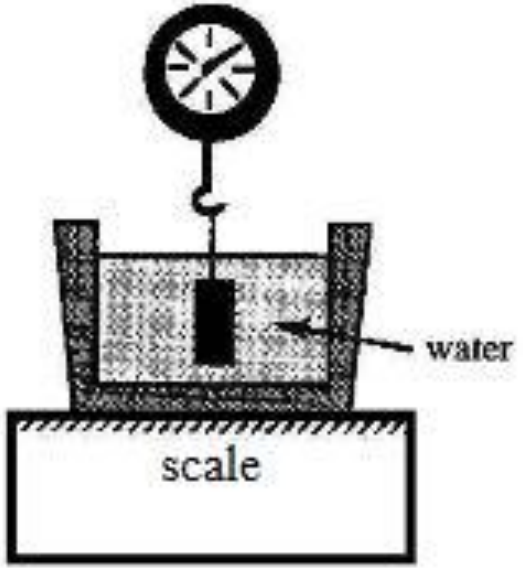
PH202 Midterm 2 Review

Thermo and Fluids

Discussion Question 1: 3 minutes

- A steel block hanging from a scale is slowly lowered into a vat of water that rests on another scale. Consider the time when the block is being lowered and is *partially* submerged. Which of the following statements are true regarding this situation?
  a) The reading on the top scale will be getting smaller while the bottom scale will stay the same
  b) The reading on the top scale will be getting larger while the bottom scale remains the same
  c) The reading on the top scale will be getting smaller while the reading on the bottom scale gets larger
  d) The reading on the top scale will be getting larger while the reading on the bottom scale gets smaller
  e) The height of the water in the vat will lower
  f) After the block is fully submerged but still not touching the bottom of the bat, the readings on both scales will remain constant



Discussion Question 2: 3 minutes

- Which of the following will increase the pressure in a sealed container of ideal gas by a factor of 1.5?
  a) Increasing the temperature by a factor of 1.5 while holding the volume constant
  b) Decreasing the temperature to 2/3 of the initial value while holding the volume constant
  c) Increasing the temperature to double the initial value while increasing the volume to three times the initial value
  d) Decreasing the temperature to ½ the initial value while decreasing the volume to 1/3 of the initial value
  e) Increasing the temperature to six times the initial value while increasing the volume to four times the initial value

Discussion Question 3: 3 minutes

- Entropy may decrease locally at some region within an isolated system. How can this statement be justified?
  a) This cannot be possible
  b) This is possible because entropy of an isolated system can decrease
  c) It must be compensated by a greater increase of entropy somewhere within the system
  d) None of the above

Question 1: 7 minutes

- Water is flowing in a fire hose with a velocity of 1.0m/s and a pressure of 200kPa. What is the velocity of the water at the nozzle assuming the height of the hose doesn’t change?

Question 2: 7 minutes

- A dam holds back water in a lake. The dam has a small hole 1.4m below the surface of the lake. What speed does water exit the hole? Assume the height of the water doesn't change as the volume of water in the lake is significantly bigger than the hole and volume of water lost due to the hole.

Question 3: 7 minutes

- There is 1 mole of a monatomic gas initially at a pressure of 2atm and temperature of 350K. The volume of the gas is then doubled adiabatically and has a temperature of 300K.
  A. Sketch the process on a PV diagram
  B. Tell me everything you can about this process. What are the initial and final volumes of the gas? What is the final pressure of the gas? Calculate W, Q, and ΔE for the process.