

Alternate CBL Instructions

Creating Motion Diagrams

Safety Precautions



- Use caution when plugging in, using, or unplugging the CBL 2 unit's power supply.

Materials

CBL 2 unit

TI graphing calculator

link cable

DataMate program

motion detector

foam board

two windup toy cars

3×5 index card

tape, 20 cm

Procedure

1. Mark a starting line on the lab table or on the surface recommended by your teacher.
2. Place both toy cars at the starting line, wind them up, and release them at the same time.
3. Observe both toy cars and determine which one is faster.
4. Place the slower toy car at the starting line. Set up data tables similar to those in the textbook.
5. To make the car more visible to the motion detector, tape the index card to the car so that it stands vertically and is oriented with a flat side toward the front of the car. Place the motion detector 40 cm behind the starting line, and make sure it is pointed at the car.
6. Connect the motion detector to the DIG/SONIC channel of the CBL 2 unit. Connect the CBL 2 unit to the calculator using a link cable. Press both ends of the link cable firmly into each unit. Turn on the graphing calculator, and start the DataMate program. The CBL 2 unit should auto ID the motion detector and a default time interval of 5 s should be displayed. Press CLEAR to reset the application program.
7. Select START to begin data collection. When you hear the motion detector begin to click, release the slow car.
8. After the CBL 2 unit has completed data collection, press ENTER to select the DISTANCE graph to display. Scroll through the graph using the arrow keys and record distance and time data in your data table.
9. Press ENTER, and then select MAIN SCREEN to return to the Main screen.

10. (optional) Select QUIT and print the distance vs. time graph using TI Connect.
11. Repeat steps 5–9 with the faster car.
12. Place a piece of foam board at an angle of approximately 30° to form a ramp.
13. Place the motion detector 40 cm behind the starting line, and make sure it is pointing down the ramp at the car. Keep the index card on the car, and make sure the flat side is pointed toward the motion detector.
14. Place the slower toy car at the top of the ramp and repeat steps 7–9.

Alternate lab procedure, using a CBL unit

1. Mark a starting line on the lab table or on the surface recommended by your teacher.
2. Place both toy cars at the starting line, wind them up, and release them at the same time.
3. Observe both toy cars and determine which one is faster.
4. Place the slower toy car at the starting line. Set up data tables similar to those in the textbook.
5. To make the car more visible to the motion detector, tape the index card to the car so that it stands vertically and is oriented with a flat side toward the front of the car. Place the motion detector 40 cm behind the starting line, and make sure it is pointed at the car.
6. Connect the motion detector to the SONIC port of the CBL unit. Connect the CBL unit to the TI graphing calculator using the link cable. Turn on the CBL unit and the graphing calculator. Start the PHYSICS program.
7. From the MAIN MENU, select SET UP PROBES. Select ONE as the number of probes. From the SELECT PROBE menu, select MOTION. You will return to the MAIN MENU.
8. On the MAIN MENU, select COLLECT DATA. Select TIME GRAPH. Enter “0.05” as the time between samples, in seconds. Press ENTER. Enter “99” as the number of samples so the CBL unit will collect data for about 5 s. Press ENTER twice and then select USE TIME SETUP.
9. Press ENTER to begin data collection. When you hear the motion detector begin to click, release the slow car. When data collection is complete, press ENTER to continue to the SELECT GRAPH menu. Select DISTANCE. Scroll through the graph using the arrow keys and record distance and time data in your data table.
10. (optional) Press ENTER, and then select NEXT. Select NO at the REPEAT? Prompt. Select QUIT and print the distance vs. time graph using TI Connect.
11. Repeat steps 5–9 with the faster car.

12. Place a piece of foam board at an angle of approximately 30° to form a ramp. Place the motion detector 40 cm behind the starting line, and make sure it is pointing down the ramp at the car. Keep the index card on the car, and make sure the flat side is pointed toward the motion detector.
13. Place the slower toy car at the top of the ramp and repeat steps 7–9.