Data Practice

1. A rectangular prism of metal has the following dimensions:
   $2.05\ cm \pm 0.07\ cm,\ 3.30\ cm \pm 0.15\ cm,\ 4.75\ cm \pm 5\%$
   a. What is the volume of the metal?

   b. What is the absolute uncertainty in the volume of the metal?

   c. The mass of the metal is $80.75\ g \pm 0.30\ g$. What is the density of the metal?

   d. What is the percent uncertainty of the density?

   e. What is the absolute uncertainty of the density?

2. The inward acceleration on an object traveling in a circular path is given by $a = \frac{v^2}{r}$ where *v* is the speed of the object and *r* is the radius of the motion. A car is traveling $10.5\ m/s \pm 0.5\ m/s$ around a circular path with a radius of $55.7\ m \pm 0.4\ m$. What is the uncertainty in the acceleration?

3. A group of three students decides to determine what is happening to the speed of a car over time through the use of high speed cameras. The students each take the same footage and use scaling techniques to determine the speed of the car every 0.50 seconds.
    - Student 1: 2.15 m/s, 4.05 m/s, 5.98 m/s, 8.04 m/s, 10.15 m/s
    - Student 2: 4.23 miles/h, 8.54 miles/h, 13.12 miles/h, 17.50 miles/h, 22.45 miles/h
    - Student 3: 6.80 km/h, 13.29 km/h, 21.34 km/h, 28.75 km/h, 35.55 km/h

    a. Obviously, the students should have talked about which units to use. Fix their mistake by converting all of the values to m/s and fill in the data table below. Show a sample calculation for each type of conversion.

	Student 1	Student 2	Student 3		
0.50					
1.00					
1.50					
2.00					
2.50					

    b. Find the average and uncertainty for the position at each time. Show a sample calculation for each time.

    c. Use a graph to find the relationship between the speed of the car and time. Include the uncertainty in the value.