7.*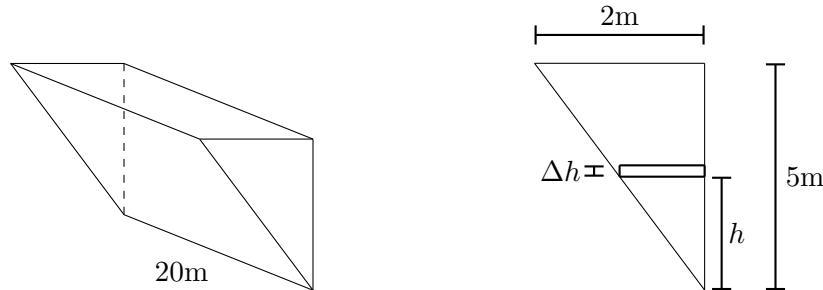* [13 points] A drinking water facility needs to pump water out of an underground tank. The tank is 20 meters in length with right-triangular cross-sections perpendicular to the ground as shown in the figure. The top of the tank is a 2m by 20m rectangle. The **top of the tank lies **5 meters below the surface of the earth.** Recall that $g = 9.8\text{m/s}^2$, where g is the gravitational constant.

Underground Tank

a. [5 points] Write an expression for the **volume** (in cubic meters) of a horizontal rectangular slice of water at height h above the bottom of the tank, with thickness Δh. Your answer should not involve an integral.

b. [2 points] The density of water is approximately 1000 kg/m^3. Write an expression for the **weight** (in Newtons) of the slice of water from part (a). Your answer should not involve an integral.

c. [3 points] Write an expression for the **work** (in Joules) needed to pump the slice of water (from parts (a) and (b)) to the surface of the earth. Your answer should not involve an integral.

d. [3 points] Assuming the tank is initially full of water, write an integral for the **total work** (in Joules) needed to pump all of the water to the surface of the earth.