

# HOMework #4

NOTES:

You will need a calculator, a pencil, and a standard scantron.

Each question has one correct answer. Choose the best answer for each. Mark your answer on the scantron.

This homework is due at the beginning of class on April 29. Late homeworks will not be accepted.

1. What does free fall mean?
  - a) No gravity.
  - b) No space.
  - c) No air.
  - d) No motion.
  - e) Refers to being in orbit.
  
2. Which of the following suffers from a runaway Greenhouse effect?
  - a) Mars
  - b) Venus
  - c) Earth
  - d) Luna
  - e) Mercury
  
3. Which is the correct ordering of worlds in terms of increasing size (from small to large)?
  - a) Mars, Moon, Earth, Venus
  - b) Mercury, Mars, Venus, Earth
  - c) Earth, Mars, Mercury, Moon
  - d) Mars, Venus, Mercury, Earth
  - e) Mercury, Moon, Venus, Earth

4. The atmosphere of the Earth has a density of about  $10^{19}$  molecules per cubic centimeter. Working out the numbers, the total number of air molecules works out to about  $4 \times 10^{43}$ . However, some gas is lost to space at the outer edge of our atmosphere, at about  $10^{28}$  molecules per year. How long can our atmosphere last?
- a)  $10^{15}$  years
  - b)  $10^{-15}$  years
  - c)  $10^{71}$  years
  - d)  $10^{-71}$  years
5. Jupiter sports an extremely strong magnetic field. This is because of its
- a) hydrogen rich atmosphere.
  - b) extensive moon system.
  - c) metallic hydrogen interior.
  - d) considerable distance from the otherwise magnetically interfering Sun.
6. Saturn's ring is composed of
- a) metallic chunks.
  - b) icy chunks.
  - c) a single solid icy band.
  - d) a single solid metallic band.
7. Who discovered Pluto?
- a) Adams
  - b) Lowell
  - c) Leverrier
  - d) Tombaugh
  - e) Herschel
8. What nation was first to put humans on the Moon?
- a) Soviet Union
  - b) USA
  - c) China
  - d) Japan
  - e) Britain
9. Neptune was a surprise for astronomers when Voyager 2 flew by, because unlike Uranus, it showed
- a) considerable atmospheric activity.
  - b) a magnetic field.
  - c) rotation.
  - d) a number of moons.
  - e) planetary rings.

10. Venus and Earth are sometimes called “sister planets” because they are similar in
- a) surface temperature.
  - b) their atmospheric content.
  - c) having polar ice caps.
  - d) mass and size.
  - e) their rotation period.
11. Who first discovered the major moons of Jupiter?
- a) Galileo
  - b) Cassini
  - c) Huygens
  - d) Copernicus
  - e) Herschel
12. Which moon has a thick nitrogen rich atmosphere?
- a) Mimas
  - b) Ganymede
  - c) Hyperion
  - d) Titan
  - e) Miranda
13. Pluto is most nearly like
- a) Earth.
  - b) Triton.
  - c) Mars.
  - d) Neptune.
14. The far side of the Moon is
- a) only visible at New Moon.
  - b) only visible at 1st and 3rd Quarter phases.
  - c) only visible at Full Moon.
  - d) always visible at some time when the Moon is above the horizon.
  - e) is never visible from the Earth.
15. Eris has an orbital period of 557 years. Its moon orbits once every 15.8 days. How many orbits will the moon make of Eris in the time it takes Eris to orbit the Sun once?
- a) About 560 times
  - b) About 5,800 times
  - c) About 203,000 times
  - d) About 8,800 times
  - e) About 13,000 times

16. Cometary orbits are extremely elliptical, so much so that their farthest distance  $d$  from the Sun is approximately equal to the major axis size ( $d = 2a$ ) of their orbit. If a comet orbits once in 3 million years, approximately what is the greatest distance it achieves from the Sun?
- a)  $3.0 \times 10^6$  AU
  - b)  $5.2 \times 10^9$  AU
  - c)  $2.0 \times 10^6$  AU
  - d)  $2.1 \times 10^4$  AU
  - e)  $4.2 \times 10^4$  AU
17. The main reservoir of comets at the edge of the Solar System is called
- a) the Ignace Assemblage.
  - b) Halley's Harbor.
  - c) the Oort Cloud.
  - d) the Zodiacal Band.
  - e) the Kuiper Belt.
- a) will one day be in the Earth's equatorial plane.  
b) will one day bring the Moon over the poles.  
c) is increasing in size.  
d) is decreasing in size.  
e) will one day become retrograde.
18. The Sun is best described as
- a) a huge ball of hydrogen gas.
  - b) a huge ball of luminous liquid.
  - c) an extremely hot metallic solid.
  - d) a gravitationally confined ball of molten rock.
19. Why does Venus not have much of a magnetic field?
- a) No iron core.
  - b) Its core is cold.
  - c) It is too near the Sun.
  - d) It rotates slowly.
  - e) Its atmosphere is too thick.
20. The Earth has a circumference of 40,000 km, and rotates once in 24 hours. Determine the speed of rotation at the Earth's equator.
- a) 40,000 km/sec
  - b) 17,000 km/sec
  - c) 28 km/sec
  - d) 2.9 km/sec
  - e) 0.46 km/sec

21. There are about 100 billion stars in the Milky Way galaxy. Each star is on average separated by about 10 light-years (LY). If there were  $10^7$  advanced civilizations with whom we could communicate, statistically speaking, how far away would the nearest one be? (Hint: Find the volume of a cube surrounding one star. Drawing a picture helps. Determine the total volume for all stars. Determine the average volume per civilization. Take the cube root.)
- a) 200 LY
  - b) 20 LY
  - c)  $10^5$  LY
  - d) 10,000 LY
  - e)  $5 \times 10^6$  LY
22. The cratering of lunar highlands shows us that
- a) they are younger than the maria.
  - b) they are older than the maria.
  - c) they were formed from plate tectonic activity.
  - d) they were formed from lava flows.
23. Mercury is different from the Earth in that
- a) Mercury has a relatively larger iron core (as fraction of volume).
  - b) Mercury has more mass.
  - c) Mercury has no craters.
  - d) Mercury has a thick carbon-dioxide atmosphere.
  - e) Mercury has larger oceans.
24. Who is famous for summarizing the geocentric model.
- a) Aristotle
  - b) Ptolemy
  - c) Galileo
  - d) Brahe
  - e) Kepler
25. Stellar parallax is an easy way to confirm the heliocentric model. Why was this not recognized in ancient times?
- a) No one knew how to spell parallax in those days.
  - b) No one was aware of the idea of parallax in those days.
  - c) Parallax does not involve geometry.
  - d) Parallax is too small to measure with the human eye alone.
  - e) No one tried to measure it.

26. The Moon orbits the Earth about monthly. Why don't we have a solar eclipse every month?

- a) The Moon's orbit is inclined to the ecliptic.
- b) The Moon's orbit is not inclined to the ecliptic.
- c) The Moon is not always the right size.
- d) The Sun is not always the right size.
- e) The Earth is sometimes in the wrong place.

27. Suppose a satellite is in a circular geosynchronous orbit. It experiences a force of gravity directed toward.

- a) Directly along its motion.
- b) Away from the Earth's center.
- c) The Earth's north pole.
- d) The Earth's center.
- e) The Earth's south pole.