



# Graphing distance

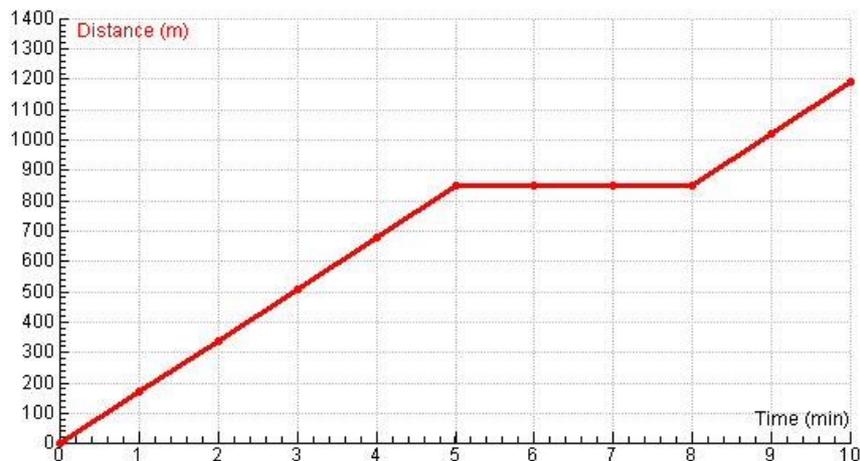
PHYSICS  
Motion in  
one direction

**Driving Question:**  
*How do you graph motion?*



## Thinking about the question

Motion graphs provide an opportunity to analyze changes in distance and time. For example in the diagram below you see a motion graph of a jogger running during 10 minutes time. Can you tell what happened during her run?



In this activity you are going to use the motion detector to record motion graphs. You will record a distance versus time graph of your own motion.

## Materials

In your investigations you will use:

– USB Motion Detector e.g. CMA €Motion

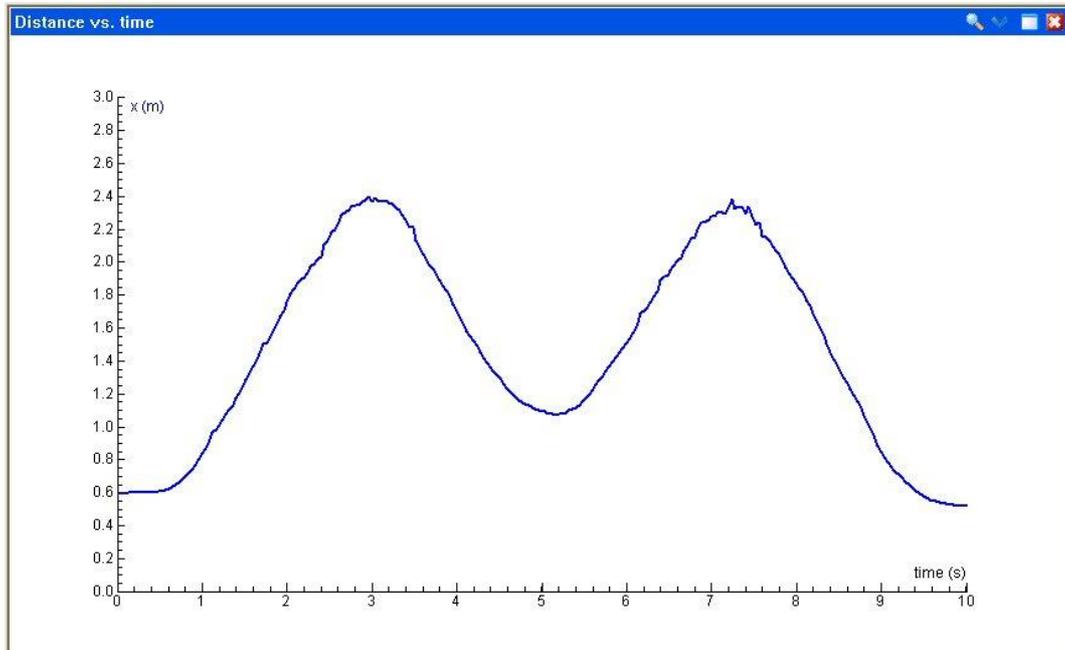
or

– Data-logger to which a motion detector can be connected and Motion Detector e.g. CMA CLAB and Motion Detector BT55i.

## Investigations

1. Place the motion detector on a table in front of you so that it points toward an open space, at least 2 meters wide and 3 meters long. During your walk you should face the sensor and must also be able to see the original graph on the screen.
2. Open Coach Activity 'Graphing distance'.
3. First you are going to stand still in front of the motion detector for 10 seconds:
  - When you are ready let your classmate start the measurement. Motion detector is taking readings when you hear it "ticking" fast. As the detector takes readings, the computer or the data-logger produces a graph that shows the distance (from you to the detector) on the vertical axis and the time on the horizontal axis.
  - How far were you standing from the motion detector?
4. Now you are going to move slowly towards the motion detector.
5. When you are ready take your position and when you hear Motion detector "ticking" fast, start to walk.
  - What was your initial position?
  - What was the distance you walked?
  - Was your predicted graph similar to the recorded graph?
6. Repeat this experiment but now move more quickly; your initial position should be the same as in the previous measurement.
  - Describe the difference between this and the previous graph.
  - Describe the difference between moving slowly and moving fast towards the motion detector.
7. Investigate motions graphs when you move away from the motion detector, first slowly then quickly.
  - Describe the difference between these two graphs.
  - How these graphs differ from the graphs made when you were walking towards motion detector?

8. Now you are going to create a motion graph, which looks like a letter M. See the exemplary graph displayed on the next page.



9. Write down which steps were necessary to create such 'M' – shape motion graph. Use words like: stand still, move forward/backward, move slow/fast.
10. Similarly, try to create a 'W' - motion graph.

### Resources:

Coach Activity: Graphing distance.cma7

Coach Result: Graphing distance - letter M.cmr7