A cube with faces parallel to the x-, y- and z-axes has edge length 2 m. There is an electric field parallel to the z-axis. On the top face of the cube the field is $E = 40 \, \hat{k} \, N/C$ and on the bottom face the field is $E = 30 \, \hat{k} \, N/C$. What is the net charge inside the cube? (you can give your answer in terms of $\varepsilon_0$)

\[
\int E \cdot dA = \frac{q_e}{\varepsilon_0}
\]

\[
\int_E \omega_0 \, dA + \int_E \omega_180^\circ \, dA = \frac{q_e}{\varepsilon_0}
\]

\begin{align*}
A_{\text{Top}} &= A_{\text{Bottom}} = 4 \\
40 \, A_{\text{Top}} - 30 \, A_{\text{Bottom}} &= \frac{q_e}{\varepsilon_0} \\
q_e &= 40 \, \varepsilon_0 \, C
\end{align*}