Rotational Equilibrium

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Procedure A: Balancing torques

What is the position of the center of mass of the meter stick?

Complete the table below.

Data Table 1

	Mass (g)	**Lever Arm x (cm)**	**Torque including sign ($g \cdot cm^2/s^2$)**
m_1			
m_2			
m_3			predicted =

Using the predicted torque in Data Table 1, predict the value of x_3.

What is the experimental value of x_3?

What is the percent difference between the predicted and experimental value of x_3? (Percent differences should not be rounded to one significant figure.)

CHECKPOINT 1: Ask your TA to check your set-up and calculations.

Procedure B: Finding the Mass of the Meter Stick

If you have not already done so, draw a sketch of the experimental set-up with appropriate labels in the space provided in your worksheet before you proceed further.

Complete the data table below.

Data Table 2

	Mass m (g)	**σ_m (g)**	**Lever Arm x (cm)**	**σ_x (cm)**	**Torque including sign ($g \cdot cm^2/s^2$)**
m_1					
m_2					predicted =

Using the predicted torque in Data Table 2, predict the value of the mass of the meter stick m_2.

What is the percent uncertainty in the predicted value of the mass?

What is the experimental value of the mass of the meter stick m_2?

What is the percent uncertainty in the experimental value of the mass?

What is the percent difference between the predicted and experimental values of m_2? (Percent differences should not be rounded to one significant figure.)

Do your values agree within experimental uncertainty? (Compare your values for m_2 and their uncertainties exactly as you have entered them.)

CHECKPOINT 2: Ask your TA to check your diagram, set-up, uncertainty formula, and calculations.

Procedure C: Determining an unknown mass

If you have not already done so, draw a sketch of the experimental set-up with appropriate labels in the space provided in your worksheet before you proceed further.

Complete the data table below.

Data Table 3

	Mass m (g)	**σ_m (g)**	**Lever Arm x (cm)**	**σ_x (cm)**	**Torque including sign ($g \cdot cm^2/s^2$)**
m_1					
m_2					
m_3					predicted =

Using the predicted value of the torque in Data Table 3, predict the value of the mass of shot plus bucket.

What is the percent uncertainty in the predicted value of the mass?

What is the experimental value of the mass of shot plus bucket?

What is the percent uncertainty in the experimental value of the mass?

What is the percent difference between the predicted and experimental values of m_3? (Percent differences should not be rounded to one significant figure.)

Do your values agree within experimental uncertainty? (Compare your values for m_3 and their uncertainties exactly as you have entered them.)

CHECKPOINT 3: Ask your TA to check your set-up, diagram, and calculations.