37.31 What quantity of heat is released per unit mass when copper is cooled from 250°F to 75°F?

A. $16 \frac{Btu}{lb}$

B. $18 \frac{Btu}{lb}$

C. $57 \frac{Btu}{lb}$

D. $157 \frac{Btu}{lb}$

For heat transfer by conduction, use the equation:

$$\dot{Q} = mc_p \Delta T$$

Divide by mass to specify heat transfer per unit mass:

$$\frac{\dot{Q}}{m} = \dot{q} = c_p \Delta T$$

Look up the specific heat capacity of Copper by searching the reference handbook for Properties of Metals.

Substitute and solve:

$$\dot{q} = \left(.09 \frac{Btu}{lb^\circ F} \right) (250^\circ F - 75^\circ F) = 15.75 \frac{Btu}{lb}$$

Answer A