Physics Name:

Activity – The Shortest Distance…

Objective:
The goal of this activity is to use vector addition to find the shortest distance from the "old oak tree" to a marker across the retention pond.

Materials:

meter sticks	50'-100' of rope	protractor
measuring tape	compass	

Procedure:

- The procedure is simple! Each group will use a piece of string to make a vector diagram from the starting point to the ending point. To define each vector, you will have to know its *length* and its *direction* (from some known ref. point).
- Starting at the first point, use your compass to determine which way is north (or just set your "north" to the direction you started in and make that your reference. Lay down your string in that direction.
- Record the vector's length (50.0 ft) and direction (the angle from your chosen reference point). Mark off where you end up on the floor. It is important to be sure you know how each vector is oriented *with respect to the last or with respect to your chosen reference point*. A top view diagram of each vector will be very helpful.
- Repeat the last step using your new point as the starting point. Continue until you reach the cone (will your last vector be 50.0ft?).
- When you are done, you will have several vectors recorded in your table. On a blank piece of paper, draw an arrow for due north (or use some reference like "the direction of my first vector". Use the component method or scale diagram method to carry out the vector addition (remember to add vectors *head to tail*). Your final answer will be a vector from the <u>first tail to the last head</u>. This will be the "line of sight" distance between the starting and ending points. If possible, use a GPS system or Google Maps to determine the exact distance and calculate your *percent error*.
- It will be helpful to draw a top view of the pond (from the 3rd floor stairwell window or from a Google image. Do that below:

Top-View of Pond:

Data:

Vector	Length	Direction
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Analysis:
Show any analysis and calculations on a blank sheet of paper. Be sure to include a scale diagram or sketch of your vector additions.

Error Analysis:
What might be some reasons for error in your investigation?

Conclusions:
What did you do? What did you find? What conclusions can you draw?