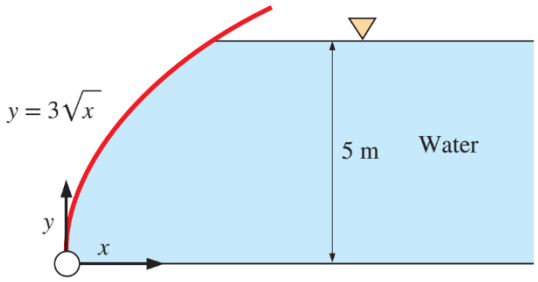
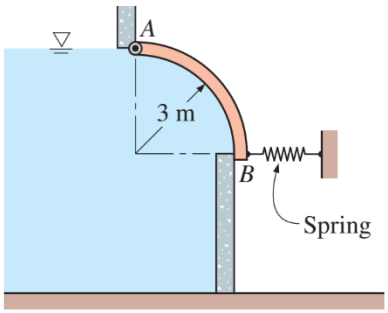
3–84 The curved surface given in the figure is defined by $y = 3\sqrt{x}$. Determine the horizontal force and its line of action applied by water on the curved surface. The width of the gate is $b = 2$ m.

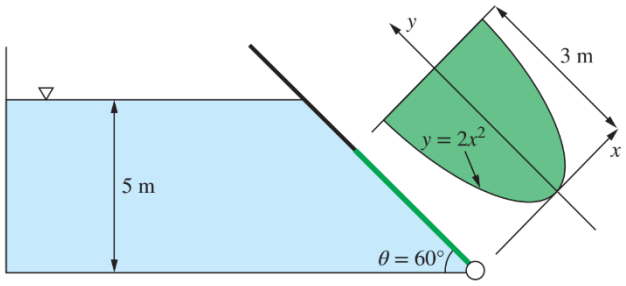


3–85 A 4-m-long quarter-circular gate of radius 3 m and of negligible weight is hinged about its upper edge *A*, as shown in Fig. P3–85. The gate controls the flow of water over the ledge at *B*, where the gate is pressed by a spring. Determine the minimum spring force required to keep the gate closed when the water level rises to *A* at the upper edge of the gate.

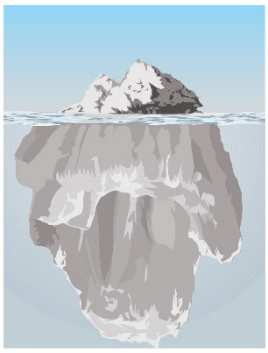


3–75 An open settling tank shown in the figure contains a liquid suspension. Determine the resultant force acting on the gate and its line of action if the liquid density is 850 kg/m^3. The gate is parabolic as sketched, looking straight at the gate.

Answers: 140 kN, 1.64 m from bottom



3–96 It is estimated that 90 percent of an iceberg's volume is below the surface, while only 10 percent is visible above the surface. For seawater with a density of 1025 kg/m^3, estimate the density of the iceberg.



3–97 One of the common procedures in fitness programs is to determine the fat-to-muscle ratio of the body. This is based on the principle that the muscle tissue is denser than the fat tissue, and, thus, the higher the average density of the body, the higher is the fraction of muscle tissue. The average density of the body can be determined by weighing the person in air and also while submerged in water in a tank. Treating all tissues and bones (other than fat) as muscle with an equivalent density of ρ_{muscle}, obtain a relation for the volume fraction of body fat x_{fat}. *Answer:* $x_{fat} = (\rho_{muscle} - \rho_{avg})/(\rho_{muscle} - \rho_{fat})$.