Student handout

Find an expression for angular momentum in polar coordinates.

1 Instructor's Guide

1.1 Introduction

This activity is designed to get students use to doing work with vectors and curvilinear coordinates again after a significant break. Recalling expressions for the position vector should be somewhat recent, but expressions like the general polar velocity should be very dusty as students would haven't worked with it since PH335.

1.2 Student Conversations

- Many students may write a formula for angular momentum that is $\vec{L} = I\vec{\omega}$. Important to tell them that only works for a rigid rotating body, and there is a more general form of angular momentum.
- Students may forget the subtlies of coordinatization, make sure they are using vectors and a cross product for said vectors and not just getting a magnitude.

1.3 Wrap-up

The solution above is quite quick once you know what to do, so showing it done is advised. Taking the time to understand the polar representation of velocity again and physically why the radial component of velocity isn't relevent for angular momentum will be important for their understanding of central forces and why angular momentum ends up being conserved in them.