1. Write the following numbers in "powers of ten" notation: (3 pts)

   two million   __________ 2 \times 10^6 

   six thousand  __________ 6 \times 10^3 

   eight hundred  __________ 8 \times 10^2 

   nine billion  __________ 9 \times 10^9  

   thirty trillion __________ 3 \times 10^{13} 

   two hundred five  __________ 2.05 \times 10^2 

2. Order the following numbers from smallest (top) to largest (bottom): (3 pts)

   a) megaparsec ___ f ___ (smallest)  

   b) light year  ___ e ___ 

   c) kiloparsec  ___ b ___ 

   d) parsec  ___ d ___ 

   e) 10^3 AU  ___ c ___ 

   f) AU  ___ a ___ (largest)
3. Place the above forms of electromagnetic radiation in order of increasing wavelength (use either the letter or the name) (3 pts)

A. Gamma Rays
B. Infrared
C. Radio
D. Visible
E. Ultraviolet
F. X-Rays
G. Microwave

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<tr>
<th>A</th>
<th>F</th>
<th>E</th>
<th>D</th>
<th>B</th>
<th>G</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>shortest</td>
<td>longest</td>
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4. Place the above forms of electromagnetic radiation in order of increasing energy. (3 pts)

<table>
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<tr>
<th>C</th>
<th>G</th>
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<th>D</th>
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<th>F</th>
<th>A</th>
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<tr>
<td>lowest</td>
<td>highest</td>
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5. Which two of the following forms of electromagnetic radiation can most easily be detected from the ground? (1 pt)

A. Radio waves
B. Visible waves
C. Gamma Rays
D. Infrared radiation

A  B

6. Visible wavelengths of electromagnetic radiation have a range of wavelengths of (1 pt)

A. 4000 to 7000 Angstroms
B. 8000 to 19000 Angstroms
C. 900 to 1300 Angstroms
D. 10 to 1000 Angstroms

A

7. Why are the frequencies of spectral lines from a given atom the same regardless of whether they are emission or absorption lines? (1 pt)

A. All types of atoms emit the exact same lines as each other
B. In a given atom the same energy levels can be involved in both emission and absorption
C. They are not. For a given type of atom, its emission lines can never be the same frequency as its absorption lines.

B