Chapter 3 - Fluid Statics

Lecture 5
Section 3.4

Introduction to Fluid Mechanics

Mechanical Engineering and Materials Science
University of Pittsburgh

©Barry, 2019

Student Learning Objectives

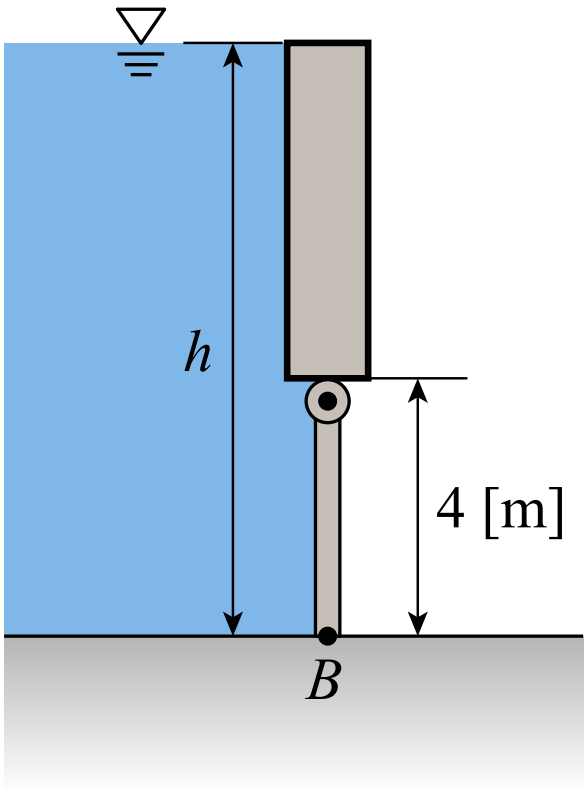
Students should be able to determine the:

- magnitude of a force acting on a submerged planar surface;
- direction of a force acting on a submerged planar surface;
- the line of action of a force acting on a submerged planar surface.

©Barry, 2019

Example #1

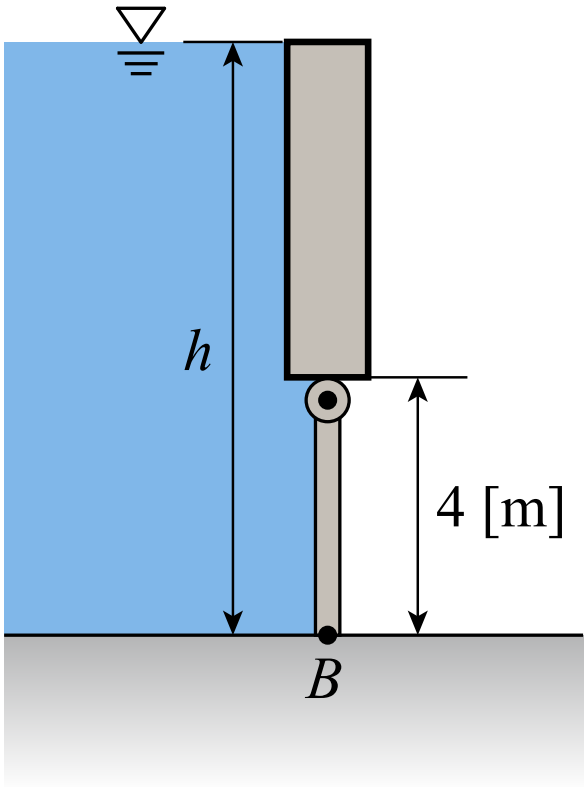
- That tank shown below is 5 [m] wide. The fluid is water at 20°C. Determine the force on B if the depth is 9.5 [m]



©Barry, 2019

Example #1

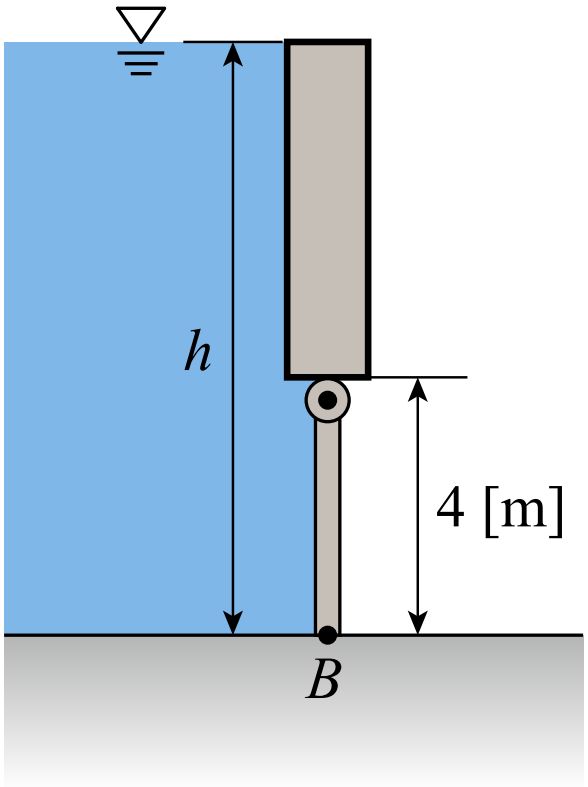
Solution:



