

Alternate CBL Instructions

Translational and Rotational Equilibrium

Safety Precautions



- Use care to avoid dropping masses.
- Use caution when plugging in, using, or unplugging the CBL 2 unit's power supply.

Materials

meterstick
two ring stands
two Buret clamps
500-g hooked mass
200-g hooked mass
two force sensors
CBL 2 unit
TI graphing calculator
DataMate program
link cable
paperclip, large

Procedure

As in the text, the left force sensor will be considered a pivot point for the purpose of this lab. Therefore, the lever arm will be measured from this point.

1. Place the ring stands 80 cm apart.
2. Attach a Buret clamp to the top of each of the ring stands.
3. Attach the force sensors to the clamps so that the hook hangs down. If you are using a dual range force sensor, place the toggle switch at the ± 50 N setting.
4. Hang a large paperclip from the force sensor hook and slip the meter stick through the paperclip so that it hangs horizontally, as shown in the textbook. Adjust the meter stick so that the 10-cm mark is supported by one paperclip and the 90-cm mark is supported by the other paperclip.
5. Connect the force sensors to Channel 1 and Channel 2 of the CBL 2 unit. Connect the TI graphing calculator to the interface with a link cable. Turn on the calculator. Start the DataMate program and press CLEAR to reset the application program. The probes should be automatically recognized and displayed in their appropriate channels.
6. The current value of force for each force sensor will be displayed on the right side of the screen. Read and record each force value in Data Table 1.
7. Hang a 500-g mass on the meter stick at the 30-cm mark. This point should be 20 cm from the left force sensor. Read and record each force value in Data Table 1.

8. Hang a 200-g mass on the meter stick at the 70-cm mark. This point should be 60 cm from the left force sensor. Read and record each force value in Data Table 1.

Alternate lab procedure, using a CBL unit

As in the text, the left force sensor will be considered a pivot point for the purpose of this lab. Therefore, the lever arm will be measured from this point.

1. Place the ring stands 80 cm apart.
2. Attach a Buret clamp to the top of each of the ring stands.
3. Attach the force sensors to the clamps so that the hook hangs down. If you are using a Dual Range Force Sensor, place the toggle switch at the ± 50 N setting.
4. Hang a large paperclip from the force sensor hook and slip the meter stick through the paperclip so that it hangs horizontally, as shown in the textbook. Adjust the meter stick so that the 10-cm mark is supported by one paperclip and the 90-cm mark is supported by the other paperclip.
5. Connect the force sensors to Channel 1 and Channel 2 of the CBL unit. Connect the CBL unit to the TI graphing calculator with a link cable. Press the ends of the cable securely into each unit.
6. Turn on the graphing calculator and the CBL unit. Start the PHYSICS program and go to the MAIN MENU.
7. From the MAIN MENU, select the SET UP PROBES menu. Choose TWO as the number of probes. Next, the SELECT PROBE menu will appear. Select FORCE. On the FORCE SENSOR menu, select your probe type and plug it into the channel indicated (should be Channel 1). Next, the CALIBRATION menu screen will appear. Select USE STORED.
8. Again from the SELECT PROBE menu, select FORCE SENSOR. On the FORCE SENSOR menu, select the force probe type and plug it into the indicated channel (should be Channel 2). Next, the CALIBRATION menu screen will appear. Select USE STORED.
9. From the MAIN MENU, select COLLECT DATA, then MONITOR INPUT. CH 1 and CH 2 will be displayed in newtons on the graphing calculator. Read and record each force value in Data Table 1.
10. Hang a 500-g mass on the meter stick at the 30-cm mark. This point should be 20 cm from the left force sensor. Read and record each force value in Data Table 1.
11. Hang a 200-g mass on the meter stick at the 70-cm mark. This point should be 60 cm from the left force sensor. Read and record each force value in Data Table 1.