

## Appendix

### Teacher Information

This section provides general information, practice data, and answers for the student activities.

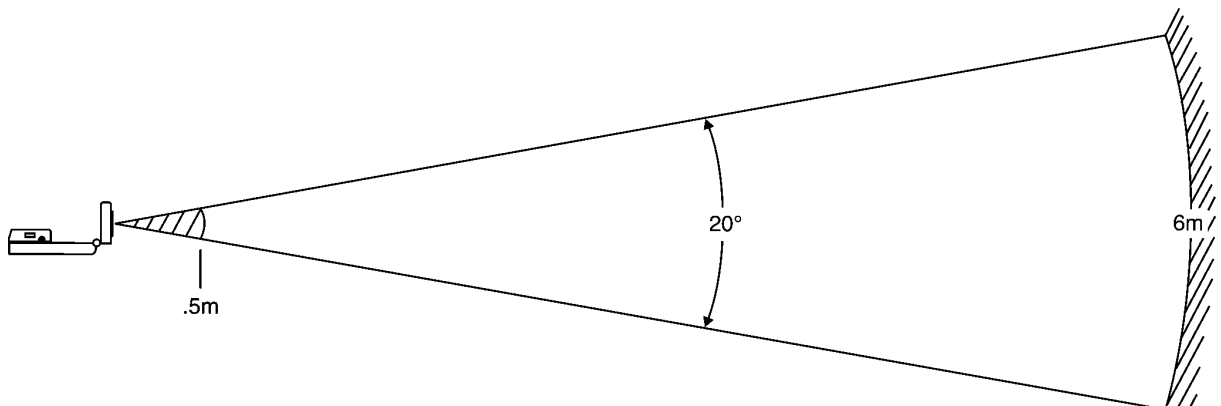
#### Activity Notes

- ◆ The CBR setup instructions are included in each activity.
- ◆ If you need additional information, refer to the *Getting Started with CBR* manual included with the CBR.
- ◆ Remind students that the CBR records motion in front of it, not to the side.
- ◆ Be sure that students stay within the range of the CBR (0.5 – 6 meters).
- ◆ Most students prefer to face the CBR when walking. This allows them to stay directly in front of the unit during data collection.

#### The Clear Zone

The path of the CBR beam is not a narrow, pencil-like beam, but fans out in all directions up to  $10^\circ$  in a cone-shaped beam.

To avoid interference from other objects in the vicinity, try to establish a clear zone in the path of the CBR beam. This helps ensure that objects other than the target are not recorded by the CBR. The CBR records the closest object in the clear zone.



## Activity 9 — Measure Up!

### *Collecting the Data*

- ◆ The CBR sometimes gives erroneous results if the target is irregularly shaped. If you have trouble reading heights for some students, have them place their hand on their head as they pass beneath the CBR to give the CBR a well-defined target.
- ◆ Be sure the students don't walk under the CBR too quickly. They should be spaced so the CBR records distance to the floor between each student.
- ◆ If you have trouble holding the CBR in place during sampling, you may consider attaching it to a door jam with the clamp provided.
- ◆ If the students have experience creating box-and-whisker plots by hand, you can use the TI-82/83 built-in feature for box-and-whiskers plots.

When your students perform this activity, the results will look similar to the examples below.

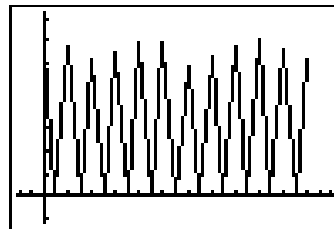
**Note:** The data in these tables is simulated. Actual data will be slightly different.

List L1	List L2
0	0.62
1	2.33
2	0.66
3	2.33
4	0.79
5	2.33
6	0.71
7	2.33
8	0.61
9	2.33
10	0.60
11	2.33
12	0.87
13	2.33
14	0.75
15	2.33
16	0.67
17	2.33
18	0.57
19	2.33
20	0.69
21	2.33
22	0.79

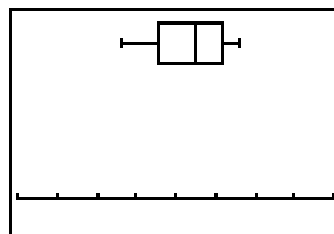
### Looking at the Results

The following answers are based on the practice data listed above.

- The inverted distance values are shown to the right.
- No answer required.



- 1.71, 1.67, 1.54, 1.62, 1.72, 1.73, 1.46, 1.58, 1.66, 1.76, 1.64, 1.54
- 146, 154, 154, 158, 162, 164, 166, 167, 171, 172, 173, 176
- Lower extreme = 146 cm  
Upper extreme = 176 cm
- Median = 165 cm
- $Q1 = 157.5$  cm;  $Q3 = 171.5$  cm
- See the plot shown to the right.



- For the practice data, 25 percent of the heights are greater than the upper quartile and 25 percent are less than the lower quartile.
- For the practice data, the middle 50 percent of the data is closer to the upper extreme than it is to the lower extreme.
- The left whisker is slightly longer than the right whisker. The heights are slightly skewed to the left.

### Going Further

- The size and shape of the box-and-whiskers plot would be exactly the same since each measurement is a constant multiple of the original data.
- The data would appear to be skewed to the right. The median, lower quartile, and upper quartile would all stay the same.
- Answers will vary. See the plot to the right. Generally, the faster the speed of the walker, the steeper the linear plot of distance versus time.
- Answers will vary.
- Answers will vary.
- Answers will vary.

