# *Introduction to Motion and Vectors Quiz Review*

**Review Concepts**
Unit Conversions
Absolute Uncertainty
Fractional/Percent Uncertainty
Graphical Uncertainty

**New Concepts**
Resolution of vectors - graphical method
Resolution of vectors – trigonometric method
Constant speed motion – Graphs
Constant speed motion – Calculations

1. A ball is rolling along a track. The task of the students is to determine the speed of the ball. The students place two meter sticks along the track and all start their watches when the ball is at position zero. The following is a compilation of their data.

| Student | Position at 0.50 seconds in cm | Position at 1.00 seconds in cm | Position at 1.50 seconds in cm | Position at 2.00 seconds in cm | Position at 2.50 seconds in cm |
|---|---|---|---|---|---|
| Student 1 | 19.4 | 40.1 | 60.2 | 81.0 | 99.8 |
| Student 2 | 19.7 | 38.9 | 59.5 | 80.3 | 100.2 |
| Student 3 | 20.2 | 39.5 | 59.7 | 79.2 | 99.4 |
| Student 4 | 19.8 | 40.3 | 60.6 | 80.4 | 100.3 |
| Student 5 | 20.4 | 39.8 | 61.0 | 79.9 | 99.0 |

The times are considered accurate to 0.10 seconds.
a. From the data given, find the position of the ball at each time given in meters.

b. Find the uncertainty each of the positions.

c. Make a graph of the position of the ball versus the time of motion. Include error bars.

d. Use the graph to determine the speed of the ball in m/s.

e. Use the graph to determine the uncertainty in the speed of the ball in m/s.

f. Find the percent uncertainty for the speed of the ball.

2. Vector **A =** 2.50 miles @ 30 degrees West of North while vector **B** has components of 3.00 km East and 1.50 km South.
a. Find the components of **A** in meters.

b. Write vector **B** in magnitude-direction form.

c. Sketch the process of finding **A+B** by using a diagram.

d. Find the components of **A+B** in meters.

e. Write **A+B** in magnitude-direction form with the units of meters.