The steady-state, one-dimensional temperature distribution in a composite wall, made of slabs of three different solid materials, is shown below. Each material has a constant, but different, thermal conductivity $k$. The heat fluxes $q''$ within each material are indicated in the diagram.

(a) What is the relative magnitude of $q_B''$ and $q_C''$?

(b) How does $q_A''$ vary with distance?

(c) What is the relative magnitude of $q_A''$ and $q_B''$ at position 2?

(d) What is the relative magnitude of $k_B$ and $k_C$?

(e) What is the relative magnitude of $k_A$ and $k_B$?

(f) Sketch a plot of $q''$ versus $x$ labeling the positions 1, 2, 3, and 4 and showing $q_A''$, $q_B''$ and $q_C''$.

(g) What is likely to be to the left of position $x$? What else might be there?

(h) The region to the right of slab C is a fluid with heat transfer coefficient $h$ and temperature far from position 4 of $T_m$. Write an expression relating surface temperature $T_A$, $T_m$, $k_C$, and $\frac{dT}{dx}$ in slab C.