

Physics 141
Quiz 5
Tuesday, Nov. 25, 2008

Name:

2 Problems (turn page over) (Recommended time \leq 20 minutes)

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Problem 1: 10 minutes/10 points Calculate the moment of inertia of a rod of length L and mass M about one end.

Problem 2: 10 minutes/10 points

a) A can of bean soup (solid inside- no internal degrees-of-freedom) rolls down a ramp from a height h . The can is cylindrical, with mass M and radius R . How fast is it going when it gets to the bottom of the ramp? (ignore the moment of inertia of the metal of the can- treat the can as a solid uniform body, as the soup weighs much more than the can. Also assume $h \gg R$)

b) Now suppose the can is boullion (e.g. chicken stock- basically salty water- low viscosity), so that the contents do not gain any angular motion as the can rolls. How fast is the can of bouillion going when it gets to the bottom? (again, ignore the moment of inertia of the can).