

W89F

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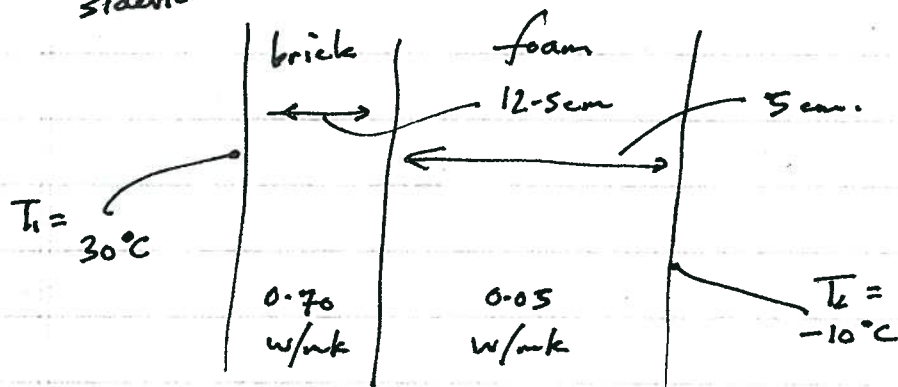
(a) box : 6 sides

$$\text{base} = 2 \times 3 \text{ m}^2$$

$$\text{sides} = 2[2 \times 1.5] \text{ m}^2 + 2[3 \times 1.5] \text{ m}^2$$

$$\text{top} = 2 \times 3 \text{ m}^2$$

side view:



$$Q = \frac{-A(T_2 - T_1)}{\frac{\Delta x_1}{k m_1} + \frac{\Delta x_2}{k m_2}} \quad \text{— ignore corners and edges}$$

$$= \frac{-[1(6) + 2(3) + 2(4.5)][-10 - 30]}{\frac{0.125}{0.7} + \frac{0.05}{0.05}}$$

$$= 712.7 \text{ J/s} = 0.713 \text{ kW}$$

question asks for sides and top only.

(b) get T° at brick/foam interface. $\Rightarrow T_{bf}$

heat flow rate is same for each
layer and composite
of two layers

so

for brick alone:

$$Q = \frac{-k_m A (T_{bf} - T_i)}{\Delta x_i}$$

or

$$712.7 = \frac{-(0.70) (6 + 2(3) + 2(4.5)) (-T_{bf} - 30)}{(0.125)}$$

$$-6.06 = T_{bf} - 30$$

$$\begin{aligned} \text{so } T_{bf} &= 30 - 6.06 \\ &= 23.94^\circ \text{C} \end{aligned}$$