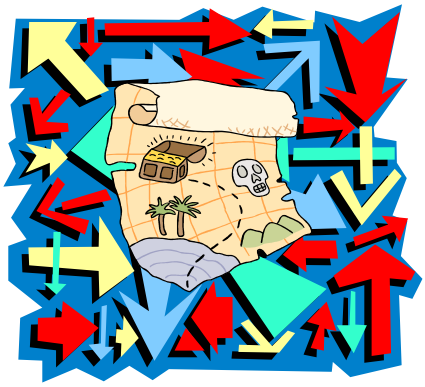
Mr. Miller Name:_____ Period:_____



VECTOR TREASURE HUNT

Objectives:

- ✓ Create a series of directions that lead to a specific object.
- ✓ Follow directions to locate a specific object.
- ✓ Generate a scale map.
- ✓ Solve for resultant displacement vectors graphically.
- ✓ Add and subtract vectors to solve for the magnitude and direction of a resultant vector.

Part 1: Giving Directions

1. Your teacher will assign you a number in class. Find the student who has the same number as you—this is your lab partner for the activity.
2. Get the pack of note cards from your teacher that matches your assigned number.
3. Remove the first card from your deck. With your lab partner, carefully peak at the location written on the back. **DO NOT SHARE YOUR LOCATION!!!** On each card in you pile, write your group number on the top left hand corner.
4. The starting point will be an "×" in the hallway outside of the classroom.
5. Plot a course from the starting point to your assigned object. Remember to **be quiet** and not to disturb classes! You measure your distances in meters.
6. Assume that all hallways in the school run either East-West or North-South; when you leave the physics room and head towards the bathrooms, you are traveling NORTH!
7. You will break up your course into 15 different segments. Write each separate segment as a distance and direction on an individual index card. For example:

Group #2 5.5 m. North	Group #2 10.2 m. West	Group #2 1.5 m. South

etc.

Be sure that each card has your group # and contains a complete description of that segment, including the magnitude of the distance in meters and the direction (North, South, East, West). **DO NOT NUMBER THE CARDS!!!**

8. The path to your object may be a direct path, or it may describe a complicated path with many changes of direction.
9. When you have completed your 15 cards, **COPY YOUR DIRECTIONS DOWN, IN ORDER, IN DATA TABLE 1**. You will need these directions for the last section of the lab. Return your deck of cards to your teacher.

Data Table 1

Group # _____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

Part 2: Following Directions

10. When you turn in your cards, your teacher will shuffle them and give your shuffled cards to another group. You will receive the shuffled cards from another group.
11. Devise a plan to use the directions on the cards you have been given to find the object, then attempt to find the object.
12. When you are sure that you have found the correct object, report your results to your teacher. Your teacher will confirm whether or not you have found the correct object. If not, review the cards and try again.

Group # of other cards: _____ Object Found: _____

_____

Part 3: Plotting a course

13. In this section, you will be creating scaled map on a separate sheet of graph paper of the path you outlined for your original object, using the list of 15 directions you made in the first section.
14. You will make the map by drawing each displacement vector indicated on a card as an arrow. The arrow will be drawn to scale to represent the length in meters and it will point in the direction specified on the card. In a scale drawing such as this, it is important for all objects in the drawing to have the same size relationship as the actual objects. For example, the arrow representing 2.0 m will be drawn twice as long as the arrow representing 1.0 m. **MAKE SURE THAT THE SCALE THAT YOU USE ALLOWS YOUR MAP TO FIT ENTIRELY ON ONE SHEET OF 8½ × 11 GRAPH PAPER!!!**
15. Draw the first arrow so that its tail is at the starting point, the point of the arrow is pointing in the direction specified in Data Table 1, and the length of the arrow represents the distance specified in Data Table 1.
16. Draw the second arrow on your map so that its tail starts at the point of the first arrow. The second arrow should also point in the direction specified in Data Table 1, and its length should represent the distance specified in Data Table 1.
17. Continue through the 15 sets of steps from Data Table 1. Draw the arrows tip-to-tail so that each arrow begins where the preceding one ends.
18. Make sure that your map is very **neat**. **YOU MUST USE A RULER WHEN DRAWING ALL VECTORS!!!** Include a legend, or key, that gives the direction and defines the scale of the map. You may wish to indicate specific landmarks, such as rooms or doors.
19. **Using a graphical or mathematical method, <u>measure</u> your resultant displacement using a ruler and a protractor. Be sure to convert the magnitude to meters using your scale and indicate the correct direction using degree from the x-axis.**

    Resultant Displacement: _____

    Resultant Angle: _____

Analysis Questions

1. What adjustments did you make when using another group's shuffled directions so that you didn't walk into walls or lockers or go into rooms? Explain.

_____

_____

_____

_____

_____

_____

_____

2. How did you choose the starting point when drawing your scaled map? Did you start in the exact middle of the paper? Why or why not?

3. When you shuffle the order and follow the directions, will your overall displacement change? What about your total distance traveled? Explain.