TORQUE LAB

Purpose: To show that sum of torques about a pivot is zero when an object is in rotational equilibrium.

Materials: meter stick, 1 spring balance, string, retort stand, set of masses

Procedure:
1. Use a spring balance to weigh the meter stick. Record this value: ________
2. Set up the meter stick and spring as shown below:

3. Use a 100g and a 50g mass to balance the metre stick until the meter stick is horizontal. Record the masses, their distance from where the spring balance is located, and the reading on the spring balance in a data table:

Data table:

4. Move the center point of the meter stick so that the spring balance is no longer at the middle of the meter stick. Move the masses into new positions and once again balance the meter stick until it is horizontal. Repeat observations as in procedure #1 and record in the data table below:

Data table:
5. Now move the masse until the meter stick is balanced, but it is at some angle to the horizontal. This angle should be about 10° or so. Record this angle and the rest of the data as in procedure #1 in the data table below:

Data Table:

Data Analysis:

1. Calculate the sum of the torques about the center of the meter stick for your first set of data. Don’t forget the weight of the meter stick. Remember you have both positive and negative torques.

2. Calculate the sum of the torques about the center of the meter stick for your second set of data. Don’t forget the weight of the meter stick. Remember you have both positive and negative torques.

3. Calculate the sum of the torques about the center of the meter stick for your third set of data. Don’t forget the weight of the meter stick. Remember you have both positive and negative torques.

4. Do an error analysis of your results as follows:

\[
\% \text{ error} = \left( \frac{\text{sum of the torques}}{\text{Ave. of the torques}} \right) \times 100\%
\]

Conclusion:

Does the premise that the sum of the torques about a pivot point equal zero held to be true?