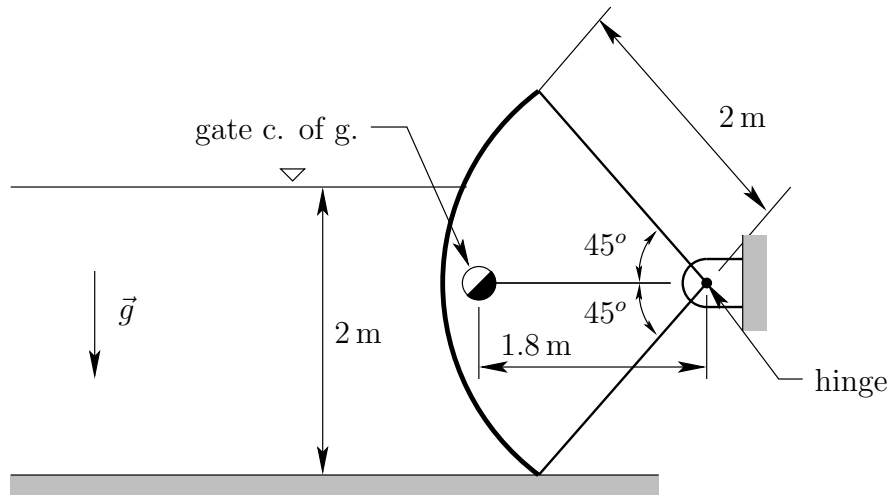


University of Saskatchewan
 Department of Mechanical Engineering
 ME 215.3 Fluid Mechanics I
 Midterm Examination
 February 28, 2005

Total Marks: 60

Instructor: JD Bugg

- (10) 1. Carefully define the following terms.
- (a) Reynolds Transport Theorem
 - (b) Gauge Pressure
 - (c) Archimedes Principle
- (25) 2. A Tainter gate holds back a pool of water ($\rho = 1000 \text{ kg/m}^3$) which is 2 m deep. The radius of curvature of the gate is 2 m and it is 6 m long. The mass of the gate is 1000 kg and its centre of gravity is at the position indicated on the diagram. Assume that the point where the gate contacts the bottom of the pool is frictionless. Calculate the reaction force on the hinge.



- (25) 3. A cart mounted on straight, level rails is used to test rocket engines. A 400 kg cart has a rocket mounted on it which has an initial mass of 500 kg. Eighty percent of the mass of the rocket is fuel. The products of combustion exhaust at a speed of 1000 m/s relative to the rocket nozzle. Neglect friction in the wheels of the cart and aerodynamic drag. Determine the speed of the rocket when the fuel is all used.

