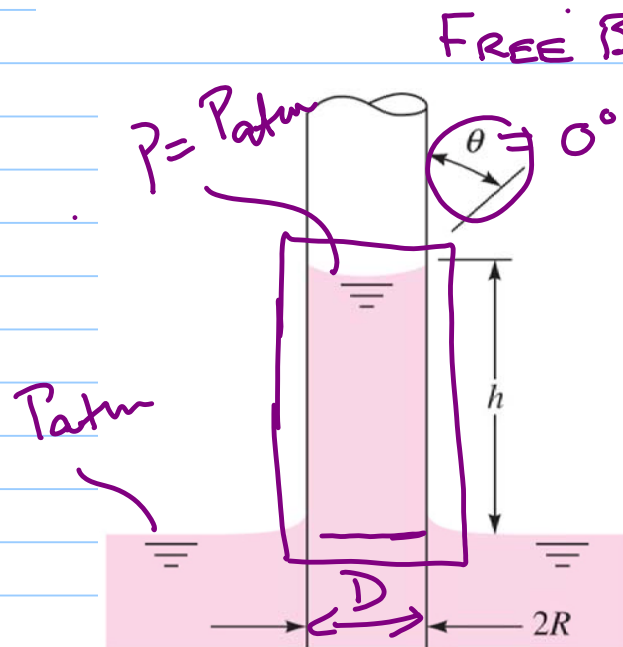
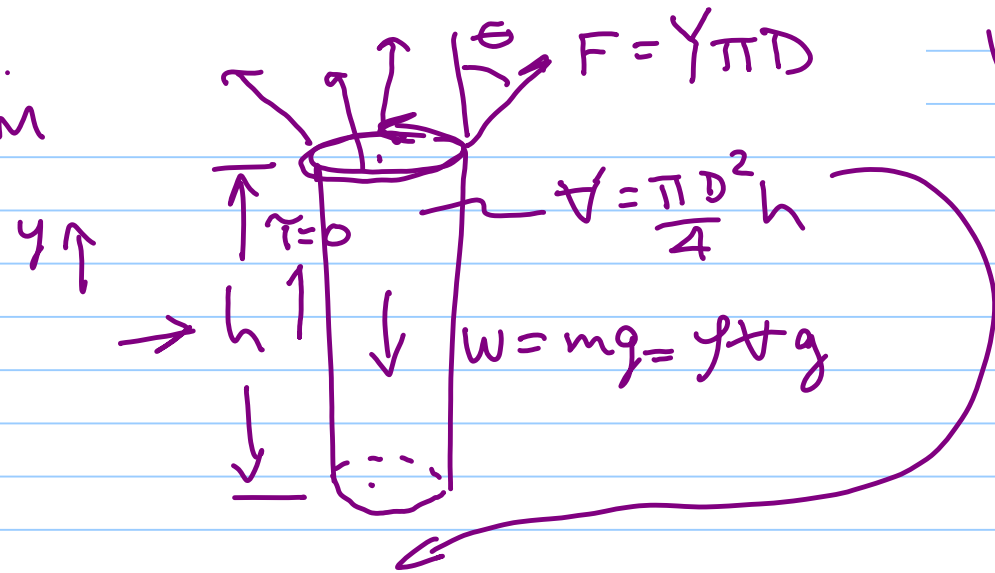


Example: Water at 40° C is observed to wet clean glass, such that the contact angle is about $\theta \approx 0^\circ$. How high will the water be drawn up a glass tube with diameter $D=0.5$ mm by capillary action?



FREE BODY DIAGRAM



$$\sum F_y = 0$$

$$\gamma \pi D \cos \theta = W = \rho V g$$

$$\gamma \pi D \cos \theta = \rho \frac{\pi D^2}{4} h g$$

$$h = \frac{4Y \cos \theta}{\rho D g}$$

TABLE A.5 AT 40°C
" A.1 " 40°C

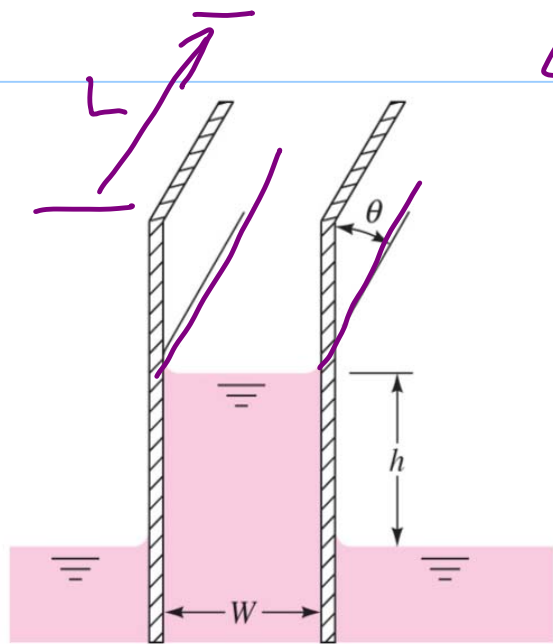
$$Y = 0.0696 \text{ N/m}$$

$$\rho = 992 \text{ kg/m}^3$$

$$\frac{\text{kg} \cdot \text{m}}{\text{s}^2}$$

$$h = \frac{4(0.0696 \text{ N/m}) \cos(0^\circ)}{992 \text{ kg/m}^3 (0.0005 \text{ m}) 9.81 \text{ m/s}^2} = 0.0572 \text{ m} = \underline{5.72 \text{ cm}}$$

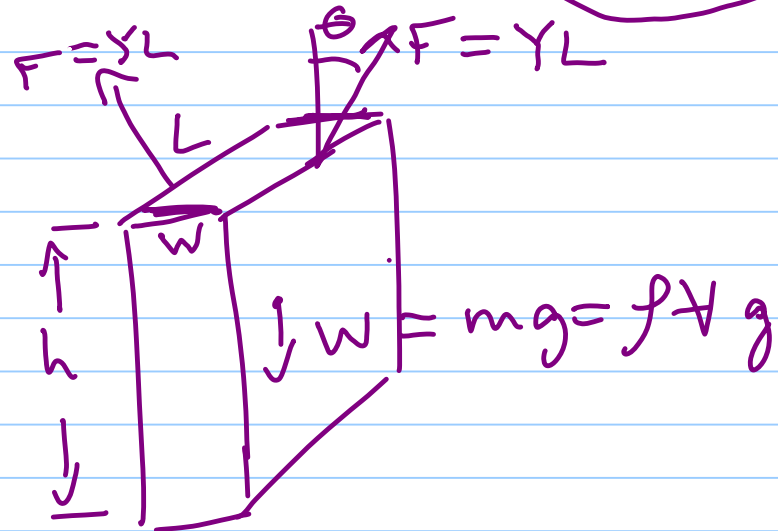
ANS.



LONG PARALLEL PLATES

$$w \ll L$$

F.B.D



$$\Sigma F_y = 0 \quad 2Y \cos \theta = \rho h w g$$

2 plates

$$h = \frac{2Y \cos \theta}{\rho w g}$$

Plates