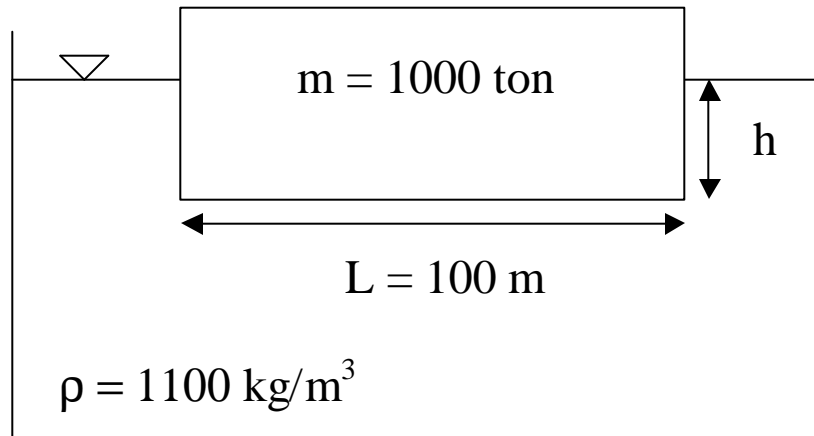
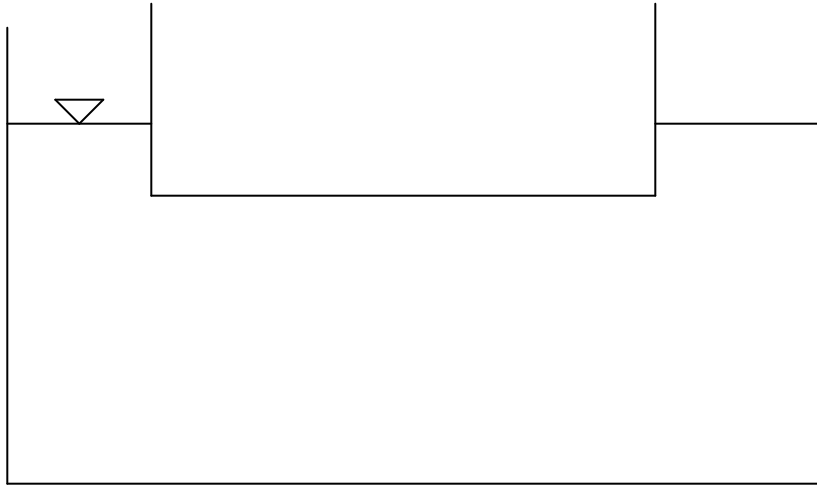


1. Cargo Problem: A 10 ton cargo ship floats in the middle of the Pacific. The ship has a width of 50 m (direction into the page). How much does the ship submerge into the ocean, *i.e.* what is h ?



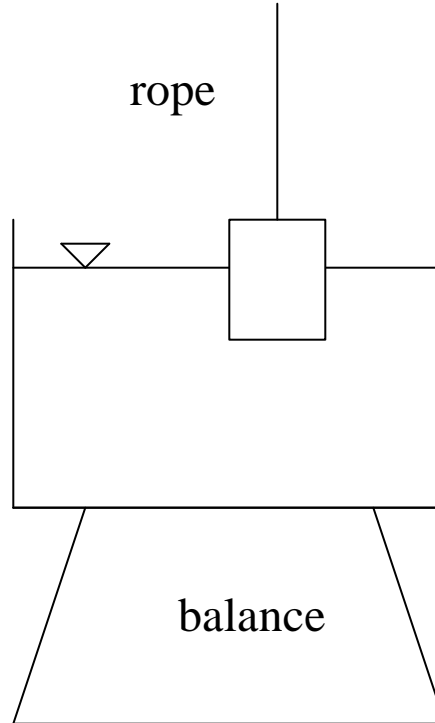
Give a physical reason for the cause of buoyancy force in the problem.

2. Consider the following figure consisting of an empty container placed in a tank of water.



- a. As one continues to add more weights into the container, sketch the variation of the buoyancy force with the added weight.
- b. What will happen if one starts pouring oil into the tank? Explain your answer.
- c. Is there any difference if mercury is poured instead?

3. Hanging weight problem: Consider the following figure:



Describe the reading on the balance as the hanging weight is gradually lowered into the water tank. Assume that the tank is large enough that no over-flowing occurs. Explain your answer with clarity. Hint: It may be helpful to consider the following possibilities separately:

- a. partially submerged condition

- b. completely submerged condition but does not reach the bottom of the tank

- c. resting at the bottom of the tank

Will your conclusion be different if the water is filled up to the brim before the weight is lowered? Explain your answer.