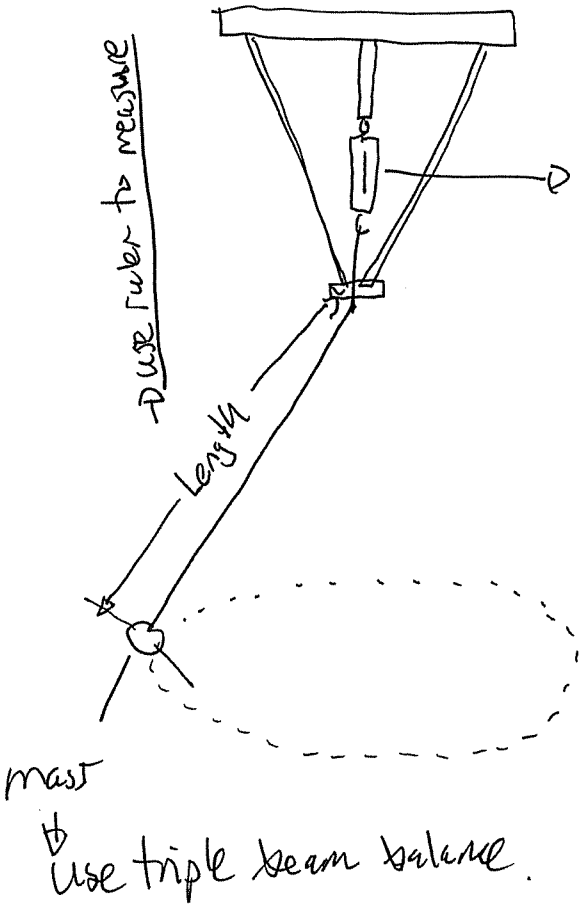
Physics 12 U6 Circular Motion Airplane Lab

Name: _____

Purpose: To apply our knowledge of circular motion to predict the tension in the string when the plane is flying around in a circle. We will see how close our predicted tension is to our measured tension.



Procedure/Data Collection: (don't turn plane on until step 4)

1. The plane goes fairly rockingly fast once it is up to speed so don't accidently step in front of it, you may hurt yourself and wreck my plane.

2. You need to measure the distance from the planes center of mass to where the string pivots, in meters.

Length = _____

3. The plane is clipped onto the string, gently unclip the plane and find its mass using the triple beam balance. After find the mass re attach plane.

Mass = _____ grams = _____ kg

4. Turn plane on, small switch. Give it a gently push to start it in its circular path. It took me about 4 tries the first time, you need to give it a fairly good push. It might take a few trials. Once you get it flying in a circle it will likely take about 10 seconds to get up to full speed. After that you need to time how long it take to complete ten full revolutions. Assign a counter and two timers (use the stop watches on your phones).

10 revolutions = _____ seconds.

5. Read the force scale while the plane is flying in a circle.

Actual Tension = _____ Newtons

Theory:

Watch video and copy down derivation of equations here.

End with

$$F_{TENSION} = m\ 4\ \pi^2\ L/T^2$$

Calculations:

1. Period = T = time for 1 revolution (divide your time for 10 revolutions by 10)

T = _____ seconds

2. Using equation below, solve for tension in string. Show your working.

$$F_{TENSION} = m\ 4\ \pi^2\ L/T^2$$

3. Percentage Difference:

Calculate the percent difference between the calculated tension and the actual tension.

Show working.

4. Watch GoldFinger clip and then using our U6 equations estimate the acceleration of James Bond. Show all working below.