____ Section:_____

Please indicate the best answer to each question on this exam sheet.

Good Luck!

Sections:

Friday	8:00AM	Section 01	(Mark T.)
	9:00AM	Section 02	(Derek J.)
	10:00AM	Section 03	(Derek J.)
	11:00AM	Section 04	(Brett G.)
	12:10PM	Section 05	(Alex R.)
Monday	8:00AM	Section 09	(Mark T.)
	9:00AM	Section 10	(Derek J.)
	10:00AM	Section 11	(Derek J.)
	11:00AM	Section 12	(Brett G.)
	12:10PM	Section 13	(Bobby C.)
	1:10PM	Section 14	(Alex R.)
	2:10PM	Section 15	(Bobby C.)

GOOD LUCK --- and RTFQ

USEFUL FORMULAE

P^2/a^3 = constant F=ma $F = GMm/d^2$ $v_e^2 = 2 \times v_c^2$

$v_c^2 \approx$ mass/distance angle of Earth's obliquity = 23.5 degrees

1 a.u. = 1.5×10^8 km

Ames, IA:

latitude = 42° 2' N

longitude = 93° 37' W

Multiple Choice: 35 questions, 2 points each. Select the *best* answer to each of the questions below.

1. The composition of most of the visible matter in the Universe are
   a) hydrogen
   b) helium
   c) mayonnaise
   d) oxygen
   e) carbon

2. A light year is
   a) a unit of distance equal to the distance light travels in one year.
   b) the length of time it takes for light to reach us from the Sun
   c) a unit of time equal to the distance the Earth travels in one year.
   d) a year with only 364 days
   e) 42

3. The point in the sky that is located 90 degrees above the horizon is the
   a) terrestrial horizon
   b) equator.
   c) pole.
   d) zenith.
   e) ascending node.

4. Which of the following would be the coordinates of a star that is rising in the southeast?
   a) azimuth 180 degrees, altitude 0 degrees
   b) azimuth 180 degrees, altitude 90 degrees
   c) azimuth 145 degrees, altitude 0 degrees
   d) azimuth 60 degrees, altitude 0 degrees
   e) azimuth 75 degrees, altitude 90 degrees

5. The equivalent of terrestrial longitude in the equatorial (celestial) coordinate system is
   a) declination.
   b) the horizon.
   c) precession.
   d) right ascension.
   e) space.

6. When the Sun is at Right Ascension (RA) 0 hours, what RA would be due South at midnight in Ames (or anywhere north of the equator)?
   a) 0 hours
   b) 6 hours
   c) 12 hours
   d) 18 hours
   e) not enough information provided to answer this question

7. Which of star would you find closest to the zenith in Ames, IA. during the night in September?
   a) Capella (RA = 5h; Dec= 46 degrees)
   b) Polaris (RA=18h; Dec= 89 degrees)
   c) Sirius (RA = 6h Dec= –16 degrees)
   d) Vega (RA = 19h Dec= 39 degrees)
   e) Alpha Ursa Majoris (RA = 14h Dec= 55 degrees)

8. Where on the Earth does the celestial equator pass through the zenith?
   a) Ames, IA
   b) the North Pole
   c) the South Pole
   d) the equator
   e) nowhere on Earth

9. The Sun's path on the celestial sphere is
   a) the zenith.
   b) the equator.
   c) the meridian.
   d) the ecliptic.
   e) the yellow brick road.

10. What is the altitude of the Sun at noon on the day of the autumnal equinox at 30 degrees North latitude?
   a) 42 degrees
   b) 30 degrees
   c) 48 degrees
   d) 60 degrees
   e) not enough information given to provide an answer.

11. On the first day of Fall, the Sun is on the
   a) zenith.
   b) meridian.
   c) celestial equator.
   d) nadir.
   e) lift at Midas Muffler Shop

12. Which of the following is true?
   a) A sidereal day is equal to a solar day on the Moon.
   b) A sidereal day is equal to a solar day on the Earth.
   c) A sidereal day is about 4 minutes longer than a solar day on the Earth.
   d) A sidereal day is the same for the Earth and the Moon.
   e) A sidereal day is about 4 minutes shorter than a solar day on the Earth.

13. The occurrence of seasons on the Earth results from
   a) the Earth being closer to the Sun in summer.
   b) the Earth changing its rotation rate during the year.
   c) the Earth's axis pointing in different south and then north during the year.
   d) the Earth's axis being inclined to the ecliptic.
   e) the appearance of Sirius rising above the Nile.

