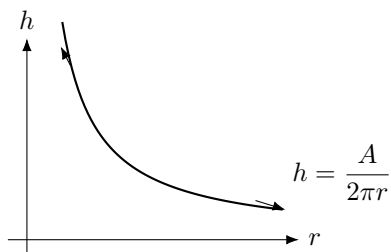


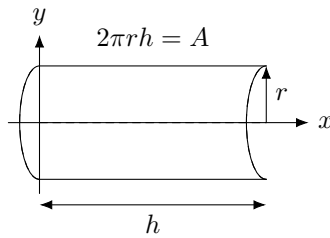
Question 10

Given: A cylinder has radius r , height h , and fixed lateral area A .

Tasks: Solve for h , find the total area including both circular ends, and then analyze the limit as $r \rightarrow 0^+$.



Question 10 – Solution



Step 1: Solve the lateral-area equation for h .

$$2\pi r h = A,$$
$$h = \frac{A}{2\pi r}.$$

Step 2: Add the two circular ends. Each end has area πr^2 , so

$$S_{\text{total}} = A + 2\pi r^2.$$

Step 3: Take the limit as $r \rightarrow 0^+$.

$$\lim_{r \rightarrow 0^+} S_{\text{total}} = \lim_{r \rightarrow 0^+} (A + 2\pi r^2) = A,$$

$$\lim_{r \rightarrow 0^+} h = \lim_{r \rightarrow 0^+} \frac{A}{2\pi r} = \infty.$$

$$\boxed{S_{\text{total}} \rightarrow A, \quad h \rightarrow \infty}$$