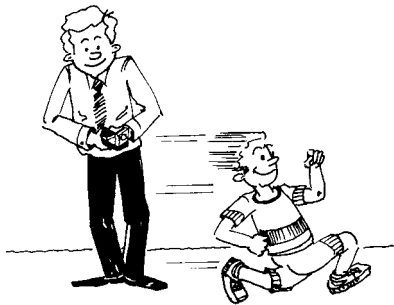*EXPLORATIONS*

ACTIVITY 3

What's Your Speed?

As you move away from the CBR, your distance from the CBR with respect to time can be plotted. Factors such as how fast you move can affect how the plot will look. Does walking faster increase the rate at which your motion is plotted? Does it result in missed points?

Objectives

In this activity you will walk away from the CBR to:

♦ Make a plot of distance versus time.

♦ Observe the effect that the *speed* at which you walk has on your motion plot.

You'll need

♦ CBR unit

♦ TI-82 or TI-83 and calculator-to-CBR cable

CBR Setup

1. Connect the CBR to the calculator using the link cable.

2. Turn on your calculator. If you have not already loaded the **RANGER** program into your calculator, follow these steps:

   a. Press [2nd] [LINK] [▶] [ENTER]. The calculator displays **Waiting …**

   b. Press the ⬭82/83⬭ transfer button on the CBR.

3. Run the **RANGER** program on your calculator:

   a. Press [PRGM].

   b. Choose **RANGER**.

   c. Press [ENTER].

4. From the **MAIN MENU** select **2: SET DEFAULTS**.

5. With the selector arrow (▶) at **START NOW** press ⌷ENTER⌷.

Collecting the Data

In this activity you will determine what effect the speed at which a person walks away from the CBR has on the appearance of the plot. Time will be plotted on the horizontal axis. The distance from the CBR to the walker (in meters) will be plotted on the vertical axis. When collecting data in these observations, stand between 0.5 and 6 meters from the CBR. Remember to always stay in front of the CBR and not to move to the side.

Trial 1

1. Walk in front of the CBR, and then stand directly in front of the CBR at a distance of approximately 0.5 meters.

Prepare to walk directly away from the CBR at a very slow but steady speed. Taking small baby steps should produce the correct results. Once data collection begins, move in this manner for approximately 15 seconds.

2. When you are ready, press ⌷ENTER⌷ and begin. The plot should look like a straight line rising from left to right.

3. If you are satisfied with your results, sketch your plot to the right and move to Trial 2. If not, press ⌷ENTER⌷, choose **3: REPEAT SAMPLE**, and begin again with step 1.

```
D(M)




                           T(S)
```
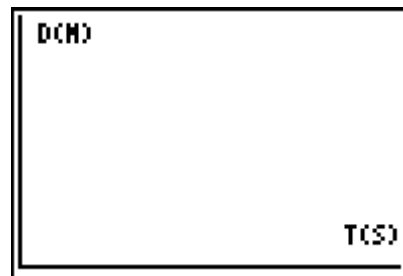
Trial 2

1. Press ⌷ENTER⌷ and choose **3: REPEAT SAMPLE**.

2. Stand approximately 0.5 meter in front of the CBR.

Prepare to walk directly away from the CBR at a medium pace. Once data collection begins, move in this manner for approximately 15 seconds.

3. When you are ready, press ⌷ENTER⌷ and begin.

The plot should be a straight line rising from left to right. Don't worry if the line goes out of the top of the viewing window on the calculator.

4. If you are satisfied with your results, sketch your plot to the right and move to the next section. If not, press ⌷ENTER⌷, choose **3: REPEAT SAMPLE**, and begin again with step 2.

```
D(M)




                           T(S)
```
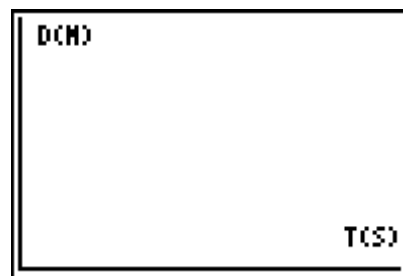
Looking at the Results

1. Which trial resulted in a steeper line? (Be sure to use the words "time" and "distance" in your answer.)

_____

_____

_____

2. In general, what effect does your speed or rate have on the shape of a Distance-Time plot?

_____

_____

_____

3. Describe what the plot would look like if you started 0.5 meters away from the CBR, walked very slowly away from the CBR for about 6 seconds, and then began walking quickly for the remainder of the data collection.

_____

_____

_____

4. On the first set of axes below make a sketch of the motion that was described in number 3 above. Next, press ⌷ENTER⌷ and choose **3: REPEAT SAMPLE**. Have the walker use the directions in number 3 and sketch the resulting plot on the second set of axes below.

Sketch	**Plot**
D(M) ⎮ T(S)	D(M) ⎮ T(S)
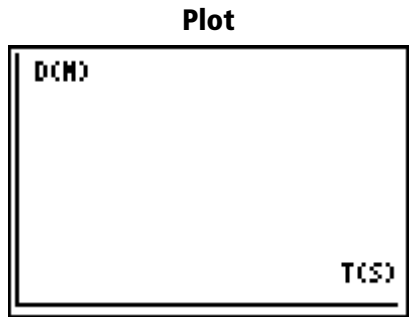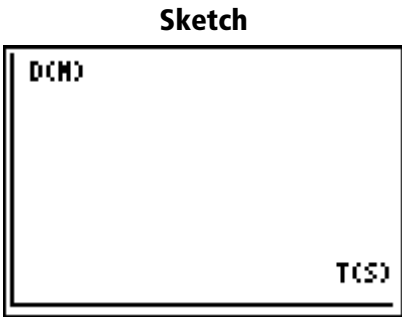
5. How well did your plot match the actual plot? Discuss the reasons for any differences.

_____

_____

_____

Press ⌷ENTER⌷ and choose **5: QUIT** from the **PLOT MENU**.

Going Further

Answer these questions on a separate sheet of paper. Show all work.

1. How would your results have differed in Trial 1 and Trial 2 if you had begun 5 meters from the CBR and had been approaching rather than walking away from the CBR?
   Hint: Take another sample if you are not sure.

2. What do you think the plot would look like if you simply stood still?

3. Make a sketch of how the plot would look if you kept changing speeds from slow to fast every couple of seconds.