14. Which of the following factors is *least* important in causing seasonal variations in temperature?
   a) the changing distance between the Earth and the Sun
   b) the length of time the Sun is above the horizon
   c) the length of the night
   d) the maximum height the Sun reaches during the day
   e) all of the above are equally important

15. Where is the Sun on December 21?
   a) RA = 0 h, Dec = 0°
   b) RA = 6 h, Dec = -23.5^o
   c) RA = 6 h, Dec = 23.5^o
   d) RA = 18 h, Dec = -23.5^o
   e) RA = 18 h, Dec = 23.5^o

16. At approximately what time does the New Moon rise?
   a) sunset
   b) sunrise
   c) noon
   d) midnight
   e) never

17. If the Moon is high in the sky at noon, its phase is
   a) first quarter.
   b) new.
   c) full.
   d) third quarter.
   e) upside down and backwards

18. One morning in 1667, Isaac Newton was watching the sun rise while sitting next to his apple tree. At the moment of sunrise, an apple fell beside him. He looked up at the moon, high in the sky, and had one of those remarkable insights that led to his theory of universal gravitation. What phase of moon did he see?
   a) new moon
   b) first quarter
   c) full moon
   d) third quarter
   e) he could not see any moon at that time.

19. The moon crosses the ecliptic plane *twice* every
   a) day
   b) week
   c) month
   d) year
   e) 18.6 years

20. Eclipses do not occur each month because
   a) the Moon is always in the ecliptic.
   b) the Moon's orbit is eccentric.
   c) the Moon's distance to the Earth keeps changing.
   d) the Moon's orbital plane is inclined (tilted) to the ecliptic plane.
   e) the Moon's angular size is not equal to the Sun's at all times.

21. At which phase of the Moon do solar eclipses occur?
   a) full
   b) new
   c) first quarter
   d) third quarter
   e) gibbous

22. What kind of eclipse will be seen by an observer located directly within the umbral shadow of the Earth?
    a) partial lunar eclipse
    b) total eclipse of Earth
    c) total lunar eclipse
    d) annular solar eclipse
    e) partial solar eclipse

23. The nodes of the lunar orbit move slowly on the celestial sphere. How long does it take the nodes to move all the way back to their initial starting point?
    a) 1 month
    b) 12 months
    c) 18.6 years
    d) 56 years
    e) 25,000 years

24. How does the planet Mars move with respect to the stars?
    a) always eastward
    b) always westward
    c) it stays in the same place at all times
    d) sometimes eastward, sometimes westward
    e) it never moves with respect to the stars

25. Which of the following did Galileo use to support the heliocentric hypothesis?
    a) phases of the Moon
    b) prograde motion of the planets
    c) existence of sunspots
    d) phases of Venus
    e) the experiment of dropping balls of different weights off of the Leaning Tower of Pisa

26. According to Occam's Razor, scientific conclusions based on observations must:
    a) be published in order to be considered correct.
    b) be based on rigorous mathematical calculations.
    c) be endorsed by the National Academy of Sciences or the American Medical Association.
    d) explain all of the observations in the simplest way possible.
    e) be so complex that only three people in the world understand them.

27. Copernicus's principal contribution to astronomy was
    a) his noble blood.
    b) his suggested model for the solar system .
    c) the accuracy of his observations and the completeness of his records.
    d) his choice of Galileo as an assistant.
    e) improving the image of astronomers as dueling hotheads.

28. In the distant future, we may find another solar system surrounding a star just like our Sun in every way. If a planet is found in this system at a distance of 1 A.U. from the star, how long might its orbital period (the planet's year) be?
    a) unknown - need to know the planet's mass
    b) 1 year
    c) 1 month
    d) between 2 and 4 years
    e) 18.6 years

29. Based on Kepler's Laws, we know that the Earth moves slowest in its orbit around the Sun
    a) January 4th, the day the Earth is closest to the Sun
    b) the 4th of July, when the Earth is as far from the Sun as it ever gets
    c) at perihelion for the Earth
    d) at aphelion for the Earth
    e) b) and d)

30. Which of the following is one of Newton's Laws of motion?
    a) planets move on elliptical orbits with the Sun at one focus
    b) an object in motion tends to stay in motion unless a force acts
    c) never allow the lead-off runner to reach first base
    d) inner planets orbit in a different direction than outer planets
    e) the force of gravity between two objects decreases with the distance squared

31. The Sun is located at one focus of the orbit of a planet. What is located at the other focus?
    a) nothing
    b) the Earth
    c) the planet itself
    d) one of the other planets
    e) Jimmy Hoffa

32. What is always true when an object accelerates?
    a) It speeds up.
    b) It changes direction.
    c) A force is acting on it.
    d) Its mass changes.
    e) Its weight changes

33. Suppose the same force were applied to objects A and B Object A is half as massive as object B How do the accelerations of A and B compare?
    a) The accelerations are the same.
    b) The acceleration of A is twice as large.
    c) The acceleration of B is twice as large.l
    d) The accelerations are equal and opposite
    e) More information is needed to find the answer.

34. Which of the following procedures is the best way to get to Mars from the Earth:
    a) attain a transfer orbit with a perihelion of 1 a.u.
    b) attain a transfer orbit with an aphelion of 1 a.u.
    c) use gravity assist from a flyby of Venus
    d) use gravity assist from a flyby of Mars
    e) it is impossible to get to Mars from Earth - it takes too long.

35. Where in its journey is a Mars probe moving at maximum speed with respect to the Sun?
    a) at launch
    b) in Earth orbit
    c) in a transfer orbit near the Earth
    d) in a transfer orbit near Mars
    e) in Mars orbit.