

Name: _____

Physics 100

Wind-up Toy Lab

The objective of this lab is to explain by using a combination scale diagrams and verbal descriptions exactly how a wind up toy works. Wherever possible/appropriate you should describe the physics of the toy by including an analysis of mechanical advantage, torque, leverage and center of gravity.

Procedure:

Things that you need to include:

- a. Make an overall external scale drawing of the toy as well as scale drawings of key internal workings of the toy. You may need to draw more than one view to capture all of the ways that the toy works.
- b. Find the center of gravity of your toy using the balance or tipping test.
- c. Count the number of teeth in the gears in order the mechanical disadvantage: how many rotations come out for every rotation in.
- d. Measure any lever arms with respect to the legs or wheels.
- e. Calculate the mechanical advantage of any gear or leverage systems that have to do with how the toy works.
- f. Understand/Explain how the internal workings of the toy cause the push against the floor such that the floor pushes back making the toy move. (This is the hard part.)
- g. Include how the toy is constructed so that when you're winding it up it does not immediately unwind.

Write-up:

For the write-up create a complete yet concise description of how the toy moves. Integrate the drawings and calculations above into this description.

Note: Ten percent of your grade on this lab involves handing in a draft of your write-up with in one week before the due date.

Extra Credit: You will receive extra credit for returning your toy in working order.