APPLICATIONS - PRESSURE

PROBLEM 1 - Pressure = Force per unit area exerted by a liquid. We assume that at any point the pressure is exerted equally in all directions. Pressure exerted by a liquid increases with depth.

$$PRESSURE_{liquid} = (DENSITY)(GRAVITY)(DEPTH)$$

$$FORCE = (PRESSURE)(AREA)$$

The Hover Dam, which stores water for California, Nevada, and Arizona has a shape like a trapezoid with top width 400m, bottom width 200m, and a height of 220m. Our goal is to calculate the **pressure** of water at the base of the dam and the **total force** of the water on the back side of the dam. The density of water is $\delta = 1000\frac{kg}{m^3}$ and the acceleration of gravity on earth is $g = 9.8\frac{m}{s^2}$. Assume that the dam is completely flat (2-D), in other words ignore the curving of the dam.

1. First draw a picture of the damn. The pressure at the base is calculated with out using integration. Calculate this pressure. Why were you able to do this without integration?

2. Show that the force of water on a small horizontal slice is given by: $F_i = 9800h_i w_i \Delta h$ where w_i is the width of your small slice.

3. Show that you can write w_i as a function of h_i given by: $w_i = 400 - \frac{10}{11}h_i$

4. Write down and solve the integral that gives the total force on the dam. (Note: in reality the Hover Damn is curved in toward the water in order to better withstand the huge force of water against it.)