Name:_____ Block:_____ Date:_____

Vector Lab (H)
Argh! How Far Away is Me Treasure?

Purpose: To determine the location of a pirate's treasure using three different methods of vector addition.

Materials: Tape, graph paper, ruler

Procedure:
1. Go to an open space and choose a starting point that will allow you to walk 10 paces in any direction. Mark your starting position with a piece of tape and label it with someone in the group's name.

2. Decide which way is north and write something found in each direction so you can remember your orientation.

> North =
>
> East =
>
> South =
>
> West =

3. Starting at the tape, have one group member follow the 10 steps to the treasure in a "tip to tail" manner.

> **7 paces W**
> **4 paces N**
> **14 paces E**
> **12 paces S**
> **4 paces W**
> **3 paces N**
> **6 paces W**
> **11 paces N**
> **8 paces E**
> **9 paces S**

4. Measure and record the distance from the starting tape to your final position. Include direction. (Example – if you end up south west of your starting position write SW, not the direction you would need to go to end up back where you started.)

> Displacement: _____ (Walking method)

Analysis:

1. On a piece of graph paper, make a scaled drawing of the path you took to get to the treasure.. Use a pencil to show the displacement vectors. Choose an appropriate scale and include it on your drawing.

2. For this part of the analysis, use a pen. Using a ruler, draw a straight line from the starting location to the treasure on the map. Use your ruler to measure this straight-line distance from your starting location to your treasure. Convert this distance to paces and record it below. Include direction.

> Displacement: _____ (Scaled drawing method)

3. Using the map you drew on the graph paper, write a two-step instruction that will lead a pirate from the start to the treasure in two steps. One step should be in the east/west direction and the other step should be in the north/south direction. These two vectors are called the "components" of the straight-line distance vector.

    1.

    2.

4. Now arrive at the answer to how far away the pirate's treasure is by only doing math – no drawing or measuring. Show your work below and include the direction in your answer.

Displacement: _____ (mathematical method)

Conclusion:
Summarize your findings in this lab in two or three typed paragraphs. A thorough conclusion should address the following:

- What three methods were used to locate the treasure? How did your results compare?
- Of the three methods, which is the most accurate and which is the least?
- What is the difference between a vector and a scalar quantity? What is an example of each?
- How did the distance traveled to the treasure compare to the displacement?
- What is a resultant?
- When determining the resultant graphically, what steps must be done?
- When determining the resultant mathematically, what are the rules for combining vectors?
- If the order of instructions to the treasure were reversed, would that still lead to the same resultant? Why or why not?