1) S = r * θ; θ = 450 degrees = 5pi/2 rad; s =1*5pi/2 = 5pi/2 cm
2) R = r*cos(θ ) = 4000* cos(42deg) = 2972mi; ω=2pi/T=2pi/24=0.262rad/h; v=r* ω=2972*0.262=778mi/hr=348m/s
3) Moment of inertia is a measure of how difficult it is to change an object's rotational motion about a particular axis. It depends on both the mass of the object and how that mass is distributed relative to the axis of rotation.
4) Yes. Moment of inertia is a property of an object's mass distribution about an axis, not about whether it is currently rotating.
5) kg*m^2
6) Door handles are placed at the far edge to maximize the lever arm
7) The solid cylinder will reach the bottom first. Although they have the same mass, radius, and total mass, the cylindrical shell has more of its mass concentrated farther from the axis, giving it a larger moment of inertia. That means more of its gravitational potential energy goes into rotational kinetic energy.
8) h=½*a*t^2; t= sqrt(2h/a)
9) x=d^2; Delta x = 2d*delta d