CONCEPT: EXPERIMENTAL ERROR

When any calculation is done there is a level of error involved.

- Error can be grouped into 2 categories: random (lack of _____) and systematic (lack of _____).

- **Random errors** are unpredictable and can lead to results that are either too high or too low.

- **Systematic errors** are more predictable and can lead to results that are always too high or always too low, but not both.

- In most cases, a percent error of less than _____ will be acceptable.

$$\% \text{ error} = \frac{\left|\text{Experimental value} - \text{Theoretical value}\right|}{\text{Theoretical value}} \times 100$$

The percent error formula is a useful tool for determining the _____ of your calculations.

- The _____ value is your calculated value, and the _____ value is your known value.

EXAMPLE 1: Which of the following features are indicative of random errors?

i. Doing numerous measurements and taking the average in order to minimize any errors.

ii. The results of an experiment are consistently greater than expected or less than expected.

iii. Refining the parameters of the experiment help to eliminate any errors.

iv. The exist of the error is hard to determine.

EXAMPLE 2: Which of the following represent a systematic error when measuring the mass of an anhydrous object?

i. You weigh the object before all the water has evaporated.

ii. The scale used has not been properly calibrated.

iii. Airflow near the balance causes the precise mass to vary.

iv. You write down the incorrect mass of the anhydrous object.