Chapter 1 – Introduction to Chemistry

Handling Numbers

**Scientific Notation:** a system for working with very ____________ and very ____________ numbers.

1000 m

0.00001 kg

0.0325 mol

11000 K

**Prefixes used with units of measurement**

Numbers less than 1:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Symbol</th>
<th>It means…</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>deci-</td>
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<tr>
<td>centi-</td>
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<tr>
<td>milli-</td>
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<td>micro-</td>
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<td>nano-</td>
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<td>pico-</td>
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Numbers more than 1:

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<thead>
<tr>
<th>Prefix</th>
<th>Symbol</th>
<th>It means...</th>
<th>Example</th>
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</thead>
<tbody>
<tr>
<td>kilo-</td>
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<tr>
<td>Mega-</td>
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<td>Giga-</td>
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<td>Tera-</td>
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Accuracy and Precision

**Accuracy:** how close a _______________________ is to the _______ ____________ of the quantity being measured.

**Precision:** how closely _______ _____ ____________ measurements of the same quantity agree with ___________ ________________.

When making measurements in the lab, we often do ________________ __________ in order to check the ________________ of our measurements.

Let’s say we do an experiment to measure the density of water. We could use a ____________________________ to measure the ________________ and a ________________ to measure the mass.

Two students each do three trials and get the following sets of data.

Student 1:  0.976 g/mL   
            0.977 g/mL   
            0.978 g/mL

Student 2:  1.013 g/mL   
            0.987 g/mL   
            1.001 g/mL

Who has more precise measurements?
Who has more accurate measurements?
What would a data set look like that was both accurate and precise?
**Significant Figures**

1. Any digit that is not zero is significant.

2. Zeros between non-zero digits are significant.

3. Zeros to the left of the first nonzero digit are not significant.

4. If any number is >1, then all the zeroes written to the right of the decimal point count as significant figures.

5. For numbers that do not contain decimal points, the trailing zeroes may or may not be significant.
Calculations using Significant Figures

The result of a calculation ___________________ be ___________ _______________ than the numbers that were used in the calculation.

1. **Addition and Subtraction**: The ______________ cannot have ________ digits to the right of the decimal point than either of the ______________ ____________.

2. **Multiplication and Division**: The number of significant figures in the final answer is determined by the original number that has the ______________ number of significant figures.

3. **Multi-step Calculations**: Significant figures should be considered for each step.
Dimensional Analysis – solving Word Problems

1. A chemist needs 2.1347 g of a liquid compound. What volume of the compound is necessary if the density of the liquid is 0.7217 g/cm³? If the compound costs $6.41 per milliliter, what is the cost of 2.1347 g?

2. Room temperature is typically around 69 °F. What is this temperature in Celsius? What is it in Kelvin?

Homework: Chapter 1 #18, 20, 22, 24, 26, 28, 30, 32b, 34, 38d, e, f, g, 44, 48, 78