

Experiment 8: Torque, Equilibrium & Center of Gravity

Student Name: _____

Section Number: _____

PRELAB

PRE-LAB Instructions:

Print out this page. Feel free to refer to the lab Instructions and other materials, your physics textbook, other students, etc. to help you to ponder, understand, and work out answers to the following question(s). Show your work & answers in the space(s) provided.

PRE-LAB Questions

A meter-long ruler (meterstick) has a mass of 200 g giving it a weight of 1.96 N (nearly 1/2 pound). A pencil lying flat on a tabletop serves as a fulcrum and the if the ruler is placed with the 50-cm mark above the pencil the ruler is balanced -showing that the center of mass is at the center of the ruler.

- 1) (a) Draw a diagram showing the ruler placed horizontally on the pencil with the ruler's 35-cm mark above the pencil. Draw vectors showing the two forces that act on the ruler (weight and normal force) at the INSTANT it is released (we realize, of course, that the ruler will quickly be rotationally accelerated by the net torque).

(b) As you have drawn it above, is the torque acting on the pencil clockwise (CW) or counterclockwise (CCW)?

(c) What is the magnitude of the torque acting on the ruler?

2) If a 100 gram mass is correctly placed on the above ruler, the ruler + 100g system will remain balanced (with the 35-cm mark above the pencil and the ruler horizontal). Such a system is in equilibrium since the forces and torques are balanced and the acceleration is zero.

(a) Draw a diagram of the balanced system described above - showing the forces that are acting on the ruler (label your vectors).

(b) According to your diagram, what is the CW torque acting on the ruler?

(c) According to your diagram, what is the CCW torque acting on the ruler?

(d) Where is the 100 gram mass placed (above what ruler mark) to achieve this equilibrium?