

## Apparatus Setup

4. Set up the apparatus as shown in **Figure 1**. Clamp the pulley to the edge of the table so that it is level with the top of the cart. Clamp the recording timer to a ring stand or to the edge of the table to hold it in place. If the timer is clamped to the table, leave 0.5 m between the timer and the initial position of the cart. Insert the carbon disk into the timer, and thread the tape through the guides under the disk. When your teacher approves your setup, plug the timer into a wall outlet.
5. If you have not used the recording timer before, refer to the lab in the chapter “Motion in One Dimension” for instructions. Calibrate the recording timer with the stopwatch or use the previously determined value for the timer’s period.
6. Record the value for the timer’s period at the top of the data table.
7. Fasten the timing tape to one end of the cart.

## Constant Mass with Varying Force

8. Carefully measure the mass of the cart assembly on the platform balance, making sure that the cart does not roll or fall off the balance. Then load the cart with masses equal to 0.60 kg. Lightly tape the masses to the cart to hold them in place. Add these masses to the mass of the cart and record the total.
9. Attach one end of the cord to a small mass hanger and the other end of the cord to the cart. Pass the cord over the pulley and fasten a small mass to the end to offset the frictional force on the cart. You have chosen the correct mass if the cart moves forward with a constant velocity when you give it a push. *This counterweight should stay on the string throughout the entire experiment.* Add the mass of the counterweight to the mass of the cart and masses, and record the sum as *Total Mass* in your data table.
10. For the first trial, remove a 0.10 kg mass from the cart, and securely fasten it to the end of the string along with the counterweight. Record 0.10 kg as the *Accelerating Mass* in the data table.
11. Hold the cart by holding the tape behind the timer. Make sure the area under the falling mass is clear of obstacles. Start the timer and release the tape simultaneously.

**Figure 1**

**Step 4:** Make sure the clamp protrudes as little as possible from the edge of the table.

**Step 7:** Fold the end of the recording tape over the edge of the rail on the cart and tape it down.

**Step 10:** Always hold the cart when you are removing and adding masses. When you are ready, release the cart from the same position each time.

