

During this lab you will determine the relationship between the force acting on the object and the speed of the object as it travels its circular path when the radius of the circular path followed by the object is kept constant.

Procedure

1. Tie the rubber stopper to one end of the string. Holding the string in your hand about 50 cm from the stopper, try whirling it above your head in a circular horizontal path. You will find that when you whirl the stopper faster you will need to hold the cord with more force. Thus, the force (tension) in the string must increase with the speed of the stopper.
2. Pass the free end of the string through the glass tube and make a loop in the end of the string. Hang a 200 g mass from the end of the string. Adjust the string so that the radius of the circular path of the stopper will be about 75cm. Mark this by attaching a piece of tape to the string or using a marker.
3. Practice whirling the stopper in a circular path above your head. The stopper is traveling at the desired speed when the weight of the mass just supplies the centripetal force needed for the stopper to maintain its circular path of 75 cm. The position of the tape indicates this. The tape should stay just a little below the glass tube. If the tape moves up against the tube, you are whirling too fast. If the tape starts to descend, you are whirling too slowly.
4. When the stopper is moving with the desired rotational speed, have your lab partner use the stopwatch to measure the time it takes the stopper to complete 30 revolutions.
5. Calculate the time for one revolution of the stopper. Calculate the circumference of the stopper. From this information determine the speed of the stopper.
6. Add 50 g more to the end of the string and repeat steps 4 and 5. Repeat this procedure each time adding 50 more grams until you reach 550 grams.

Interpreting the Investigation

Do your findings support the equations for uniform circular motion?

Present an argument by following along the *Data Collection* and *Processing* portion of a lab report. Also include percent error. This lab will be assessed fully along the criteria of *Data Collection* and *Processing*.