35.26 Condenser water returns to a cooling tower at $95°F$ and leaves at $85°F$. The outside conditions are $84°F$ and 60% relative humidity. What is the cooling tower effectiveness?

A. 9%

B. 46%

C. 54%

D. 91%

To find the Cooling Tower effectiveness, start by using the Psychrometric Chart to determine the wet bulb temperature of the outdoor conditions.

$$T_{db} = 84°F$$

$$\phi = 60\%$$

$$T_{wb} = 73.1°F$$

Cooling tower effectiveness is defined by the equation below where range and approach are defined in terms of the entering and leaving water temperatures and the wet bulb temperature as shown.

$$\varepsilon = \frac{range}{range + approach}$$

$$range = EWT - LWT$$

$$approach = LWT - T_{wb}$$

$$\varepsilon = \frac{EWT - LWT}{(EWT - LWT) + (LWT - T_{wb})} = \frac{EWT - LWT}{EWT - T_{wb}} = \frac{95°F - 85°F}{95°F - 73.1°F} = 45.7\%$$

Answer B