In the rotational inertia lab, we suspended masses from threads so that they would exert a constant force via tension. Given what you now know about the behavior of a pendulum, why was it important that the mass not swing back and forth? To be specific, how would the force have changed had the mass had been swinging? Please be specific and relate the swinging motion to whatever results you predict.

Forces of tension and gravity no long aligned

When the spring is not swing the net force is in the direction of force tension, so up. However, **when the spring is swinging, the force tension is at an angle like 150ish and the force of gravity is still downward. The net force would be at an angle and downward.** This would effect how the force is measured in the RMS.

Magnitudes are no longer what they were assumed to be

In the rotational lab, we relied on the vertical forces of gravity and tension. If that pendulum was swinging, the Force of gravity would not be equal to the force of tension due to the addition of sin(theta). **The force of tension would be greater than the force of gravity, this causes the pendulum to swing back and forth**. Thus, changing how the value of the force of gravity. **Also, the value for sin(theta) would decrease after every change in direction of the pendulum. Until the force of gravity equaled the force of tension.**

The actual net force would not equal what was assumed

If the mass was swinging back and forth, this would be due to the force of gravity and tension, which would continue to restore the mass to its equilibrium point before passing it due to conservation of energy. **The force on the mass would change because it would not be parallel to the force of the tension anymore and essentially cancel, but instead would have an angular displacement from the vertical that would increase the Fnet the mass is experiencing.**

Another expression of that

It was important that the mass not swing back and forth because if the mass did start to swing, the force of tension would no longer be parallel to gravity, meaning there would no longer be forces acting only in the vertical direction. There would be a net force that returns the mass back to equilibrium. **Essentially, if the mass had been swinging, the force of tension could not be calculated by determining the force of gravity acting on the mass because the force of tension would no longer be constant.**

At the Smithsonian Museum of Natural Science, an impressive Foucault pendulum hangs from the third floor and all the way down to the basement. Imagine that we had a similar one hanging in the atrium of Stephens Science Center. Estimate the amount of time it would take to complete a full swing.

Right logic, though actual calculation mysteriously absent

Considering the 3rd floor is about 30ft (or roughly 10m) above the basement floor, we can assume **the length of the pendulum would be around 10m**. We can now use the equation T = 2pi*(L/g)^.5 to find the time required for a full swing. **When the estimated length is plugged into this equation the resulting T is roughly 6 seconds**.

Calculation present, units absent!

t=2πsquareL/g

The atrium ceiling is pretty high it looks like 16 feet high or around five meters tall.

2(π)square 5/10

6square 1/2

6*square 2/2

6 seconds

Calculation and units!

The time period is 2pi*sqrt(l/g)

l = is the length of pendulum and g is gravity.

if l was about 12 meters then the time period would be **2pi*sqrt(12m/9.8m/s^2)** which is about 7 seconds. So it would take about 7 seconds for the pendulum to complete a full swing.

What condition must be satisfied for a pendulum to execute simple harmonic motion, at least approximately?

a. The swinging mass must be concentrated in a small volume
b. The string must not have a significant mass
c. The maximum angle of the swing must be fairly small
d. All of the above must be satisfied