Astronomy 101.002
Hour Exam 2
March 11, 2009

Answers given in Bold Face

QUESTION 1: Where would you look to find Mercury in the sky?
   a) Near Orion’s belt.
   b) Near Polaris.
   c) High in the sky from 9 PM to 3 AM.
   d) **Near the Sun just after sundown or just before sunrise.**
   e) In the west at sunrise or the east at sunset.

QUESTION 2: A major difference between Jovian and Terrestrial planets is:
   a) Jovian planets have moons while Terrestrial planets do not.
   b) Terrestrial planets have metallic cores while Jovian planets do not.
   c) Terrestrial planets have water while Jovian planets do not.
   d) Jovian planets have thick atmospheres while Terrestrial planets do not.
   e) **Terrestrial planets have higher densities than Jovian planets.**

QUESTION 3: The major constituents of the Earth’s atmosphere are:
   a) 95% carbon dioxide and some water vapor.
   b) **77% nitrogen, 21% oxygen.**
   c) 77% oxygen, 21% nitrogen.
   d) Ozone, carbon dioxide, and water vapor.
   e) Hydrogen, helium and oxygen in roughly equal amounts.

QUESTION 4: Astronomers have not reported any extrasolar planets similar to the Earth because:
   a) There are none.
   b) **They are not detectable with current technology.**
   c) There are no nearby stars of like the Sun.
   d) It’s a conspiracy to keep us ignorant.
   e) They are hidden by interstellar dust.

QUESTION 5: In the picture below of the Comet Hyakutake, the Sun is located:
   a) You can’t tell as it is nighttime in the picture.
   b) Above and to the left of the picture
   c) Above and to the right of the picture.
   d) Below and to the left of the picture.
   e) **Below and to the right of the picture.**
QUESTION 6: In the leading theory of the formation of the solar system, the planets:
  a) Were ejected from the Sun following a close encounter with another star.
  b) Were ejected from the Sun following a close encounter with a rogue planet.
  c) **Formed from the same flattened, swirling gas cloud that formed the Sun.**
  d) Are much younger than the Sun.
  e) Are much older than the Sun.

QUESTION 7: The Jovian planets have lower densities than Earth because:
  a) They are larger.
  b) They do not have much water.
  c) They rotate slower on their axes.
  d) **They retained their hydrogen and helium.**
  e) They have thick atmospheres.

QUESTION 8: The orbits of most asteroids:
  a) **Lie between Mars and Jupiter.**
  b) Are beyond Neptune.
  c) Intersect the Earth’s orbit.
  d) Are highly elliptical.
  e) Do not obey Kepler’s Laws.

QUESTION 9: Comets are composed mainly of:
  a) Silicates (sand).
  b) **Frozen water and gases.**
  c) Iron.
  d) Compacted dust.
  e) Stardust.

QUESTION 10: It is believed that dinosaurs became extinct because:
  a) The Earth got too hot for them to survive.
  b) **A meteor struck the Earth killing off their food supply.**
  c) They were hunted to extinction by early man.
  d) They killed each other off.
  e) They died during the collision with another planet that created the Moon.

QUESTION 11: The spinning solar nebula contracted because of:
  a) **Its own gravity.**
  b) Conservation of momentum.
  c) Conservation of angular momentum.
  d) The scattering of light from the sun.
  e) Accretion.

QUESTION 12: When the spinning solar nebula contracted, it spun faster because of
  a) **Its own gravity.**
  b) Conservation of momentum.
  c) **Conservation of angular momentum.**
  d) The scattering of light from the sun.
  e) Accretion.
QUESTION 13: It is believed that the Moon was created by
a) Accretion of material from the solar nebula.
b) A collision of a comet with the Earth.
c) A collision of a meteor with the Earth.
d) A collision of a Mars-size protoplanet with the Earth.
e) A blob of molten material coming off the spinning Earth.

QUESTION 14: Most planets observed orbiting other stars have been discovered by:
a) Observing their gravitational effects on the star.
b) Direct observation of the planet.
c) Detecting radio transmissions from the planet.
d) Spectroscopic analysis of the light from the star and planet.
e) Interferometry.

QUESTION 15: The seasons on Earth occur primarily because
a) The Earth rotates on its axis.
b) The Earth’s axis is tilted with respect to the ecliptic.
c) The Earth’s distance from the sun changes throughout the year.
d) The Earth’s orbit is an ellipse.
e) Kepler’s Third Law.

