Astronomy 110-1

PROBLEM SET #3 (15 Pts) Answer Key Name
24 February, 2012
DUE Friday, 2 March, 2012

1. Match the following with their appropriate “average density” (1 pt):
   A. Ices  B. Rocks  C. Metals
   8 grams/cm$^3$ ___C____  1 grams/cm$^3$ ___A____  3 grams/cm$^3$ ___B____

2. Which object has the smallest fraction of its interior in a metal core? (0.5 pt)
   A. Earth  B. Mercury  C. Venus  D. Mars
   ____D____

3. The most abundant element found in the inner core of the Earth is (0.5 pt)  ____Iron____

4. For the Earth, Venus, and Mars list the primary atmospheric gas(es) (meaning any molecule accounting for more than 10% of the total mass of the atmosphere), and the total atmospheric pressure (in units of bars) for each planet (3 pts)

<table>
<thead>
<tr>
<th>Primary atmospheric gases (&gt;10% of total)</th>
<th>Total atm pressure (bars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth, N$_2$, O$_2$, <em><strong>1</strong></em></td>
<td></td>
</tr>
<tr>
<td>Venus, CO$_2$, <em><strong>~90</strong></em></td>
<td></td>
</tr>
<tr>
<td>Mars, CO$_2$, <em><strong>~0.01</strong></em></td>
<td></td>
</tr>
</tbody>
</table>

5. The Asteroid Belt is located between the orbits of (1 pt)
   _______Mars_______________ and _______Jupiter______

6. What is most responsible for producing the Earth's magnetic field? (0.5 pt)?
   A. sunspots
   B. a rotating outer core of liquid metal
   C. bombardment of the Earth by asteroids
   D. the solar wind
   ____B____

7. If the Earth early on had a reducing atmosphere, circle the following molecules that would likely be most abundant (circle all correct answers) (1 pts)
   $\text{O}_2$, $\text{O}_3$, $\text{NH}_3$, $\text{CH}_4$
8. Which below would contribute to an increasing “greenhouse effect” on Earth? (0.5 pt)
   A. cutting down the Amazon rain forest
   B. massive volcanic eruptions
   C. release of CO$_2$ from surface rocks
   D. all of the above

   _____ D _____

9. Rank (largest to smallest) the 4 giant outer planets according to the following intrinsic properties: (3 pts)

   Diameter
   - Jupiter
   - Saturn
   - Uranus
   - Neptune

   Mass
   - Jupiter
   - Saturn
   - Neptune
   - Uranus

   Density
   - Neptune
   - Jupiter
   - Uranus
   - Saturn

   largest
   smallest

10. Match the moons of Jupiter with the given property: (2 pts)

   A = Io    B = Callisto    C = Ganymede    D = Europa

   heavily cratered, icy body; diameter comparable to Mercury
   rocky interior, icy covered surface
   largest moon in the solar system
   surface riddled with active volcanoes

   _____ B _____

11. Why do we say there are virtually no seasons on the planet Jupiter? (0.5 pt)

   A. the thick cloud layers uniformly absorb solar energy
   B. the axis of rotation is tilted by only three degrees
   C. Jupiter maintains a constant distance from the Sun
   D. since Jupiter is so far from the Sun, winter lasts all year long

   _____ B _____

12. The ring particles in the rings of Saturn are composed mainly of (0.5 pt)

   A. pure water ice
   B. ice-coated dust and rock
   C. methane gas
   D. ammonia gas

   _____ B _____

13. What feature separates the B and A rings of Saturn? (0.5 pt)

   ______ Cassini’s Division ______

14. The density of Saturn is ______ A ______ the density of water. (0.5 pt)

   A = less than    B = greater than    C = equal to