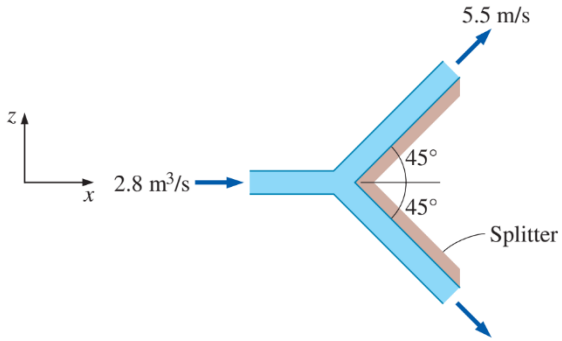
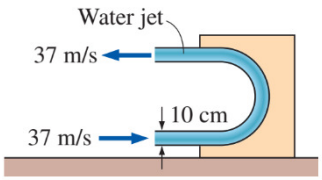
6–24 A 2.8-m^3/s water jet is moving in the positive x-direction at 6 m/s. The stream hits a stationary splitter, such that half of the flow is diverted upward at 45° and the other half is directed downward, and both streams have a final average speed of 5.5 m/s. Disregarding gravitational effects, determine the x- and z-components of the force required to hold the splitter in place against the water force.



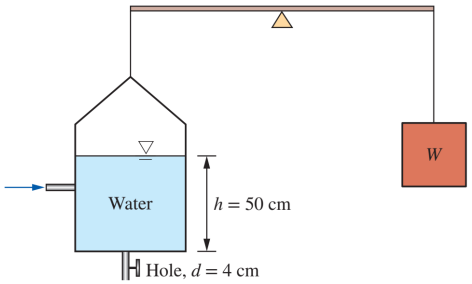
6–31 A 10-cm-diameter horizontal water jet having a velocity of 37 m/s strikes a curved plate, which deflects the water 180° at the same speed. Ignoring the frictional effects, determine the force required to hold the plate against the water stream.



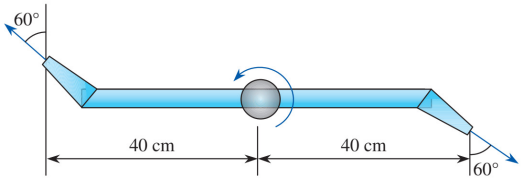
6–28 Firefighters are holding a nozzle at the end of a hose while trying to extinguish a fire. If the nozzle exit diameter is 8 cm and the water flow rate is 12 m^3/min, determine (*a*) the average water exit velocity and (*b*) the horizontal resistance force required of the firefighters to hold the nozzle.

Answers: (*a*) 39.8 m/s, (*b*) 7958 N

6–42 The weight of a water tank open to the atmosphere is balanced by a counterweight, as shown in Fig. P6–42. There is a 4-cm hole at the bottom of the tank with a discharge coefficient of 0.90, and water level in the tank is maintained constant at 50 cm by water entering the tank horizontally. Determine how much mass must be added to or removed from the counterweight to maintain balance when the hole at the bottom is opened.



6–65 Water enters vertically and steadily at a rate of 10 L/s into the sprinkler shown in Fig. P6–65. Both water jets have a diameter of 1.2 cm. Disregarding any frictional effects, determine (*a*) the rotational speed of the sprinkler in rpm and (*b*) the torque required to prevent the sprinkler from rotating.



6–93 A cart with frictionless wheels and a large tank shoots water at a deflector plate, turning it by angle θ as sketched. The cart tries to move to the left, but a cable prevents it from doing so. At the exit of the deflector, the water jet area A_{jet}, its average velocity V_{jet}, and its momentum flux correction factor β_{jet} are known. Generate an expression for the tension T in the cable in terms of the given variables.