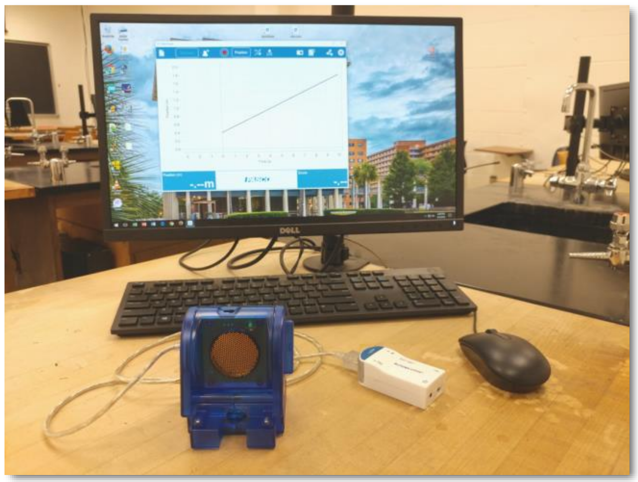
# Match Graph

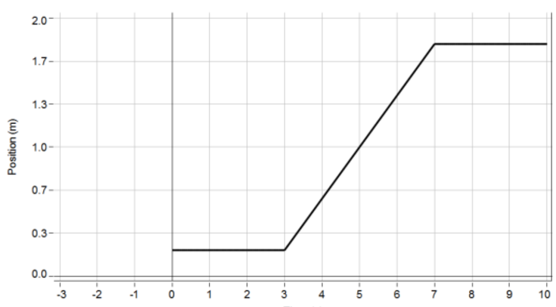
**Purpose:** To read and interpret one-dimensional motion graphs.

**Set-up:**
Plug in the motion sensor to the Airlink and set it on the table with the sensor facing away from the table, and with room to move 2 m away from the table without hitting something. Turn the Airlink ON. Open the "MatchGraph" program on your computer desktop. In the window that pops up, click on "*Choose Wireless Interface*". Click on the 6-digit ID belonging to your Airlink and click "*Connect*".

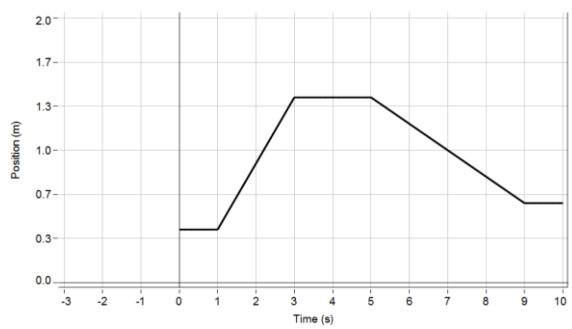


**Activity:**

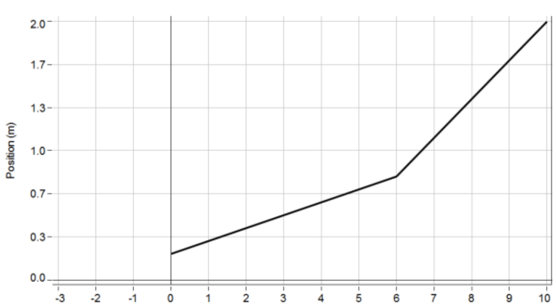
For this experiment, your goal is to match four (4) Position vs Time graphs shown below by moving away from or towards the motion sensor.



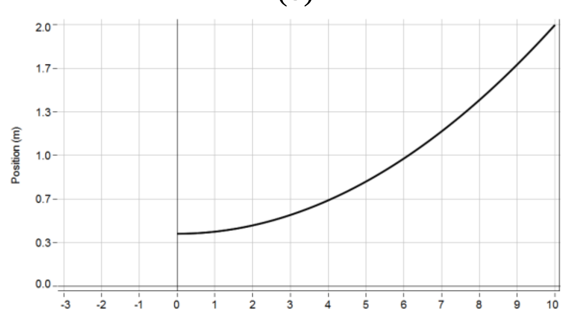

(a)




(b)




(c)




(d)

Set the motion sensor to "People" mode". Select one of the required graphs by clicking on and have someone in your group stand in front of the sensor, at the initial distance shown in the graph. Have someone else in your group click the record button to start the activity. The third person can act as a coach/skeptic. You have three seconds until your position starts getting plotted on the graph. Watch your position on the screen and move to match the Position vs. Time profile. You will get a score indicating how well you have matched the graph. You may repeat to improve on your score. Once satisfied with your run, click on and type in the name of the person who did the run and hit "*Enter*". Click on and print a copy for your report by clicking on the print icon .

Rotate through your roles until all the required graphs are matched. **Each member of the group should be the subject of at least one of these graphs.** Write down the names of all the members of the group on each of the 4 printed graphs before turning them in.

Turn the Airlink OFF and unplug it from the motion sensor. (To turn it off, press and hold the ON button until the status LEDs stop blinking.)

**Questions:**
Answer the following questions. You may discuss with your group mates but write down your answers individually.

1. As you walk towards the sensor, is your position relative to the sensor increasing or decreasing? As you walk away from the sensor, is your position relative to the sensor increasing or decreasing?
2. To describe the motion, you may use terms like moving towards, moving away from, or not moving relative to the position of the sensor. For graph (a): Describe the motion for each section of the graph (i.e. from 0 – 3 sec, 3 – 7 sec, and 7 – 10 sec). What is the average velocity for each of the sections as identified above. Are the velocities constant in each region?
3. Answer the same questions in no. (2) above for graph (b): i.e. from 0 – 1 sec, 1 – 3 sec, 3 – 5 sec, 5 – 9 sec, and 9 – 10 sec.
4. For graph (c): Differentiate the motion and velocity in each of the two sections of the graph, i.e. from 0 – 6 sec, from 6 – 10 sec.
5. For graph (d): Calculate the average velocity for the region from 0 – 10 sec. Is the velocity in this region constant? Explain your answer.