PHY218 RECITATION WEEK 4 YOUR NAME:

GROUP QUIZ GROUP NUMBER:

You tie a rope to a pole placed at the center of an ice rink and skate around it in a horizontal circular motion at a constant speed. You tested the rope's strength and found that it can hold a maximum mass, M, before breaking.

(a) You use a rope of length, R, from the center pole and, you are a mass of m, find an expression for the maximum velocity you can travel, v_{max}, without breaking the rope in terms of M, m, R, and g. What assumptions about the rope and ice did you make to solve this problem? Be sure to include a diagram of the system with all the relevant quantities and their directions.

(b) In the previous part we assumed that we were traveling on frictionless ice. Now assume that the ice has a coefficient of kinetic friction, μ_k. What is the expression for v_{max} now (in terms of M, m, R, g, and μ_k)?

(c) Why do we use μ_k rather than μ_s, the coefficient of static friction?