Introduction to Measurement
Worksheet 1

Uncertainty in Length Measurements

Measurements are often written as a single number rather than a range. When you write the measurement as a single number, it’s understood that the last figure had to be estimated. Consider measuring the length of the same object with two different rulers.

1. Give the correct length measurement for the steel pellet for each of the rulers, as a single number rather than a range.

Left Ruler: __________________
Right Ruler: _________________

Uncertainty in Volume Measurement

Use the bottom of the meniscus (the curved interface between air and liquid) as a point of reference in making measurements of volume in a graduated cylinder, pipet, or buret. In reading any scale, your line of sight should be perpendicular to the scale to avoid ‘parallax’ reading errors.

The graduated cylinder on the left has scale marks 0.1 mL apart, so it can be read to the nearest 0.01 mL. Reading across the bottom of the meniscus, a reading of 5.72 mL is reasonable (5.73 mL or 5.71 mL are acceptable, too). What are the volume reading for the middle and right cylinders below, assuming each scale is in mL.

Middle Cylinder: ________________ mL
Right Cylinder: ________________ mL
Uncertainty in Temperature Measurements

A zero will occur in the last place of a measurement if the measured value fell exactly on a scale division. For example, the temperature on the thermometer just should be recorded as 30.0°C. Reporting the temperature as 30°C would imply that the measurement has been taken on a thermometer with scale marks 10°C apart!

Find the temperature for each thermometer.

_______ C  _______ C  _______ C  _______ C  _______ C  _______ C
Measurement Worksheet #2
Measurement and Uncertainty
Significant Figures

1. Which is larger? Circle your choice for each one.
   a. 1 kilogram OR 1500 grams
   b. 4 kilometers OR 4400 meters
   c. 200 milliliters OR 1.2 liters
   d. 1200 millimeters OR 1 meter

2. Use the ruler and line below to answer the question:

   ![Ruler Image]

   What is the length of the line (include units & degree uncertainty)?
   ____________________________

3. What would be the mass of the object measured in the picture?
   ![Mass Measurement Image]
   _____ + _____ + _____ = _____ g

4. Determine the number of significant figures in each of the following:
   a. 3427 _______
   b. 0.00456 _______
   c. 123456 _______
   d. 3100.0 x 10^2 _______
   e. 0.0114 x 10^4 _______
   f. 0.982 x 10^-3 _______
   g. 2205.2 _______
   h. 30.0 x 10^-2 _______
   i. 0.0000455 _______
   j. 1000. _______