

# Astronomy 161 Exam 2

## October 21, 2002

### WHITE VERSION

Select the single best answer for each question, unless otherwise instructed. No notes or calculators are permitted. Each question is 1 point unless otherwise noted.

1. Much of our knowledge of the interior of the Earth comes from the study of planetary vibrations, which is the science of

- a. planetology.                       b. seismology.                      c. meteorology.  
d. geography.                      e. geology.

2. The presence of scarps (cliffs) on Mercury's surface is thought to be due to

- a. a shrinking of Mercury's core in the relatively recent past.  
b. bombardment of Mercury by large planetesimals in the early the solar system.  
c. erosion by Mercury's tenuous atmosphere.  
d. the activity of tectonic plates similar to those on Earth.

Mercury only has one tectonic plate. The cliffs are thought to be due to the core's shrinking.

3. The heat energy in the Earth's interior is due to

- a. gravitational compression.                      b. friction in the core and mantle  
c. chemical reactions.                       d. natural radioactivity.

The original heating was due to gravitational compression, but now the heat comes from radioactive decay.

4. Match the theory of the Moon's formation to each statement. Write the letter corresponding to the theory in each blank. You can use each theory more than once. (7 points)

a. fission            b. large impact            c. capture            d. co-accretion

\_\_\_c\_\_\_ does not explain why the Earth and Moon are so similar as they are.

\_\_\_b\_\_\_ assumes a planetesimal the size of Mars struck the Earth at one time.

\_\_\_a\_\_\_ would suggest that the Earth and Moon have more similar compositions than they actually do and is unsupported by any dynamical explanation of how it could happen.

\_\_\_d\_\_\_ is dynamically feasible, but suggests that the Earth and Moon are too similar in composition, and probably would give the earth an excessively long rotational period.

\_\_\_b\_\_\_ has the best match to current data.

\_\_\_c\_\_\_ would tend to put the Moon in an extremely elliptical orbit, and create large tidal forces.

\_\_\_a\_\_\_ suggests that the creation of the Pacific Ocean and moon are connected.

5. Which of the following is **not** a similarity of Venus and Mars?

- a. Both have been explored by probes landing on the surface.
- b. Both have strong evidence of past liquid water on the surface.
- c. Both have atmospheres containing more than 95% carbon dioxide.
- d. Both have mountains much higher than any on Earth.
- e. Both have such weak magnetic fields they are difficult to explain.

It is unknown whether Venus ever had liquid water, but clear evidence exists that Mars did at one time, although the liquid water which caused this is no longer present on the surface.

6. The highest and lowest tides occur

- a. when the Moon is new or full.
- b. when the Sun's gravitational pull is the greatest.
- c. in spring.
- d. when the Moon is at first or last quarter.

At these times, the sun and moon pull along the same axis, so the gravitational forces act together to make the largest tidal variations.

7. Compared with the near side of the Moon, the far side is

- a. rougher.
- b. smoother.
- c. more volcanically active
- d. cooler.
- e. a darker color.

The far side of the moon has more of the rough highlands and few maria.

8. Two remarkable aspects of our solar system that must be accounted for in any theory of cosmogony are that

- a. all of the planets revolve around the Sun in the same sense as the Sun rotates, and the orbits of all of the planets lie in nearly the same plane.
- b. all of the planets rotate in the same sense as the Sun, and all have a density similar to that of water.
- c. the planets all have the same density and composition.
- d. the orbits of all of the planets lie in nearly the same plane, and all have the same composition.

9. Match the atmospheric layer of the Earth with a property shown. You may use each more than once. Select answers from the letters given: (7 points)

- a. ionosphere
- b. troposphere
- c. mesosphere
- d. stratosphere

  a   Layer that makes long distance radio communication possible.

  d   Characterized by horizontal wind flow and a temperature inversion.

  b   Contains the peak of Mount Everest.

  d   The layer containing the ozone layer.

  a   Where the highest temperatures in the atmosphere occur.

  c   Where the temperature falls with elevation to the atmosphere's coldest point.

  b   Where the earth's weather occurs.

10. When the Moon is at opposition to the Sun and in the plane of the ecliptic, the result will be

- a. a solar eclipse.     b. a lunar eclipse.    c. a new Moon.    d. minimal tides.

This means the Moon and Sun are in opposite directions from the Earth, so the Earth is between the Moon and Sun if the Moon is in the same plane as the Earth and Sun, which is the ecliptic plane.

11. The ozone hole

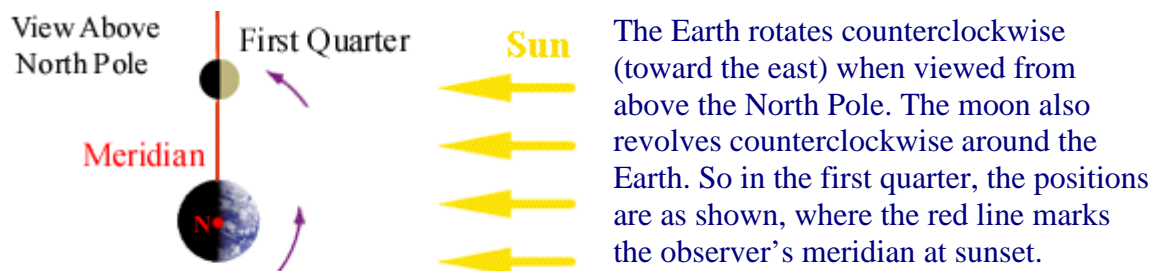
- a. is a temporary depletion in ozone levels worldwide that occurs every spring.  
b. is a permanent depletion in ozone levels worldwide.  
 c. appears each spring over Antarctica and disappears after a few months.  
d. is a permanent depletion in the ozone levels over Antarctic.

12. The theory that plates in the Earth's rigid outer layer are being driven around the surface of the Earth by convective currents in the mantle is called

- a. plate tectonics.    b. differentiation.    c. tidal locking.    d. dynamo effect.

13. If the Sun is just setting, and the Moon is at its first quarter phase, the Moon will be

- a. on the eastern horizon.    b. on the western horizon.  
 c. below the horizon.     d. on the meridian.



14. Match each statement to a planet and write its name. You can use the planets more than once. Print your answer clearly. (10 points)

\_\_\_ **Pluto** \_\_\_ is the only planet whose orbit is significantly tilted with respect to the ecliptic.

\_\_\_ **Mercury** \_\_\_ has an iron core making up much of its interior, but no significant magnetic field.

\_\_\_ **Venus** \_\_\_ rotates slowly in retrograde motion.

\_\_\_ **Jupiter** \_\_\_ is the largest Jovian planet.

\_\_\_ **Mars** \_\_\_ shows evidence of running water on its surface in the past, but not the present.

\_\_\_ **Earth** \_\_\_ is the densest planet in the solar system.

\_\_\_ **Venus** \_\_\_ has the highest average surface temperature.

\_\_\_ **Earth** \_\_\_ has the strongest magnetic field of the Terrestrial planets.

\_\_\_ **Mars** \_\_\_ has a day which is just slightly longer than one Earth day.

\_\_\_ **Mercury** \_\_\_ has a rotational period in tidal resonance with its solar orbit.