Name: ___________________________ AP Physics 1 Bridge

— Take a Hike —

Objective: Calculate the distance and displacement from your teacher's classroom to another point around the school.

PROCEDURE

1. Plan your path from your teacher's door to your final location of _______________________.

2. Who will be doing the walking? ____________________.

3. Measure one of your walker's steps using a meter stick. 1 step = ___________ meters

4. Starting at your teacher's door, proceed along your planned route while following these rules:

   a) The walker must only walk in one of the four cardinal directions at any one time (i.e. forward, right, left, backward). That is, the walker may only make 90° turns. ***No diagonal turns!!!***
   b) **Directions:** ***+y = towards Malcolm X Blvd***
   -y = towards the football field
   +x = toward Madison Park
   -x = Dudley Square
   *****If you are making this project up at home over the summer, you must choose your own directions for x and y***
   c) For each STAGE #, record the walker's number of steps, meter equivalent, and direction in the table on the reverse side of this paper.

5. When finished walking to your destination and recording your data, return to your teacher's room.

6. Record your times here: Start time: __________ End Time: ___________ Travel Time: ______________

7. **AS YOU GO** Fill in the details of your walk and your new **x-** and **y-positions** for each STAGE # by Adding the *DISTANCE IN METERS* with the appropriate sign (direction) to the appropriate initial position. **Complete all 11 stages!**

8. On the provided graph paper, draw each step of your path to scale (ex. 1 square = 1 meter).
   a. Add all of the displacement vectors (+ and -) in the x-direction to draw the vector representing the "net" displacement travelled in the x-direction. Label this vector **X**
   b. Add all of the displacement vectors (+ and -) in the y-direction to draw the vector representing the "net" displacement travelled in the y-direction. Label this vector **Y**
   c. Your final position in the x direction should be equal to all the little x-direction displacements added (hence the "∑") and your final position in the y direction should be equal to all the little y-direction displacements added. Is this true? _________

9. In the box marked *#9* at the bottom of this paper, draw vector ***X*** taking care to use the correct orientation.
10. Beginning at the tip of the ***X*** vector, draw the ***Y*** vector in the correct orientation (ex: ↑←).
11. Draw the hypotenuse from the beginning of ***X*** to the tip of ***Y***. Label the hypotenuse as ***R***, and calculate its length in the space marked *#11*. *Include equation, value substitution, and answer with units of meters.*
12. The distance you travelled is a scalar, not a vector. Determine this by adding all of the little distances you travelled, paying no attention to direction.

YOUR VALUES:

Stage #	**No. of Steps**	**Distance (meters)**	**Direction Walked (+/- x/y)**	**new x-position**	**new y-position**
1	3	1.5 m	+y	0	1.5 m
2	5	2.5 m	-x	-2.5 m	1.5 m
3					
4					
5					
6					
7					
8					
9					
10					
11					
12				$\sum x = X =$	$\sum y = Y =$

(#9) *DIAGRAM OF **X**, **Y**, and **R**:*	***(#11)*** *CALCULATION OF **R** (**WHAT IS THE MAGNITUDE** AND **DIRECTION?)*** ***R IS YOUR DISPLACEMENT*	**(#12) CALCULATION OF THE TOTAL DISTANCE TRAVELLED ON YOUR WALK**