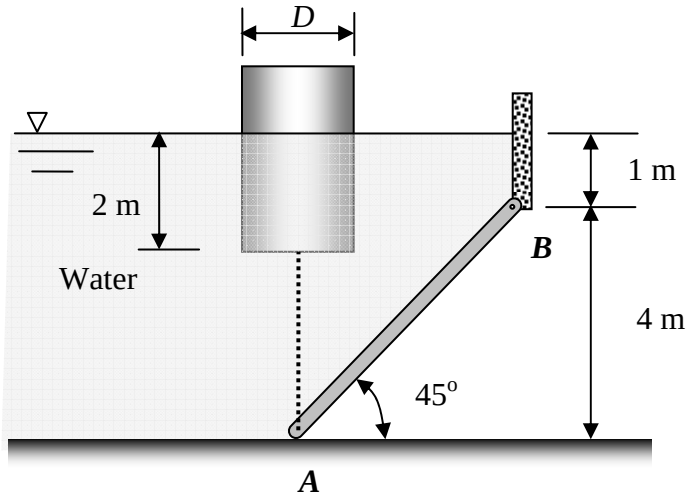
Homework Set #6

Problem 6.1

A 500-kg, 10-m-wide rectangular gate shown in the figure is hinged at *B* and rests against the floor at *A* making an angle of 45° with the horizontal. A cylindrical float of diameter *D* and negligible mass is attached to the gate at *A*. Assume the specific weight of water is 9.81 kN/m^3.

(a) Determine the diameter of the float if the buoyancy force on the float is just equal to the weight of the gate.

(b) Determine the reaction force of the ground on the gate at point *A* and the reactions on the gate at point *B*. Assume the hinge at *B* is frictionless.



Problem 6.2

A concrete dam is 40 feet high and 200 feet long and sits on a rock formation. The dam's cross-section is a 30-60-90 triangle. The depth of the water behind the dam is 30 ft. To see if the dam could slide or overturn due to the water forces, you need to perform a safety analysis.

To analyze the forces on the dam, assume the dam is restrained at only two points, *A* and *B*. Model point *A* as a single vertical reaction force and point *B* as a frictionless hinge. There is no water leakage under the dam. Assume that water has a density of 62.4 lbm/ft^3 and concrete has a specific gravity of 2.2.

(a) Determine the magnitude and direction of the reaction forces *on* the dam at points *A* and *B*.

(b) Should the owners of the dam be concerned?

(c) Explain how your answers to (a) and (b) would change if there was hydrostatic pressure along surface *AB* because of a water leak. A numerical answer is *not* required.