Name _____

Circular Motion LAB

This lab is all about circular motion. You will examine how mass, velocity, and radiuseffects centripetal force.

Part 1: MASS

PURPOSE: Examine the relationship between mass and centripetal force.

QUESTION: How does changing the mass of the spinning object affect the centripetal force?

HYPOTHESIS

Variables:

Independent: _____

Dependent: _____

Controlled: _____

MATERIALS: string (approximately 1 meter),washers or weights, tape, meter stick/ruler, timer

METHODS

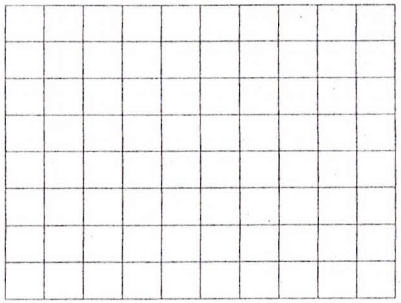
1. Weigh two washers (or use weights) and put them on the string (convert to kg).
2. Begin to spin your string in a horizontal circle. Try to keep**radius** and **velocity**constant so that you are only seeing the effect that mass produces.
3. Time 10 rotations.
4. Weigh two more washers (or weights) and add them to the string. Time 10 rotations.
5. Do step 4 again. You should test four different masses.
6. Put all of your data in the table.

RESULTS

TABLE 1: Mass and Centripetal Force

Trial	Mass (kg)	Radius (m)	Time (s) for 10 revs	Period T (s) (time for 1 rev)	Velocity $v = \frac{2\pi r}{T}$	Acceleration $a_c = \frac{v^2}{r}$	Centripetal Force $F_c = \frac{mv^2}{r}$
1							
2							
3							
4							

Make a line graph for Table 1. It will be mass (x-axis) vs centripetal force (y-axis). Label all axes and give it a title.



CONCLUSIONS

1. Do you accept or reject your hypothesis? EXPLAIN

2. How does the mass of the spinning object affect centripetal force?

Part 2: VELOCITY

PURPOSE: Examine the relationship between velocity and centripetal force.

QUESTION: How does changing the velocity of the spinning object affect the centripetal force?

HYPOTHESIS

Variables:

Independent: _____

Dependent: _____

Controlled: _____

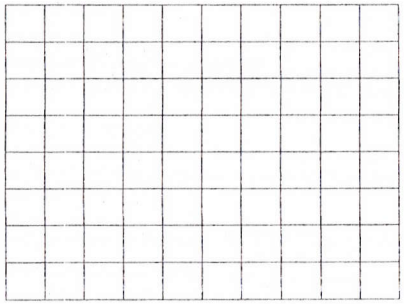
METHODS

For part 2, keep mass and radius constant. Spin the weightaround in a horizontal circle. Measure the time it takes for 10 revolutions. Increase the spin velocity and measure again. Test 4 different velocities.

RESULTS

TABLE 2: Velocity and Centripetal Force							
Trial	Mass (kg)	Radius (m)	Time (s) for 10 revs	Period T (s) (time for 1 rev)	Velocity $v = \frac{2\pi r}{T}$	Acceleration $a_c = \frac{v^2}{r}$	Centripetal Force $F_c = \frac{mv^2}{r}$
1							
2							
3							
4							

Make a line graph for Table 2. It will be velocity (x-axis) vs centripetal force (y-axis). Label all axes and give it a title.



CONCLUSIONS

1. Do you accept or reject your hypothesis? EXPLAIN

2. How does the velocity of the spinning object affect centripetal force?

Part 3: RADIUS

PURPOSE: Examine the relationship between radius and centripetal force.

QUESTION: How does decreasing the radius of the spinning object affect the centripetal force?

HYPOTHESIS

Variables:

Independent: _____

Dependent: _____

Controlled: _____

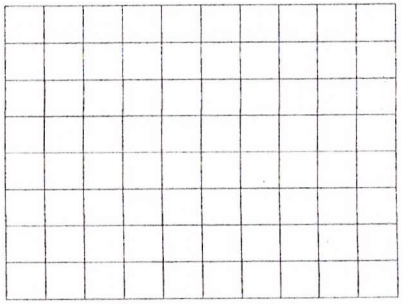
METHODS

For part 3, keep mass and velocity constant. Spin the weightaround in a horizontal circle. Measure the time it takes for 10 revolutions. Decrease the radius and measure again. Test 4 different radii.

RESULTS

TABLE 3: Radius and Centripetal Force							
Trial	Mass (kg)	Radius (m)	Time (s) for 10 revs	Period T (s) (time for 1 rev)	Velocity $v = \frac{2\pi r}{T}$	Acceleration $a_c = \frac{v^2}{r}$	Centripetal Force $F_c = \frac{mv^2}{r}$
1							
2							
3							
4							

Make a line graph for Table 3. It will be radius (x-axis) vs centripetal force (y-axis). Label all axes and give it a title.



CONCLUSIONS

1. Do you accept or reject your hypothesis? EXPLAIN

2. How does the radius of the spinning object affect centripetal force?