Steps for Finding the Moment of Inertia of an Object with Uniform Density

1) Organize and plan
    a. Chop up: Imagine chopping up the object differential-sized mass elements, each of which has a moment of inertia given by a known expression in terms of the mass and dimensions of the element. If all else fails, you can chop the object up into points with moment of inertia given by $dI = dm * r^2$.
    b. Picture: draw a diagram showing a representative differential piece of the object. The diagram should clearly show the parameterizing variable. Do NOT picture the mass element at an "extreme" part of the object; pick a representative part of the object.
    c. Parameterize the elements: define a variable or variables that have unique values associated with each individual element. Usually, these variables are either lengths or angles.
    d. List the integration limits of your parameterizing variables such that they describe the object.
    e. Find dl, dA, or dV, the length/area/volume of the differential element, by finding the dimensions of the element in terms your parameterizing variable(s). (Warning: this can be tricky if you are using an angle as a parameterizing variable: proceed with caution and draw a magnified version of your mass element if needed).
    f. Find dm, the mass of the differential element in terms of the parameterizing variable(s) by multiplying dl/dA/dV by the appropriate density. (If given the total mass, you may need to calculate the density).
2) Solve
    a. Write an expression for dI in terms of your parameterizing variables, using the known equation for the moment of inertia of the differential element.
    b. Integrate!
3) Reflect
    a. Does the answer make sense?
    b. Did you use any new techniques?
    c. Any other insights?