Name: _____ Hour: _____

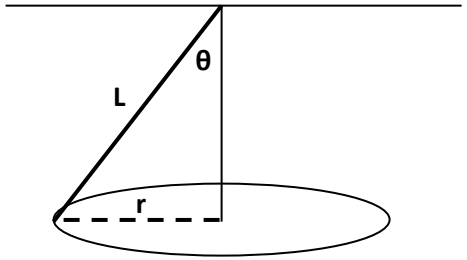
Airplanes!!

Purpose: To determine the centripetal force acting on a toy airplane in uniform circular motion using 2 different methods.

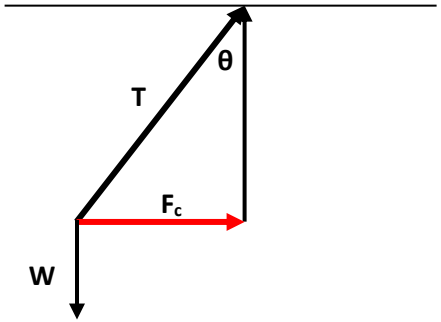
Procedure:

1. Time 10 revolutions of the airplane (to find the period).
2. Shine a flashlight underneath the airplane and stick a tack in the ceiling where the shadow falls (to measure the radius).
3. Stop the plane carefully with a meter stick.
4. Measure the radius of the circle.
5. Measure the length of the string (from the bottom of the clamp to the middle of the plane).
6. Remove the tack from the ceiling.
7. Measure the mass of the airplane using a scale.

METHOD 1: Circular Motion



METHOD 2: Newton's 2nd Law



Data:

Time (s)	**Radius** (m)	**String Length** (m)	**Mass** (kg)

Calculations:

For each calculation, include a formula, algebra, plugged-in-numbers, units, and circled answers.

Method 1

- Period
- Velocity
- Centripetal acceleration
- Centripetal force

Method 2

- Angle
- Weight
- Centripetal force

Also include a % difference for the 2 Centripetal Force values that you calculated.

$$\%\ \text{difference} = \left|\frac{(\text{Experimental Value 1} - \text{Experimental Value 2})}{\text{Average Experimental Value}}\right| * 100$$

Questions:

1. What force is responsible for the centripetal acceleration of the plane? (Hint: NOT centripetal force.)
2. How many g's was the airplane experiencing? (Show your work.)

Results:

What was the centripetal force of the airplane? (Include both methods and the % difference.)

Discussion:

Were the measurements that you took precise? Why or why not?

How would inaccurate or imprecise measurements affect your results? Be specific.