QUESTION 16: The surface of Venus is hotter than Earth primarily because of:
a) It is closer to the Sun.
b) Its rotation rate is so slow.
c) It has no polar ice cap to cool it.
d) The greenhouse effect from the carbon dioxide in its atmosphere.
e) Venus isn’t much hotter than the Earth.

QUESTION 17: A greenhouse exposed to sunlight gets warm because:
a) Carbon dioxide is trapped inside the greenhouse.
b) The glazing insulates the interior from the cooler outside air.
c) The glazing traps visible light inside the greenhouse.
d) The glazing prevents ultraviolet rays from escaping.
e) The visible light can penetrate the glazing but the re-radiated infrared cannot.

QUESTION 18: Continental drift on Earth is believed to be caused by:
a) The steady flow of winds at lower altitudes of the atmosphere.
b) The precession and nutation of the Earth’s axis.
c) Circulation currents deep within the Earth causing large slabs of the Earth’s crust to move slowly.
d) Tidal forces from the oceans on the continental shelves.
e) Volcanism deep within the Earth.

QUESTION 19: The Earth has an average density of roughly:
a) The same as water.
b) Twice that of water.
c) Five times that of water.
d) Ten times that of water.
e) Greater than ten times that of water.
QUESTION 20: The number of planets in the solar system is:
   a) 4.
   b) 6.
   c) 7.
   d) 8.
   e) 10.

QUESTION 21: The Earth’s structure is differentiated. This means that the least dense material make up the ______ and the densest make up the ______.
   a) Core, mantle.
   b) Core, crust.
   c) Mantle, crust.
   d) Crust, mantle.
   e) Crust, core.

QUESTION 22: Ultraviolet rays from the Sun are absorbed in our atmosphere by:
   a) Nitrogen.
   b) Oxygen.
   c) Water vapor.
   d) Carbon dioxide.
   e) Ozone.

QUESTION 23: About 200 million years ago the continents:
   a) **Formed a single, large continent.**
   b) Were much like they are today.
   c) Were submerged under the oceans.
   d) Did not exist.
   e) Were farther apart than they are today.

QUESTION 24: Tides on Earth caused by the Moon are larger than those caused by the Sun because:
   a) The gravitational force on Earth from the Moon is stronger than that from the Sun.
   b) Heat from the Sun causes its tides to be smaller.
   c) The Moon always presents the same face to the Earth.
   d) The gravitational force from the Moon varies more across the Earth than does that from the Sun.
   e) The 23.5° tilt the Earth’s rotational axis.

QUESTION 25: Examination of the entire surface of the Moon reveals:
   a) The Northern hemisphere is distinctly different from the Southern hemisphere.
   b) There are craters only on one side of the Moon.
   c) **The Moon has two distinctly different sides, that seen from the Earth and that hidden from the Earth.**
   d) There is water on the Moon.
   e) There are no significant differences in surface features around the Moon.

QUESTION 26: Which of the following describes the formation of the lunar maria?
   a) Melting and solidification of crust followed by impacts.
   b) **Lava flows from volcanism.**
   c) Impact by comets.
   d) Tectonic activity.
   e) Chemical combination of atmospheric gases with lunar soil.
QUESTION 27: The Moon lacks an atmosphere because:
   a) It never had one.
   b) It was destroyed by the impact with a protoplanet.
   c) **Its gravitational field is too small to hold it.**
   d) Tidal forces from the Earth pulled it away.
   e) Its atmosphere condensed and became liquid because it is so cold.

QUESTION 28: In its orbit around the Earth, the Moon:
   a) Rotates once every 24 hours to keep in step with the Earth.
   b) **Always keeps the same side facing the Earth.**
   c) Always keeps the same side facing the Sun.
   d) Always keeps the sunlit side facing the Earth.
   e) Is in a highly elliptical orbit.

QUESTION 29: The helium used in children’s balloons comes from:
   a) Chemical separation of air.
   b) Chemical extraction from seawater.
   c) **Underground wells.**
   d) It is a by-product of the manufacture of plastics.
   e) Cosmic rays.

QUESTION 30: The Earth and the Moon are, on average, the same distance from the Sun. However, the Earth is, on average, much warmer than the Moon. Why?
   a) The Moon is much smaller than the Earth.
   b) The lunar night is much longer than night on Earth.
   c) **The Moon has no atmosphere.**
   d) The Moon contains fewer radioactive materials than the Earth.
   e) Global warming (on Earth).