©Barry, 2019

Example #1

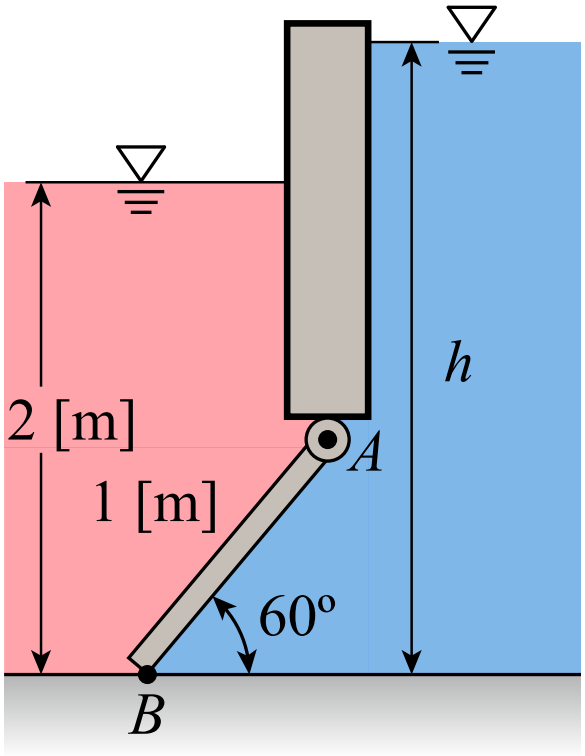
Solution:



©Barry, 2019

Example #2

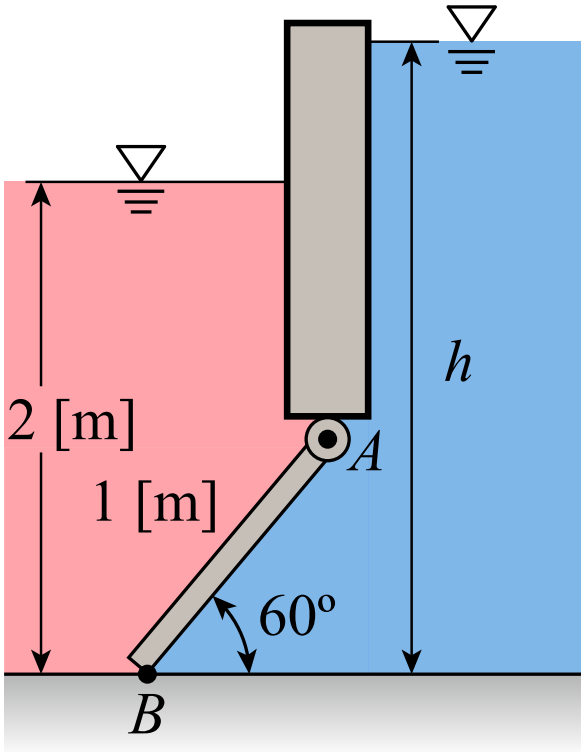
- The gate below shown between points AB has a mass of 180 [kg], is 1.2 [m] wide and is hinged at A. If all fluids exist at 20°C, for what depth of water h will the force at point B be zero?



©Barry, 2019

Example #2

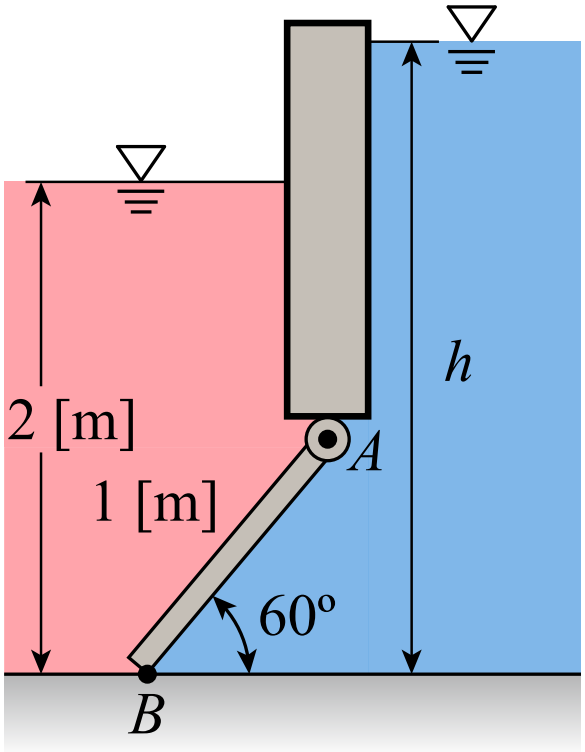
Solution:



©Barry, 2019

Example #2

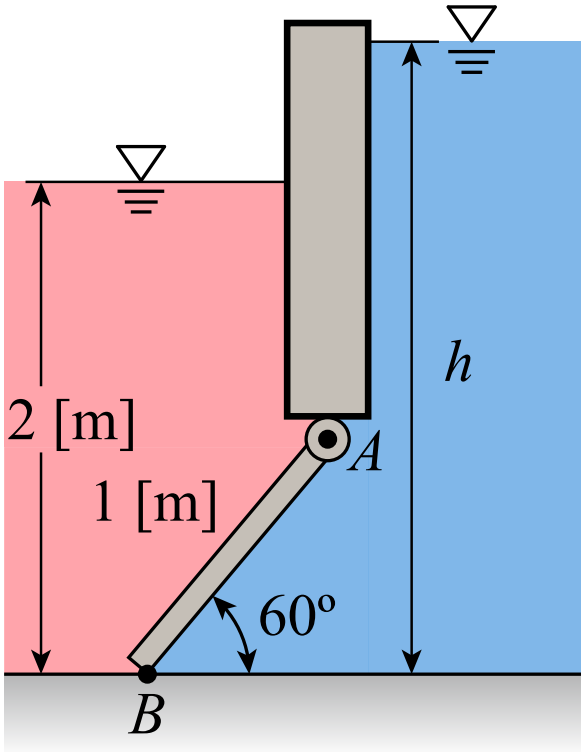
Solution:



©Barry, 2019

Example #2

Solution:



©Barry, 2019