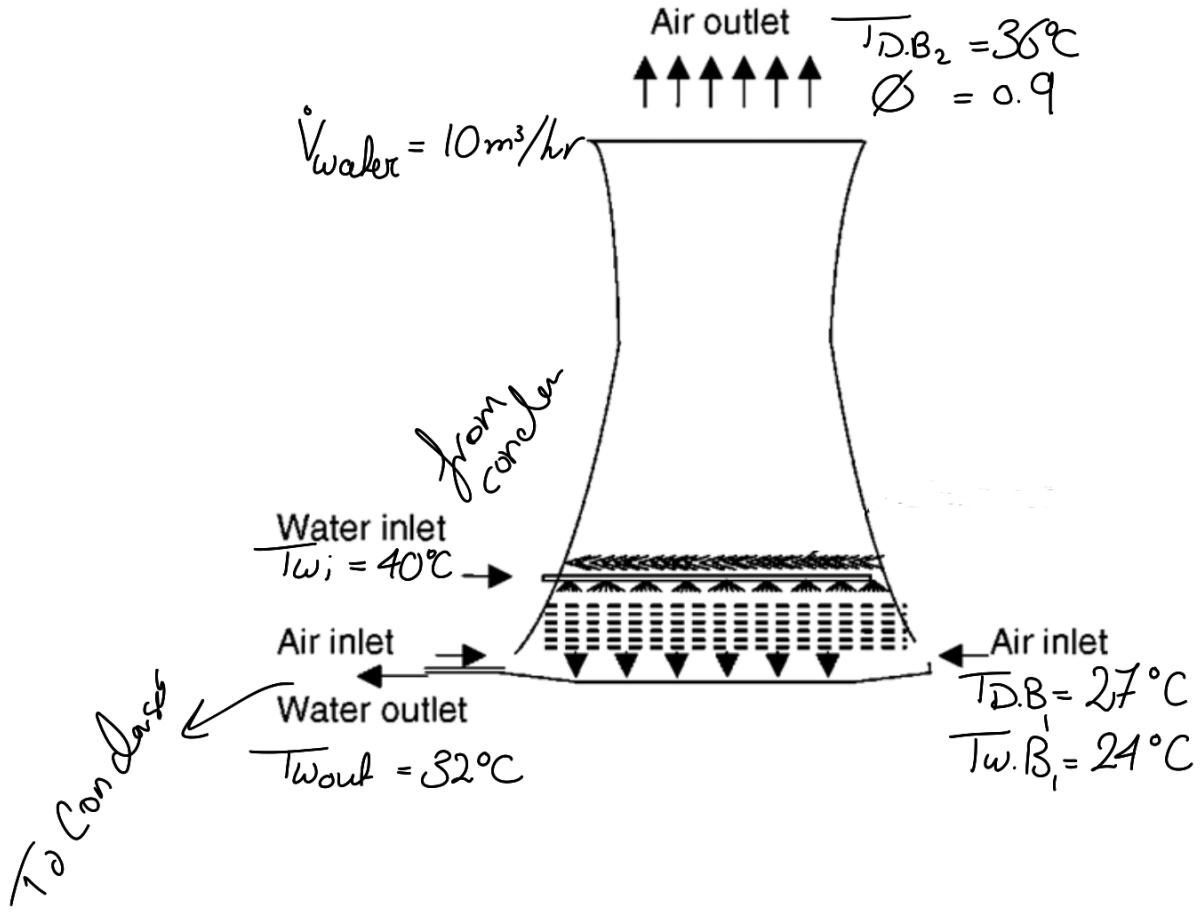
Home Work



$$\text{Range} = R = (T_{c.w})_{inlet} - (T_{c.w})_{outlet}$$

$$= 40 - 32 = 8°C$$

$$\text{Approach} = A = (T_{c.w})_{outlet} - (T_{w.B})_{Ambient}$$

$$= 32 - 24 = 8°C$$

$$\dot{m}_w = \dot{V}_w \times \rho_w = 10 \times 1000 = 10000 \text{ kg/hr}$$

Cooling Capacity $= Q_H = \dot{m}_w \times C_{p_{water}} \times \Delta T$

$= \frac{10000}{3600} \times 4.18 \times (40-32)$

$= 92.9$ kw

Effectiveness $= \varepsilon = \frac{\text{Range}}{\text{Rang + Approach}} = \frac{8}{16} = 0.5 = 50\%$

Air flow rate:

$\dot{m}_a \Delta h = \dot{m}_w C_{pw} \Delta T =$ Cooling capacity

From Psychometric chart:

h_1 at $T_{D.B} = 27°C$, $T_{w.B} = 24°C = 72$ KJ/Kg

h_2 at $T_{D.B} = 36°C$, $\emptyset = 0.9$ (Obtained from Software) $= 125.2$ KJ/Kg

$\dot{m}_a = \frac{92.9}{125.2-72} = 1.716$ Kg/s

Make up water:

$\dot{m}_3 = \dot{m}_a \Delta W$

$= 1.75 (W_2 - W_1)$

$= 1.75 (0.0087 - 0.0027)$

$= 0.063$ kg/s