QUESTION 31: Judging from the appearance of the Moon, the Earth, and Mercury and an understanding of their interiors, we may conclude which of the following?
   a) Mercury and the Moon have changed little since their initial formation.
   b) Both Mercury and the Earth are evolving but the Moon is not changing significantly.
   c) The present surface features of all three bodies may be considered permanent.
   d) **Only the surface of the Earth is changing significantly.**
   e) All three objects are in a state of constant evolutionary change.

QUESTION 32: Which of the following statements about Mercury’s atmosphere is true?
   a) **Mercury has no permanent atmosphere.**
   b) Mercury has a thin atmosphere composed primarily of nitrogen.
   c) The atmosphere of Mercury is primarily carbon dioxide and methane.
   d) The atmosphere of Mercury contains mostly Hydrogen and Helium.
   e) We don’t know enough about Mercury to determine whether it has an atmosphere or not.

QUESTION 33: Mercury’s rotation period is precisely 2/3 of its period of revolution around the Sun. This is due to:
   a) Its magnetic field.
   b) The tidal effect from its moon.
   c) **The tidal effect from the Sun.**
   d) The impact from a planet-sized object that altered its rotation.
   e) The statement is false – it actually rotates rapidly.
QUESTION 34: Which statement is true about the appearance of Mars?
   a) The surface cannot be seen because of dense clouds.
   b) **It appears red because of its iron-rich crust.**
   c) It appears red because of the greenhouse effect.
   d) It shows no evidence of volcanism.
   e) It shows no evidence of craters.

QUESTION 35: Which of the following statements is true about Mars?
   a) There never was any running water on Mars.
   b) Space probes have found small amounts of running water in deep canyons.
   c) **Water ice probably exists below the surface.**
   d) The polar ice caps consist entirely of frozen water.
   e) Mars has small lakes.

QUESTION 36: The giant red spot on Jupiter is believed to be:
   a) An enormous volcano.
   b) A region of hot gases in the upper atmosphere.
   c) **A cyclonic storm that has lasted over 300 years.**
   d) An opening in the atmosphere (like our ozone hole).
   e) A scar produced by the impact of the comet Shoemaker-Levy.

QUESTION 37: The rotation periods of Jupiter and Saturn are:
   a) Very short – roughly 1 hour.
   b) **Fairly short – roughly 10 hours.**
   c) About 1 day.
   d) Very long - about 10 weeks.
   e) Neither Jupiter nor Saturn rotate.

QUESTION 38: The Jovian planets retain Helium and Hydrogen in their atmospheres primarily because:
   a) They are so far from the Sun.
   b) The other gases in their atmospheres keep them from escaping.
   c) **Their great mass results in large escape velocities.**
   d) They are so cold.
   e) The statement is false – they do not have much helium or hydrogen in their atmospheres.

QUESTION 39: Neptune was discovered by:
   a) Kepler.
   b) Newton.
   c) Tycho Brahe.
   d) **Observing discrepancies in the orbit of Uranus.**
   e) Observations with the Palomar telescope.

QUESTION 40: The Jovian planets radiate more energy than they receive from the Sun. The source of this extra energy is most likely:
   a) Radioactive decay in the core.
   b) The greenhouse effect.
   c) Energy converted from their rotational motion.
   d) **Heat left over from their formation.**
   e) The statement is false – the Jovian planets do not radiate more heat than they receive from the Sun.
QUESTION 41: The rotation of Uranus is unlike that of Jupiter and Saturn because:
   a) The rotation period is much shorter.
   b) The rotation period is much longer.
   c) The rotation period of Uranus is the same as its orbital period.
   d) The axis of rotation of Uranus is nearly in the ecliptic.
   e) The statement is false – the rotation of Uranus is similar to that of Jupiter and Saturn.

QUESTION 42: The core of Jupiter is believed to be:
   a) Rocky.
   b) Compressed helium.
   c) Liquid.
   d) Compressed gas.
   e) Metallic hydrogen.

QUESTION 43: In the kinetic theory of heat, gas molecules:
   a) Always have the same velocity.
   b) Move with an average velocity that decreases as the gas gets hotter.
   c) All have the same velocity if the gas is at a fixed temperature.
   d) Expand as the gas gets hotter.
   e) Move with an average velocity that increases as the temperature increases.

QUESTION 44: The oxygen in the Earth’s atmosphere came from:
   a) Production by plant life several billion years ago.
   b) Chemical dissociation of water vapor by UV radiation from the Sun.
   c) Outgassing from volcanoes.
   d) The collision with the protoplanet that produced the Moon.
   e) The solar nebula.

