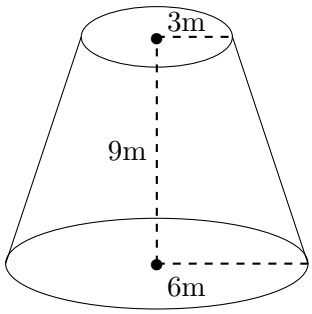
9. [12 points] The Nub's Nob Ski Area keeps a massive supply of hot chocolate. The hot chocolate is stored in a container shaped like a cone with the point end removed as shown below. The height of the container is 9 meters, and it has lower radius 6 meters and upper radius 3 meters. The hot chocolate has a density of 3000 kg/m^3. Recall the gravitational constant is $g = 9.8\text{m/s}^2$.



a. [3 points] Write a formula for $r(h)$, the radius of a circular cross section of the container h meters above the base.

b. [6 points] Write a formula in terms of $r(h)$ for the work required to lift a slice of hot chocolate of thickness Δh from height h to the top of the container.

c. [3 points] Write an integral that gives the work required to lift all of the hot chocolate to the top of the container. Do not evaluate this integral.

9. [9 points] The tank pictured below has height 2 meters, and the top and bottom are equilateral triangles with sides of length 1 meter. It is filled **halfway** with hot chocolate. The hot chocolate has uniform density 1325 kg/m^3. The acceleration due to gravity is 9.8 m/s^2. Calculate the work needed to pump all the chocolate to the top of the tank. Show all your work. Give an **exact** answer. Include **units**.