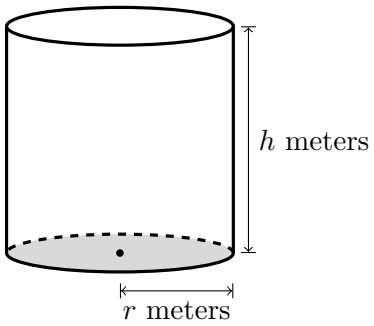
**2**. [10 points] Suma is making cylindrical paper cups that will be used to serve milkshakes at Qabil's Creamery. She rolls paper into a cylinder and then attaches it to the base. The thicker material that she uses for the base costs \$4.30 per square meter, and the lighter material that she uses for the vertical part of the cup costs \$2.20 per square meter. The radius of the circular base is $r$ meters, and the height of the cup is $h$ meters, as shown in the diagram on the right.
It may be helpful to know that the surface area of the vertical portion of the cup is $2\pi rh$.
*Note:* The top of the cup is left open.




Throughout this problem, assume that the material that Suma uses to make one paper cup costs \$0.12.

**a**. [4 points] Find a formula for $h$ in terms of $r$.

**Answer:** $h =$ _____

**b**. [2 points] Let $V(r)$ be the volume (in cubic meters) of the cup that Suma makes given that the material for the cup costs \$0.12 and the radius of the cup is $r$ meters. Find a formula for $V(r)$. The variable $h$ should <u>not</u> appear in your answer.
(Note: This is the function that Suma would use to find the value of $r$ maximizing the volume of the cup, but you should <u>not</u> do the optimization in this case.)

**Answer:** $V(r) =$ _____

**c**. [4 points] In the context of this problem, what is the domain of $V(r)$?

**Answer:** _____