QUESTION 45: Earthquake epicenters and volcanoes tend to occur in the same regions on Earth because:
   a) they are both caused by the action of molten lava.
   b) they tend to occur where plates are colliding.
   c) they tend to occur under the oceans where the water interacts with the landmasses.
   d) earthquakes often produce volcanoes.
   e) The statement is false. The locations of earthquakes and volcanoes are not correlated.

QUESTION 46: The average speed of the plates on the Earth’s surface is:
   a) A few centimeters per century.
   b) A few centimeters per year.
   c) A few meters per year.
   d) Very small – a few millimeters per century.
   e) Too small to notice over a person’s lifetime.

QUESTION 47: The force of gravity is weaker on the surface of the Moon than on Earth because:
   a) The Moon rotates so slowly.
   b) The Moon has a smaller diameter than the Earth.
   c) The Moon has no atmosphere.
   d) The Moon has a smaller mass that the Earth.
   e) The statement is false – the force of gravity is the same on the Moon and on the Earth.
QUESTION 48: Because of the tides:
   a) The Earth’s rotation rate is increasing.
   b) **The Earth’s rotation rate is decreasing.**
   c) The Earth will eventually spiral away from the Sun.
   d) The level of earthquake activity is increasing.
   e) Motion of the plates is decreasing.

QUESTION 49: The planets that have rings tend to have:
   a) Only a few moons.
   b) Weak gravitational fields.
   c) **High gravitational fields.**
   d) Slow rotation rates.
   e) Only Saturn has rings so one cannot generalize.

QUESTION 50: The sixth planet from the sun is:
   a) The Earth.
   b) Mars.
   c) Jupiter.
   d) **Saturn.**
   e) Uranus.

QUESTION 51: The second brightest object in the night sky is:
   a) The Moon.
   b) Mercury.
   c) **Venus.**
   d) Mars.
   e) Jupiter.

QUESTION 52: The rings of Saturn can best be described as:
   a) Solid orbiting sheets of ice.
   b) Numerous thin solid rings.
   c) **Numerous solid chucks of ice and rock.**
   d) Bright thin layers of orbiting gas.
   e) Thin layers of volcanic ash.

QUESTION 53: Saturn’s rings are believed to have formed:
   a) **From the breakup of a moon of Saturn that was torn apart by tidal forces.**
   b) At the same time Saturn formed.
   c) From material ejected from Saturn.
   d) From captured comets.
   e) From accretion of gas from Saturn’s atmosphere.

QUESTION 54: The largest four moons of Jupiter were discovered by:
   a) Tycho Brahe.
   b) Johanes Kepler.
   c) Isaac Newton.
   d) Percival Lowell.
   e) **Galileo.**
QUESTION 55: The strong seasonal variations on Uranus over the course of its orbit around the Sun are caused by:
   a) Variations in the Sun’s intensity.
   b) The **98° tilt of its rotation axis with respect to the ecliptic**.
   c) Periodic shadowing of sunlight by the other Jovian planets and moons.
   d) The variation of its distance to the Sun.
   e) The statement is false – there are no significant seasonal variations on Uranus.

QUESTION 56: The density of Saturn is approximately:
   a) Equal to the density of Earth.
   b) Equal to the density of the Sun.
   c) Equal to the density of Mars.
   d) Equal to the density of water.
   e) **Less than the density of water**.

QUESTION 57: The (orbital) period of Neptune is:
   a) The time it takes Neptune to complete one revolution on its axis.
   b) 365 days.
   c) **Longer than 365 days**.
   d) Shorter than 365 days.
   e) 1 day.

QUESTION 58: What is the approximate age of the solar system according to the best scientific evidence?
   a) 5000 years.
   b) 500,000 years.
   c) 2.5 million years.
   d) **4.6 billion years**.
   e) 10 billion years.

QUESTION 59: Pluto no longer considered a planet. What is it then?
   a) A large comet.
   b) A moon of Neptune.
   c) A meteor.
   d) An asteroid.
   e) **A Kuiper belt object**.

QUESTION 60: The peculiar rotation of Uranus is probably due to:
   a) Random chance when it was formed.
   b) A slowly changing axis of rotation caused by interactions with Jupiter and Saturn.
   c) A slowly changing axis of rotation caused by tidal forces from its moons.
   d) A slowly changing axis of rotation caused by asymmetrical volcanic eruptions.
   e) **A catastrophic event such as a collision with another large body**.