35.13 $90°F$, **20% relative humidity air is cooled using a 75% effective evaporative cooler. What is the temperature of the air after being cooled?**

A. $55°F$

B. $63°F$

C. $70°F$

D. $76°F$

The effectiveness of an evaporative cooler is given by the formula below where t_1 represents the entering air dry bulb temperature, t_2 represents the leaving air dry bulb temperature, and t'_s is the wet bulb temperature of the entering air. The wet bulb temperature is the minimum temperature which could theoretically be achieved in a 100% efficient evaporative cooler.

$$\varepsilon_e = \frac{t_1 - t_2}{t_1 - t'_s}$$

Use the Psychrometric Chart to find the wet bulb temperature of the entering air.

$$t_1 = 90°F$$

$$\phi = 20\%$$

$$t'_s = 62.8°F$$

Substitute into the effectiveness formula and solve for t_2.

$$0.75 = \frac{90°F - t_2}{90°F - 62.8°F}$$

$$t_2 = 69.6°F$$

Answer C