

## **Centripetal Force**

### **After Lab Questions**

**1. List at least three sources of error in the experiment.**

The human error is that we can misread the instruments such as the timers, the weighing of the weight and the measuring of the distance. The systematic error in the experiment is the environmental factors such a friction of the spin and air resistance from it moving in the air. Lastly the random error is that the device may not spin perfectly as the person spinning it cannot input the same every time.

**2. Explain why the spring stretches when the bob moves in a circle. Use a diagram in your explanation.**

The spring stretches because of the centripetal force that is pulling the spring. The pull of the spring and the centripetal force is equal. The equation both is

$$F_c = \frac{mv^2}{r} \quad F = kx$$

If the velocity increases both the radius from the centripetal acceleration increases and the x from the spring equation gets until both of the forces are equal.

**3. Does the centripetal force acting on an object in uniform circular motion do work on the object? Explain?**

There is no work being done on the device as there is no displacement. The equation for work is force times displacement. Since the device is going in circles the displacement is zero.

Displacement is the shortest position from the initial and final destinations .

## **Centripetal Force**

### **Advance Study Assignment**

#### **1. Define Centripetal Force**

It is any force that causes an object to move in a circular path and compels it to stay in that path of a circle instead of moving in a straight line. Some examples are tension from a swing and gravity from a planet orbiting or an object spinning around.

#### **2. What supplies the centripetal force for a satellite in orbit around the Earth?**

The centripetal force is gravity and velocity. The gravity pulls it down while velocity goes so fast it neglects the gravity. The combination of its forward velocity and the pull of gravity is balanced. The balanced forces allow

#### **3. What supplies the centripetal force for the mass in uniform circular motion in this experiment?**

The centripetal force is the spring pulling it. As the acceleration is higher the longer the spring which creates a higher radius and a higher radius means the acceleration is slower. The spring makes this complicated as the radius acceleration can change each other.

#### **4. An object that is moving in uniform circular motion is always accelerating. Explain how this can be, since uniform implies constant speed?**

The object is always accelerating due to its direction change. In order to keep it at a constant speed and direction change it needs a constant acceleration.

- 5. If the centripetal force acting on a satellite in uniform circular motion suddenly disappears, describe the motion of the satellite after that. Draw a diagram.**

If the centripetal force disappears the velocity would keep it going in a straight line Since there is nothing keeping it in place for it to go into a circular motion.

- 6. A girl rotates a ball on a string in uniform circular motion above her head in a horizontal circle. Next she increases the tension force to twice its original value while keeping the radius constant. How is the new motion different from before? That is, what other parameter is higher or lower?**

The centripetal force is always trying to keep the ball as horizontal as possible so the higher the tension means the higher acceleration that is applied. The ball is never spinning above 90 degrees as gravity is always pushing it down. So double the tension means the height is a little higher.

- 7. In this experiment, what parameter will you measure to calculate the centripetal force? Show a formula.**

The time interval is how long it takes to complete 20 spins; the period is the time taken for one spin.

The  $F_c$  is the amount of newtons the tension of the spring is

The mass is how heavy the ball is measured in Kilograms

The radius is how long the ball is to the pole in meters

The acceleration and velocity is conceived with this formula.

